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ORIGINAL PAPER

Demographic and social determinants of stalled fertility among women in Ghana: evidence from Ghana demographic and health surveys 1998–2014

Desmond Klu[1] · **Patrick Agyekum**[2]

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Abstract

Ghana was one of the first countries to be identified as experiencing a stall in fertility transition. The purpose of this study is to examine contextual demographic, social and proximate determinants of stalling fertility among women in Ghana. The study used data from the four rounds of the Ghana Demographic and Health Survey (1998–2014). The study found a stalled fertility level at 4 children per woman from 1998 to 2014. Women between the ages of 30–39 and 40–49 years, with primary education, dwelling in poor and middle-income households and women using contraception had a higher probability of experiencing stalls in their fertility levels. However, women with 1–4 children, with no formal education**,** currently and never married women, belonging to Christian, Islamic and traditional faith as well as sexually active and inactive women had a lower probability of experiencing stalling fertility. The determinants of stall in fertility transition can be attributed to demographic, social and proximate factors. These factors should be considered in achieving a continuous decline in fertility levels among women.

Keywords Stalled fertility · Demographic · Social · Proximate · Women · Ghana

Abbreviations

AOR	Adjusted odds ratio
CI	Confidence interval
GDP	Gross domestic product
GDHS	Ghana demographic and health survey
GSS	Ghana statistical service

✉ Desmond Klu
klud@uhas.edu.gh

[1] Institute of Health Research (IHR), University of Health and Allied Sciences (UHAS), PMB 31, Ho, Ghana

[2] Economics Department, Ghana Statistical Service, Accra, Ghana

PRB Population reference bureau
TFR Total fertility rate

Introduction

Slow population growth has been identified as a necessary and insufficient factor in enhancing foreseeable threats to global peace, security and prosperity. One of the factors contributing to the slow growth of the world's population is the decline in fertility across the globe. According to the United Nations Population Division, 183 out of 195 developing countries have fertility below the replacement fertility level (United Nations Population Division 2021). The conditions in the African subregion are somewhat different, and the fertility transition in Sub-Saharan Africa has been either very dithering or stalling (Schoumaker and Sánchez-Páez 2020; Schoumaker 2019; Bongaarts 2017, 2008; Shapiro and Gebreselassie 2008; Williams et al. 2013). Aside from countries located in Southern Africa with a total fertility of less than four children, other countries located in Eastern, Central and West Africa have documented high total fertility rates between four and seven children per woman. For instance, South Africa had a total fertility rate of 2.1 as of 2010, while a West African country such as Niger had a total fertility rate of 7.1 children per woman. Researchers, demographers and population scientists have ascribed some fundamental explanations for the increase in fertility across the African region. These are decreasing levels of infertility (Larsen and Raggers 2001) and eroding traditional birth-spacing practices not compensated by increasing contraceptive use (Caldwell et al. 1992; Lesthaeghe and Jolly 1995).

Ghana and Kenya were the maiden countries to be recognized as undergoing a stall in the transition of their fertility (Bongaarts 2006; Westoff and Cross 2006; Agyei-Mensah 2006). Therefore, Ghana provides a fascinating context in which to examine not only stalls in fertility decline but also the demographic and social determinants of such stalls because compared to other countries in West Africa, the fertility transition has been rapid and more substantial. This has apparently made Ghana the forerunner in the West African subregion and of significant interest for policy makers and researchers. Ghana's total fertility rate from 1998 to 2014 was approximately four births per woman (1998-TFR 4.6; 2003-TFR 4.4; 2008-TFR 4.0; 2014-TFR 4.2), and the occurrence of this phenomenon in Ghana's fertility transition calls for scientific research into the underlying determinants of this stalling in fertility over the decade.

Theoretical framework of fertility transition

The study of fertility dynamics has witnessed profound growth in its theoretical formulations over the last three decades. The theoretical explanations of fertility behavior incorporate lessons and insights for a clearer understanding of the causes and consequences of the fertility process in the African subregion. This theoretical formulation will help in understanding the impact of fertility on the

social, economic and physical environments within the subregion and the factors affecting fertility dynamics in Africa, particularly Ghana. For this study, two theoretical perspectives were discussed. The first is the demographic transition theory, and the second is the economic theory of fertility transition.

Demographic transition theory (Notestein 1953) stipulates that in traditional agrarian society, high fertility occurs as a response to high mortality levels to guarantee human existence and survival. However, as society goes through modernisation and socioeconomic transformation, such as increasing formal education, medical advancement, urbanization and industrialization leads to a decline in the death rate and a variation in the value of children. The rise in the survival of children coupled with the increasing cost and decreasing economic value of children is regarded as the basic driving force of the fertility transition. As couples desire a small number of children, they turn to increasing the use of birth control measures such as contraceptives and other family planning methods to lower fertility levels.

The second is the economic theory of fertility transition (Lee 1997; Weil and Galor 2000), which argues that a country may face a relatively high fertility level in the face of declining child mortality and increasing income level and female education. This implies that fertility remains high despite increased socioeconomic advancement. The theory further argues that fertility stalls may be conditional (increase in mothers' education and income together with high fertility) and unconditional (lack of improvement in female education together with high fertility), and there needs to be a clear differentiation between conditional fertility stalls and unconditional fertility stalls (Goujon et al. 2015; Kebede et al. 2019).

The two distinct propositions of these theories of fertility set a tone for this study to examine the factors that predict the conditions of fertility stalls in the context of Ghana.

Although fertility has been declining from 6.4 children per woman in 1988 to 4.2 children per woman in 2014, fertility levels are still high relative to the world's standard of 2.3 (Population Reference Bureau 2021). In all the past Ghana Demographic and Health Surveys (1998–2014), new concerns have arisen that the ongoing fertility decline in Ghana has been stalling from 1998 to 2014, where the average number of children a woman gives birth to have been four over the decade. Researchers and scholars have attempted to provide explanations for fertility stalling across the world. Some of these reasons are changes in demographic factors, such as the tempo of fertility (stop in the increase of mean age at birth), shorter birth intervals (as a result of changes in mortality and improvement in health outcomes) (Aghajanian 1991; Bongaarts 2006; Camlin et al. 2004). Other reasons are low use of contraceptives, less abortion, early marriages (decreasing age of marriage), more premarital births, low infertility rates, less separation or divorce between spouses and more sexual intercourse (Fasang and Raab 2014; Dahlberg 2013; Eltigani 2003; Murphy and Knudsen 2002). Furthermore, a change in socioeconomic lives is another contributing factor to stalling fertility across the world. These socioeconomic changes include but are not limited to an increase in urbanisation, a decline in per capita income, a low education level, a rise in poverty and a decrease in participation in the labor force (Lucero 2001; Falconi-Benitez 2001; William et al. 2013).

However, despite these explanations on why fertility is stalling in Africa, there are contextual problems when narrowed down to specific countries such as Ghana. To the best of my knowledge, no study has focused on the contextual determinants (demographic and social) of stalling fertility using a nationally represented survey and how these factors impact stalling fertility. Inadequate knowledge of these contextual factors and their relationship with stalled fertility is likely to lead to uncontrolled childbirth, which has adverse effects on the health of women, especially those of their reproductive ages. These negative health outcomes as a result of a high rate of child birth may lead to high mortality and morbidity rates among women.

Furthermore, a number of determinants are associated with fertility transitions, and according to Bongaarts (1978), changes in levels of fertility are usually attributed to variations in some proximate fertility variables, including marriage, postpartum infecundability, abortion and contraception. What is quite unknown is that, with Ghana experiencing stalled fertility, what is the contribution of social and demographic factors to this phenomenon. It is therefore necessary to investigate the contribution of these factors to stall in Ghana's fertility over the years. The study, therefore, seeks to examine the role that social and demographic factors play in bringing about stalls in Ghana's fertility.

Methods

Study design and population

The study used four rounds of the Ghana Demographic and Health Survey conducted in 1998, 2003, 2008 and 2014. The Ghana Demographic and Health Survey is a nationally representative cross-sectional survey that collects information on issues such as housing characteristics and household population, marriage and sexuality, fertility and fertility preferences, family planning, infant and child mortality, maternal health, and child and early development. It further includes issues on nutrition of children and women, malaria, HIV and AIDS related knowledge, attitudes, and behavior, HIV prevalence, adult health and lifestyle, women empowerment and demographic and health outcomes. This study focuses on women within their reproductive ages 15–49 who had given birth. The study used information on the demographic and social characteristics of the women.

Sample size

In all four rounds of the GDHS conducted in 1998, 2003, 2008 and 2014, women who had ever given birth were in their reproductive ages 15–49 years. The women's data file utilized in this study was weighted to obtain the following sample sizes of the four rounds of the survey. Thus, there were 9396 women in 2014, 4916 women in 2008, 5691 women in 2003 and 4843 women in 1998 (GSS and Macro 1999, 2004, 2009, 2015). We filtered out women in their reproductive ages (15–49 years) who have ever had a live birth, thus women who experience

pregnancy termination (abortion, still birth and miscarriages). The sample weight (v005/1,000,000) was applied in weighting all the data to correct possible over- and undersampling issues. Weighting data also helped in mitigating the effects of non-response bias with respect to the target population of interest.

Variable definitions and measurements

Outcome variable

The outcome variable is stalled fertility, which is defined as an interruption period in an on-going fertility transition before a country reaches the end of the transition (Gendell 1989; Bongaarts 2006; Moltrie et al. 2008). 'Stall' is a dummy variable created by comparing fertility levels in the four Ghana Demographic and Health Survey (1998, 2003, 2008 and 2014). If the change during the fourth round is equal to or greater than zero (meaning that TFR in the most recent survey is equal to or higher than TFR in the previous survey) while change in the previous three rounds is negative (meaning that TFR has been declining in the previous surveys), 'stall' = 1. 'Stall' equals 0 in all other cases. This measurement and operational definition of stall is consistent with that used by previous studies that defined stall as an interruption period in an on-going fertility transition before a country reaches the end of the transition (Bongaarts 2006; Moltrie et al. 2008).

Intermediate variables

The two intermediate variables (proximate determinants) used in this study are sexual activity and contraception. Sexual activity is operationally defined as how sexually active and inactive the respondents have been in the last four weeks, and it is measured as never having sex = 1; sexually active = 2; sexually inactive = 3. Contraception in this study is defined as any form of contraception both modern and traditional methods of contraception/any of these two methods and measured as not using = 1; using = 2.

Predictor variables

Demographic determinants

The demographic characteristics are women's reproductive ages (15–29, 30–39, 40–49). Parity refers to the number of living children a woman has (1–2, 3–4, 5 or more) and place of residence (rural, urban).

Social determinants

The social determinants used in this study are the educational level of women (no education, primary, secondary or higher), partners' educational level (no education, primary, secondary or higher), marital status (never married, currently married, formerly married), religion (no religion, Christians, Muslim and Traditionalist) and wealth quintile (poor, middle, rich).

Data analysis

Statistical analysis software package (SPSS) version 25.0 was used for both the descriptive and inferential analyses. Bivariate using cross-tabulations to relate the demographic and social determinants (independent variables) to the intermediate variables (sexual activity and contraception) and stalled fertility (dependent variable) were analysed. Chi-square tests were also performed to determine whether the observed associations were statistically significant.

Multivariate analysis was performed using a binary logistic regression model whose likelihood function follows the binomial distribution. A binary logistic regression model is a way to perform regression for binary outcome variables (for this study, the outcome variables are not stalled [0] and stalled [1]). The purpose of the model is to estimate the probability that an observation with particular characteristics will fall into a specific category; moreover, classifying observations based on their predicted probabilities is a type of binary classification model.

Results

Demographic and social characteristics of respondents

More than half (over 50%) of the women who constituted the highest proportion were of reproductive age 15–29 years from 1998 to 2014 (see Table 1). The highest proportion of women of reproductive age had 1–2 children in all years. Most of the women resided in rural areas in all years, with the exception of 2014, where most of the respondents predominantly resided in urban areas. This increasing urban women population may be due to high natural growth rates and net in-migration to urban centers (Yankson and Bertrand 2012; Agyei-Mensah and Owoo 2015). The results show that over 50% of the women attained a secondary or higher level of education in all years. Most partners of women also attain secondary or higher education. It was again observed that the majority (over 50%) of the women were currently married, with most of them belonging to the rich wealth status and majority of them belonging to the Christian faith. Approximately 4 in 10 of the women were currently sexually inactive in all the years, and approximately 80% were not currently using any form of contraception.

Table 1 Demographic and social characteristics of women in their reproductive ages 1998–2014

Variables	Year			
	1998	2003	2008	2014
	N = 4843	N = 5691	n = 4916	n = 9396
	n (%)	n (%)	n (%)	n (%)
Demographic				
Age				
15–29	2676 (55.3)	3111 (54.7)	2735 (55.6)	4842 (51.5)
30–39	1278 (26.4)	1524 (26.8)	1283 (26.1)	2667 (28.4)
40–49	888 (18.3)	1056 (18.6)	899 (18.3)	1887 (20.1)
Parity				
1–2	2938 (60.7)	3474 (61.0)	3137 (63.8)	5837 (62.1)
3–4	1057 (21.8)	1227 (21.6)	1050 (21.4)	2119 (22.6)
5 +	848 (17.5)	990 (17.4)	729 (14.8)	1440 (15.3)
Place of residence				
Urban	1739 (35.9)	2755 (48.4)	2383 (48.5)	5051 (53.8)
Rural	3104 (64.1)	2936 (51.6)	2533 (51.5)	4345 (46.2)
Social characteristics				
Maternal education				
No education	1410 (29.1)	1608 (28.2)	1042 (21.2)	1792 (19.1)
Primary	874 (18.0)	1135 (20.0)	991 (20.2)	1672 (17.8)
Secondary +	2559 (52.8)	2948 (51.8)	2883 (58.6)	5933 (63.1)
Partners' education				
No education	994 (20.5)	1354 (23.8)	863 (17.6)	4331 (46.1)
Primary	1421 (29.4)	1906 (33.5)	1825 (37.2)	696 (7.4)
Secondary +	2428 (50.1)	2431 (42.7)	2227 (45.3)	4369 (46.5)
Marital status				
Never married	1147 (23.7)	1616 (28.4)	1593 (32.4)	3094 (32.9)
Currently married	3131 (64.7)	3549 (62.4)	2876 (58.5)	5321 (56.6)
Formerly married	565 (11.6)	526 (9.2)	446 (9.1)	981 (10.4)
Religion				
No religion	314(6.5)	252(4.4)	162(3.3)	253 (2.7)
Christians	3656 (75.5)	4401(77.3)	3810(77.5)	7531(80.1)
Moslem	532(11.0)	887(15.6)	738(15.0)	1423 (15.2)
Traditionalist	342(7.1)	152(2.7)	205(4.2)	188 (2.0)
Wealth quintile				
Poor	–	1919 (33.7)	1683 (34.2)	3148 (33.5)
Middle	–	1071 (18.8)	979 (19.9)	1938 (20.6)
Rich	–	2702 (47.5)	2254 (45.8)	4311 (45.9)
Proximate determinants				
Sexual activity				
Never had sex	–	886 (15.6)	794 (16.1)	1193 (12.7)
Sexually active	–	2369 (41.6)	1928 (39.2)	4033 (42.9)

Table 1 (continued)

Variables	Year			
	1998	2003	2008	2014
	N = 4843	N = 5691	n = 4916	n = 9396
	n (%)	n (%)	n (%)	n (%)
Sexually inactive	–	2436 (42.8)	2195 (44.6)	4169 (44.4)
Contraception				
Not using	3970 (82.0)	4514 (79.3)	3965 (80.7)	7253 (77.2)
Using	873 (18.0)	1177 (20.7)	951 (19.3)	2143 (22.8)

Source: Computed author using the 2003, 2008, 2014 GDHS

N = total number of sampled women in each year

n = sub total number of women on each background characteristic

% = percentage

+ = means tertiary educational level

– = no information on variable in the dataset

Trends of the total fertility rate from 1988–2014 in Ghana

Figure 1 shows the trend in the total fertility rate (TFR) in Ghana from 1988 to 2014 using data from the demographic and health surveys. It shows that TFR declined from 6.4 children to 5.5 children from 1988 to 1993, and there was a further decrease in TFR from 5.5 (1993) to 4.5 (1998). Ghana's TFR started stalling at 4 children from 1998 (4.5), 2003 (4.4), 2008 (4.0) to 2014 (4.2).

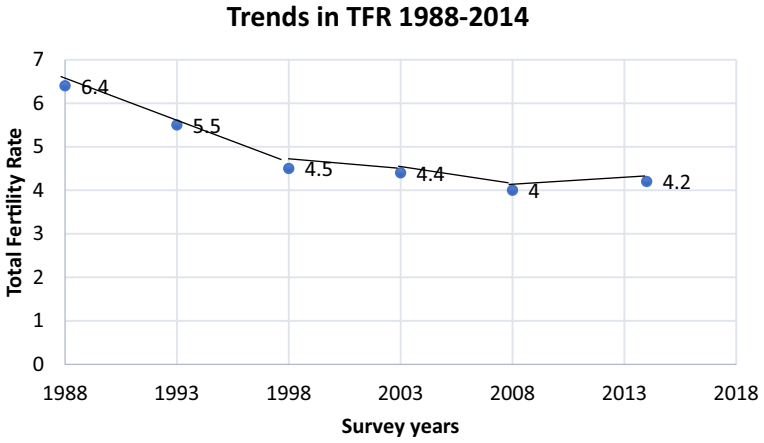

Fig. 1 Trends in Ghana's total fertility rate, 1988 to 2014

Association between demographic, social, and proximate factors and stalled fertility among women in Ghana

Table 2 shows the strength of association with chi-square analyses between the demographic, social and proximate and stalled fertility among women in Ghana. In all the four survey years, all the demographic factors such as age of women, parity, and place of residence had significant association with stalled fertility at $p < 0.001$. Social factors, including women's education ($p = 0.000$) partner's educational level ($p = 0.000$), religion ($p = 0.000$) religion ($p = 0.000$), marital status ($p = 0.000$) and wealth quintile ($p = 0.000$) were found to be significantly associated with stalled fertility at $p < 0.001$. Regarding proximate factors, sexual activity ($p = 0.000$) and contraceptive use ($p = 0.000$) were significantly associated with stalled fertility among women in Ghana at $p < 0.001$.

Binary logistics regression modeling of demographic, social and proximate factors influencing stalled fertility

Table 3 illustrates the combined effects of demographic, social, and proximate determinants (contraception and sexual activity) of stalled fertility among women in Ghana. Demographic factors such as maternal age**,** parity and place of residence and social factors such as maternal education and current marital status were significant in predicting stalled fertility among women in Ghana. In all the years (1988–2014), the results showed that women within the age range of 30–39 years (aOR = 2.35, CI 1.67–3.31; 1998), (aOR = 1.54, CI 1.26–1.89; 2003), (aOR = 1.43, CI 1.15–1.77; 2008), (aOR = 1.66, CI 1.45–1.92; 2014) were more likely to experience stalled fertility than women 15–29 years. A similar observation was made among women within 40–49 years of age who had a higher probability (aOR = 2.82, CI 1.55–5.13; 1998) (aOR = 6.68, C.I 5.24–8.51; 2003) (aOR = 5.49, CI 4.25–7.49; 2008) (aOR = 6.28, CI 5.26–7.49; 2014) of experiencing stalling fertility relative to their counterparts aged 15–29 years. Women who had fewer than five children had lower odds of experiencing stalls in their fertility decline compared to women with 5 or more children in 2003–2014. For instance, women with 1–2 children were less likely (aOR = 0.06, CI 0.04–0.08, 2003) (a0R = 0.05, CI 0.03–0.06, 2008) (aOR = 0.07, CI 0.06–0.09, 2014) to experience stalls in their fertility decline than women aged 15–29 years. Similar observations were made among women with 3–4 children (aOR = 0.31, CI 0.25–0.39, 2003), (aOR = 0.30, CI 0.23–0.39, 2008), (aOR = 0.35, CI 0.29–0.42, 2014) who were less likely to have a stall in their fertility decline relative to women aged 15–29 years**.** Rural−urban disparity was also significant in predicting stalls in fertility in 1998, where women who resided in urban areas (aOR = 0.74, CI 0.59–0.93) had lower odds of experiencing stalled fertility than their rural counterparts.

With reference to social determinants, in 1998, women with no formal education (aOR = 1.41, CI 1.01–1.97) were more likely to have their fertility stalled than women with secondary or higher education. However, a different observation was made in 2014, where women with no formal education (aOR = 0.77, CI 0.65–0.93) had a lower likelihood of experiencing stalled fertility relative to those

Table 2 Association between demographic, social and proximate factors and stalling fertility among women in Ghana

Factors	Stalling fertility											
	1998			2003			2008			2014		
	No stall	Stalled	p-values	No stall	Stalled	p-values	No stall	Stalled	p-values	No stall	Stalled	p-values
Demographic												
Age												
15–29	48.9	51.1	0.000***	91.6	8.4	0.000***	85.7	14.3	0.000***	83.1	16.9	0.000***
30–39	4.6	95.4		60.2	39.8		57.1	42.9		52.5	47.5	
40–49	1.8	98.2		24.1	75.9		21.1	78.9		19.6	80.4	
Parity												
1–2	47.1	52.9	0.000***	91.3	8.7	0.000***	85.9	14.1	0.000***	81.5	18.5	0.000***
3–4	0.0	100.0		51.8	48.2		43.0	57.0		38.1	61.9	
5 +	0.0	100.0		21.3	78.7		16.5	83.5		15.8	84.2	
Place of residence												
Urban	37.0	63.0	0.000***	74.2	25.8	0.000***	69.2	30.8	0.000***	64.6	35.4	0.000***
Rural	23.0	76.2		67.3	32.7		63.8	36.2		58.2	41.8	
Social characteristics												
Maternal education												
No education	13.8	86.2	0.000***	66.5	33.5	0.000***	56.3	43.7	0.000***	51.6	48.4	0.000***
Primary	23.8	76.2		66.9	33.1		63.6	36.4		52.9	47.1	
Secondary +	38.4	61.6		74.3	25.7		71.0	29.0		67.1	32.9	
Partners' education												
No Education	5.8	94.2	0.000***	64.6	35.4	0.000***	60.5	39.5	0.000***	76.3	23.7	0.000***
Primary	76.1	23.9		91.0	9.0		84.9	15.1		48.1	51.9	
Secondary +	10.0	90.0		58.0	42.0		53.5	46.5		49.2	50.8	
Marital status												
Never married	93.2	6.8	0.000***	97.7	2.3	0.000***	88.3	11.7	0.000***	85.9	14.1	0.000***
Currently married	8.5	91.5		61.1	38.9		57.6	42.4		51.5	48.5	
Formerly married	8.7	91.3		51.5	48.5		45.0	55.0		40.6	59.4	

Table 2 (continued)

Factors	Stalling fertility											
	1998			2003			2008			2014		
	No stall	Stalled	p-values	No stall	Stalled	p-values	No stall	Stalled	p-values	No stall	Stalled	p-values
Religion												
No religion	12.7	87.3	0.000***	61.4	38.6	0.000***	56.8	43.2	0.000***	50.8	49.2	0.000***
Christians	30.8	69.2		69.0	31.0		65.6	34.4		60.4	39.6	
Moslem	31.2	68.8		82.1	17.9		75.2	24.8		70.1	29.9	
Traditionalist	14.9	85.1		66.4	33.6		57.3	42.7		60.8	39.2	
*Wealth quintile												
Poor	–	–	–	68.5	31.5	0.000***	63.2	36.8	0.000***	57.6	42.4	0.000***
Middle	–	–		64.0	36.0		65.6	34.4		57.1	42.9	
Rich	–	–		74.8	25.2		69.2	30.8		66.7	33.3	
Proximate determinants												
*Sexual activity												
Never had sex	–	–	–	97.6	2.4	0.000***	86.1	13.9	0.000***	87.1	12.9	0.000***
Sexually active	–	–		64.4	35.6		62.1	37.9		57.2	42.8	
Sexually inactive	–	–		66.9	33.1		63.1	36.9		58.6	41.4	
Contraception												
Not using	30.6	69.4	0.000***	72.6	27.4	0.000***	68.1	31.9	0.000***	63.3	36.7	0.000***
Using	19.5	80.5		62.8	37.2		59.2	40.8		56.2	43.8	

Source: computed from 1998, 2003, 2008 & 2014 Ghana Demographic and Health Surveys (GDHS)

*p < 0.05, **p < 0.01, ***p < 0.001

*Information not collected/available in the 1998 GDHS

+ = means tertiary educational level

Table 3 Results of binary logistic regression showing the relationship between demographic, social and proximate factors and stalled fertility among women in Ghana, 1998, 2003, 2008 & 2014

Variables	1998	2003	2008	2014
Demographic	aOR [95%CI]	aOR [95%CI]	aOR [95%CI]	aOR [95%CI]
Maternal age				
15–29 (RC)	1.00	1.00	1.00	1.00
30–39	2.35 [1.67–3.31]***	1.54 [1.26–1.89]***	1.43 [1.15–1.77]***	1.66 [1.45–1.92]***
40–49	2.82 [1.55–5.13]***	6.68 [5.24–8.51]***	5.49 [4.25–7.09]***	6.28 [5.26–7.49]***
Parity				
1–2	0.66 [0.35–1.24]	0.06 [0.04–0.08]***	0.05 [0.03–0.06]***	0.07 [0.06–0.09]***
3–4	0.73 [0.44–1.22]	0.31 [0.25–0.39]***	0.30 [0.23–0.39]***	0.35 [0.29–0.42]***
5 + (RC)	1.00	1.00	1.00	1.00
Place of residence				
Urban	0.74 [0.59–0.93]*	1.05 [0.85–1.31]	1.15 [0.93–1.41]	1.00 [0.87–1.16]
Rural (RC)	1.00	1.00	1.00	1.00
Social				
Maternal education				
No education	1.41 [1.01–1.97]*	0.97 [0.77–1.22]	0.82 [0.63–1.06]	0.77 [0.65–0.93]**
Primary	1.68 [1.23–2.31]**	1.35 [1.10–1.65]**	1.01 [0.82–1.24]	1.30 [1.06–1.43]**
Secondary + (RC)	1.00	1.00	1.00	1.00
Partner's education				
No education	1.12 [0.78–1.16]	0.63 [0.51–0.78]***	0.43 [0.34–0.56]***	0.54 [0.44–0.66]***
Primary	1.73 [0.93–3.21]	0.85 [0.61–1.17]	0.49 [0.33–0.72]***	0.75 [0.61–0.92]**
Secondary + (RC)	1.00	1.00	1.00	1.00
Current marital status				
Never married	0.01 [0.00–0.02]***	0.25 [0.15–0.42]***	0.84 [0.50–1.40]	0.93 [0.70–1.23]
Currently Married	0.85 [0.60–1.20]	0.84 [0.61–1.17]	0.65 [0.50–0.86]**	0.72 [0.60–0.87]***
Formerly Married (RC)	1.00	1.00	1.00	1.00
Religion				
No religion (RC)	1.00	1.00	1.00	1.00
Christian	0.29 [0.16–0.52]***	1.02 [0.71–1.46]	0.92 [0.60–1.41]	1.10 [0.79–1.53]
Moslem	0.21 [0.11–0.40]***	0.38 [0.25–0.56]***	0.52 [0.33–0.83]**	0.58 [0.41–0.83]**
Traditionalist	0.30 [0.14–0.63]***	0.46 [0.27–0.79]**	0.89 [0.51–1.54]	0.41 [0.25–0.67]***
Wealth quintile				
Poor	–	0.72 [0.56–0.94]*	0.99 [0.77–1.28]	1.20 [1.00–1.43]*
Middle	–	1.06 [0.84–1.33]	0.97 [0.78–1.22]	1.32 [1.13–1.54]***
Rich (RC)	–	1.00	1.00	1.00

Table 3 (continued)

Variables	1998	2003	2008	2014
Demographic	aOR [95%CI]	aOR [95%CI]	aOR [95%CI]	aOR [95%CI]
Proximate				
Sexual activity				
Never had sex (RC)	–	1.00	1.00	1.00
Sexually active	–	0.35 [0.22–0.54]***	0.53 [0.38–0.74]***	0.78 [0.62–0.99]*
Sexually inactive	–	0.52 [0.34–0.80]**	0.70 [0.52–0.96]*	0.98 [0.79–1.22]
Contraception				
Not using (RC)	1.00	1.00	1.00	1.00
Using	1.41 [1.03,1.92]*	1.16 [0.96–1.41]	1.17 [0.95–1.44]	1.23 [1.08–1.40]**

Source: computed using the 1998, 2003, 2008 & 2014 GDHS

***p value < 0.001; **p value < 0.01; *p value < 0.05

RC reference category, *CI* confidence interval

with secondary or higher education. Again, women who attained primary education had higher odds (aOR = 1.68, CI 1.23–2.31, 1998) (aOR = 1.35, CI 1.10–1.65, 2003) (aOR = 1.30, CI 1.06–1.43, 2014) of experiencing stalls in their fertility compared to women with secondary or higher levels of education. With regard to the educational level of women partners, the results show that partners with no formal education were less likely (aOR = 0.63, CI 0.51–0.78, 2003) (aOR = 0.43, CI 0.34–0.56, 2008) (aOR = 0.54, CI 0.44–0.66) to have their women experience fertility stalling compared to men with secondary or higher education. A similar outcome was shown, where male partners with primary education (aOR = 0.49, CI 0.33–0.72, 2008) (aOR = 0.75, CI 0.61–0.92) were less likely to have their wives experience stalls in fertility decline compared to men with secondary or higher education.

The results indicated that women who were never married (aOR = 0.01, CI 0.00–0.02, 1998) (aOR = 0.25, CI 0.15–0.42, 2003) were less likely to experience stalls in their fertility decline. Similarly, women currently married had a lower probability (aOR = 0.65, CI 0.50–0.86, 2008) (aOR = 0.72, CI 0.60–0.87, 2014) of experiencing stalling fertility compared to formerly married women.

Concerning religiosity and stalling fertility, the results indicate that women who belong to the Christian faith (aOR = 0.29, CI 0.16–0.52, 1998) or Islamic faith (aOR = 0.21, CI 0.11–0.40, 1998) (aOR = 0.38, CI 0.25–0.56, 2003) (aOR = 0.52, CI 0.33–0.83,2008) (aOR = 0.58, CI 0.41–0.83, 2014) had lower odds of experiencing stalls in their fertility compared to women who do not belong to any religion. Again, women who belong to the traditional religion had a lower probability (aOR = 0.30, CI 0.14–0.63, 1998) (aOR = 0.46, CI 0.27–0.79, 2003) (aOR = 0.41, CI 0.25–0.67, 2014) of stalling fertility decline than women with no religious affiliation.

The household wealth quintile also significantly predicted stalls in fertility decline among women. Women who belonged to poor households in 1998 had lower odds (aOR = 0.72, CI 0.56–0.94) of experiencing fertility stalling than those from rich households. However, a different observation was made in 2014, where women from poor households had a higher probability (aOR = 1.20; CI 1.00–1.43) of their

fertility decline experiencing stalling compared to their counterparts from rich households. Again, in 2014, women from the middle wealth quintile had a higher likelihood (aOR = 1.32, CI 1.3–1.54) of experiencing fertility stalling compared to women from rich households.

Sexually active women in the last four weeks (aOR = 0.35, CI 0.22–0.54, 2003), (aOR = 0.53, CI 0.38–0.74, 2008), (aOR = 0.78, CI 0.62–0.99, 2014) were less likely to experience stalling in their fertility decline than women who never had sexual intercourse. Again, sexually inactive women in the last four weeks had a lower likelihood (aOR = 0.52, CI 0.34–0.80, 2003) (aOR = 0.70, CI 0.52–0.96, 2008) of experiencing fertility stalling. The results further show a higher probability of stalling in fertility decline among women using contraception (aOR = 1.41, CI 1.03–1.92, 1998), (aOR = 1.23, CI 1.08–1.40, 2014) relative to their counterparts who are not using contraceptives.

Discussion

This study examined demographic, social and proximate factors that predicted stalled fertility in Ghana from 1998 to 2014 using data from demographic and health surveys. The study identified the age of women**,** parity and place of residence as demographic factors that significantly predicted stalling fertility. It also identified the educational level of women and their male partners, marital status**,** religion and wealth quintile as significant social predictors of stalled fertility in Ghana. Sexual activity and contraception were also found in this study as proximate determinants of stalled fertility in Ghana.

Higher odds of experiencing stalled fertility were found among relatively older women aged 30–49 years. The possible reason for this outcome was the fact that women within 30 years and above might have their desired number of children and therefore will have no intention of having another child, hence stalling in their fertility (Schoumaker, 2009; Garenne 2008). Women in the later reproductive ages may have also experienced a decline in their fecundity due to changes in their biological and physiological conditions. Schoumaker (2009) suggests that a fertility transition has begun when either the total fertility rate or the average number of children ever born among women aged 40–49 has stalled by at least 10 percent. Other studies have also argued that the differences in parity progression across age groups of women also contribute to stalling fertility rates (Caldwell et al. 1992; Mutuku 2015). In his study, Mutuku (2015) found that the proportion of birth orders 2 to 5 increased for younger women (15–34 years) but increased by 5 percentage points for older women (35 years and above).

The study further showed that women with 1–4 children had a lower probability of experiencing stalling fertility relative to those with 5 or more children. This means that if couples do not attend their ideal number of children, their fertility desires remain unstable (Casterline and Agyei-Mensah 2017; Bongaarts and Casterline 2013).

The study showed that women who reside in urban centers had lower odds of experiencing stalling fertility than their rural counterparts. This implies that the

urban−rural differential in fertility stalling further provides insight into the nature of the stall in fertility decline (Shapiro and Tambashe 2002; Uchudi 2001; Shapiro and Gebreselassie 2008; Ezeh et al. 2009; Mutuku 2015; Askew et al. 2017). In the early stages of the transition, urban fertility declined substantially from 5.1 in 1988 to 4.0 in 1993. Rural fertility, however, did not experience any significant decline in the same period (total fertility rate of 6.6 in 1988 and 6.4 in 1993). Urban fertility further declined to 3.0 in 1998, with rural fertility experiencing a substantial decline from 6.4 in 1993 to 5.4 in 1998 (Agyei-Mensah 2002). The emergence of urbanisation in sub-Saharan Africa has given rise to changing lifestyles, increasing economic conditions, high cost of child care, eroding cultural beliefs that encourage high fertility, easy access to sexual and reproductive health services to limit and space birth and other socio-economic challenges associated with urban life, which have implications for the fertility desires of couples living in urban areas.

Women with no formal education had a lower probability of experiencing stalls in their fertility level compared to those who had attained some level of education. The findings of this study are consistent with the findings of other studies (Kebede et al. 2019; Askew et al. 2017; Chicoine 2012; Pradhan and Canning 2016; Günther and Harttgen 2016; Lavy and Zablotsky 2015; Shapiro and Gebreselassie 2008; William et al. 2013; Westoff and Cross 2006; Agyei-Mensah 2006). For instance, a study by Agyei-Mensah (2006) found increasing educational attainment among women as an explanation for the decline in stalled fertility in Ghana. Westoff and Cross (2006) found that stalling fertility was more pronounced among uneducated women and those with basic education. Higher education among women is considered a catalyst for female empowerment and labor force participation, which gives women the autonomy to influence the number of children they want to have and increases their bargaining power with regard to fertility preferences. Female education is also considered a means through which contraceptive use and birth control measures can be increased among women. A study paper by Goujon et al. (2015) found that in most countries in SSA, stall in fertility occurs as progression in female education stalls, especially for women who attained a primary education level. Male partners with no or primary level of education will have their women less likely to experience stalling in their fertility decline. This reveals the important role formal education plays in the fertility desires of couples (Kravdal 2002; Berrington 2004).

Lower odds of experiencing stalled fertility were found among currently married women compared to those formerly married. The outcome of this finding is not surprising because marriage has been noted as a factor explaining stalling fertility (Garenne 2008). Studies have argued that increases in the phenomenon of delayed marriages is an important influencer of stall fertility decline in SSA (Garenne 2008; Shapiro and Gebreselassie 2008; Bongaarts and Casterline 2013; Strulik 2019). Age at first marriage has been delaying due to increased female education, advances in technology, increased female labor force participation, and a decline in child marriage. A variation in the age at first marriage influences the probability that women of reproductive age are in a formal union, which could decrease their exposure to the risk of childbearing (Howse 2015).

Fertility transition and behavior among women in sub-Saharan Africa are deeply rooted in religious factors (Adongo et al. 1998; Avong 2001; Takyi et al.

2006; Gyimah et al. 2008; Götmark and Andersson 2020; Turner 2021). This study result shows that women who belong to the Christian, Islamic and traditional faith are less likely to experience a stall in their fertility decline. This study's findings clearly highlight the importance of religion and religiosity in the fertility behavior of women in sub-Saharan Africa, including Ghana. In recent times, religious denominations such as Protestant faith have adopted a more liberal approach in their teachings and practices on family planning and the use of modern contraceptives (Sweet 1996; Goodson 1997). Other studies also reported that despite the strong rejection of modern contraceptive use to limit fertility among Catholics, some Catholic denominations have a liberal attitude toward the use of modern methods of contraception (Ignaciuk and Kelly 2020; Kok et al. 2020). In the Islamic faith, studies have found that the acceptability rate of modern contraceptives has improved and is permitted in Islam (Budhwani et al. 2018; Gele et al. 2020).

Sexually active and inactive women in the last four weeks had a lower probability of experiencing any stall in their fertility. This outcome is not surprising because fertility occurs among sexually active women; hence, there is a stall in their fertility decline, and perhaps their contraceptive use is low. However, the likelihood of stall fertility will occur among women who are currently using any form of contraceptives. The findings of this study support the results of earlier studies in Benin (Johnson-Hanks et al. 2011), Kenya (Westoff and Cross, 2006), and Turkey (Alpu and Fidan 2006) and Nigeria (Ezeh et al. 2009). The studies argued that satisfying women's implied demand for contraceptive methods for spacing and limiting births would contribute to avoiding unplanned births by increasing women's chances of having only the births that they want at the time that they want them.

Strengths and limitations of the study

One of the strengths of this study includes the use of large nationwide population data, which made the result generalizable to all women in their reproductive ages in regard to stalling their fertility levels. However, because the study used secondary data, it could not account for other factors (cultural, economic) at the community and national levels that might have influenced stalling fertility levels among women in Ghana.

Conclusion

The menace of a stall in fertility is on the face of it straightforward. The determinants of this transition in fertility can be attributed to demographic, social and other proximate factors. A stall is an extreme case of a slowdown in the rate of decline in fertility, which is most prevalent in African countries, and Ghana is no exception. It has been suggested that the original rationale for distinguishing between declining and stalling was practical; the change from decline to stall could act as a signal for policymakers to intervene by implementing something new and intensifying efforts to restart fertility decline. In conclusion, the high prevalence of fertility stalling in Sub-Saharan Africa

is an essential part of the evidence for such a view of regional and national trends. It is recommended for future studies to research into stalling fertility trends of sub-Saharan Africa countries as they go through fertility transitions taking into consideration demographic, socio-cultural, household, economic and other proximate factors.

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Data availability The datasets used for this study are openly available and can be accessed via https://dhsprogram.com/.

Declarations

Conflict of interest None declared.

Ethical approval The Informed Consent Form (ICF) Institutional Review Board (IRB) approved the protocol for the 1998, 2003, 2008 and 2014 GDHS. We obtained permission from the ICF for the use of the datasets, and the terms of use were strictly adhered to. Informed consent was obtained from respondents before interviews were conducted. Again, all methods used were carried out in accordance with relevant guidelines and procedures.

References

Adongo PB, Phillips JF, Binka FN (1998) The influence of traditional religion on fertility regulation among the Kassena-Nankana of northern Ghana. Stud Fam Plan. https://doi.org/10.2307/172179

Aghajanian A (1991) Population change in Iran, 1966–86: a stalled demographic transition? Popul Develop Rev. https://doi.org/10.2307/1973603

Agyei-Mensah S (2002) Fertility transition in West Africa. J Afr Policy Stud 19(2):225–234

Agyei-Mensah S (2006) Fertility transition in Ghana: looking back and looking forward. Popul Space Place 12(6):461–477

Agyei-Mensah S, Owoo NS (2015) Explaining regional fertility variations in Ghana. J Popul Res 32(3):157–172

Alpu Ö, Fidan H (2006) On the use of contraceptive methods among married women in Turkey. Eur J Contracept Reprod Health Care 11(3):228–236

Askew I, Maggwa N, Obare F (2017) Fertility transitions in Ghana and Kenya: trends, determinants, and implications for policy and programs. Popul Dev Rev 43:289–307

Avong HN (2001) Religion and fertility among the Atyap in Nigeria. J Biosoc Sci 33(1):1–12

Berrington A (2004) Perpetual postponers? Women's, men's and couple's fertility intentions and subsequent fertility behavior. Popul Trends 117:9–19

Bongaarts J (1978) A framework for analyzing the proximate determinants of fertility. Popul Develop Rev. https://doi.org/10.2307/1972149

Bongaarts J (2006) The causes of stalling fertility transitions. Stud Fam Plann 37(1):1–16

Bongaarts J (2008) Fertility transitions in developing countries: progress or stagnation? Stud Fam Plann 39(2):105–110

Bongaarts J (2017) Africa's unique fertility transition. Popul Dev Rev 43:39–58

Bongaarts J, Casterline J (2013) Fertility transition: is sub-Saharan Africa different? Popul Dev Rev 38(Suppl 1):153

Budhwani H, Anderson J, Hearld KR (2018) Muslim women's use of contraception in the United States. Reprod Health 15(1):1–8
Caldwell JC, Orubuloye IO, Caldwell P (1992) Fertility decline in Africa: a new type of transition? Popul Develop Rev. https://doi.org/10.2307/1973678
Camlin CS, Garenne M, Moltrie TA (2004) Fertility trend and pattern in a rural area of South Africa in the context of HIV/AIDS. Afr J Reprod Health. https://doi.org/10.2307/3583176
Casterline JB, Agyei-Mensah S (2017) Fertility desires and the course of fertility decline in sub-Saharan Africa. Popul Dev Rev 43:84–111
Chicoine L (2012) Education and fertility: Evidence from a policy change in Kenya. SSRN Electron J. https://doi.org/10.2139/ssrn.2157920
Dahlberg J (2013) Family influence in fertility: a longitudinal analysis of sibling correlations in first birth risk and completed fertility among Swedish men and women. Demogr Res 29:233–246
Eltigani EE (2003) Stalled fertility decline in Egypt, why? Popul Environ 25(1):41–59
Ezeh AC, Mberu BU, Emina JO (2009) Stall in fertility decline in Eastern African countries: regional analysis of patterns, determinants and implications. Phil Trans R Soc b: Biol Sci 364(1532):2991–3007
Falconí-Benítez F (2001) Integrated assessment of the recent economic history of Ecuador. Popul Environ 22(3):257–280
Fasang AE, Raab M (2014) Beyond transmission: Intergenerational patterns of family formation among middle-class American families. Demography 51(5):1703–1728
Garenne M (2008) Situations of fertility stall in sub-Saharan Africa. Afr Popul Stud. https://doi.org/10.11564/23-2-319
Gele AA, Musse FK, Shrestha M, Qureshi S (2020) Barriers and facilitators to contraceptive use among Somali immigrant women in Oslo: a qualitative study. PLoS ONE 15(3):e0229916
Gendell M (1989) Stalls in the fertility decline in Costa Rica and South Korea. Int Fam Plan Perspect. https://doi.org/10.2307/2133274
Goodson P (1997) Protestants and family planning. J Relig Health 36(4):353–366
Götmark F, Andersson M (2020) Human fertility in relation to education, economy, religion, contraception, and family planning programs. BMC Public Health 20(1):1–17
Goujon A, Lutz W, Kc S (2015) Education stalls and subsequent stalls in African fertility: a descriptive overview. Demogr Res 33:1281–1296
GSS G & Macro ICF (1999) Ghana demographic and health survey 1998. Accra, Ghana: Ghana Statistical Service, Ghana Health Service, and ICF Macro.
GSS G & Macro ICF (2004). Ghana demographic and health survey 2003. Accra, Ghana: Ghana Statistical Service,Ghana Health Service, and ICF Macro.
GSS G & Macro ICF (2009). Ghana demographic and health survey 2008. Accra, Ghana: Ghana Statistical Service, Ghana Health Service, and ICF Macro.
GSS G & Macro ICF (2015) Ghana demographic and health survey 2014. Accra, Ghana: Ghana Statistical Service, Ghana Health Service, and ICF Macro.
Günther I, Harttgen K (2016) Desired fertility and number of children born across time and space. Demography 53(1):55–83
Gyimah SO, Takyi B, Tenkorang EY (2008) Denominational affiliation and fertility behavior in an African context: an examination of couple data from Ghana. J Biosoc Sci 40(3):445–458
Howse K (2015) What is fertility stalling and why does it matter. Popul Horizons 12(1):13–23
Ignaciuk A, Kelly L (2020) Contraception and catholicism in the twentieth century: Transnational perspectives on expert, activist and intimate practices. Med Hist 64(2):163–172
Johnson-Hanks JA, Bachrach CA, Morgan SP, Kohler HP (2011) The theory of conjunctural action. Understanding family change and variation. Springer, Dordrecht, pp 1–22
Kebede E, Goujon A, Lutz W (2019) Stalls in Africa's fertility decline partly result from disruptions in female education. Proc Natl Acad Sci 116(8):2891–2896
Kok M, Tolani M, Mtonga W, Salamba T, Mwabungulu T, Munthali A, Smet E, Chinsakaso B (2020) Enabling and hindering factors of health surveillance assistants' roles in the provision of contraceptive services in Mangochi. Malawi Reprod Health 17(1):1–13
Kravdal Ø (2002) Education and fertility in sub-Saharan Africa: individual and community effects. Demography 39(2):233–250
Larsen U, Raggers H (2001) Levels and trends in infertility in sub-Saharan Africa. Women and infertility in sub-Saharan Africa. A multidisciplinary perspective. Royal Tropical Institute KIT Pub, Amsterdam, pp 27–69

Lavy V, Zablotsky A (2015) Women's schooling and fertility under low female labor force participation: evidence from mobility restrictions in Israel. J Public Econ 124:105–121
Lee RD (1997) Population dynamics: Equilibrium, disequilibrium, and consequences of fluctuations. Handb Popul Fam Econ 1:1063–1115
Lesthaeghe R, Jolly C (1995) The start of the sub-Saharan fertility transition: some answers and many questions. J Int Dev 7(1):25–45
Lucero JA (2001) High anxiety in the Andes: crisis and contention in Ecuador. J Democr 12(2):59–73
Moltrie TA, Hosegood V, McGrath N, Hill C, Herbst K, Newell ML (2008) Refining the criteria for stalled fertility declines: an application to rural KwaZulu-Natal, South Africa, 1990–2005. Stud Fam Plann 39(1):39–48
Murphy M, Knudsen LB (2002) The intergenerational transmission of fertility in contemporary Denmark: the effects of number of siblings (full and half), birth order, and whether male or female. Popul Stud 56(3):235–248
Mutuku AK (2015) Role of fertility size preferences in explaining stalling fertility transition in Kenya. In 80th Annual meeting of the Population Association of America, San Diego
Notestein FW (1953) Proceedings of the eighth international conference of agricultural economists.
Population Reference Bureau (2021) report. Reference Reviews.
Pradhan E, Canning D (2016) The effect of schooling on teenage fertility: Evidence from the 1994 education reform in Ethiopia (No. 12816). Program on the Global Demography of Aging
Schoumaker B (2009) Stalls in fertility transition in sub-Saharan Africa: real or Spurious? Louvain-la-Neuve: departement des sciences de la population et du developpment, Universite catholique de Louvain
Schoumaker B (2019) Stalls in fertility transitions in sub-Saharan Africa: revisiting the evidence. Stud Fam Plann 50(3):257–278
Schoumaker B, Sánchez-Páez DA (2020) Identifying fertility stalls by place of residence in sub-Saharan Africa. In Population Association of America (PAA)
Shapiro D, Gebreselassie T (2008) Fertility transition in sub-Saharan Africa: falling and stalling. Afr Popul Stud. https://doi.org/10.11564/23-1-310
Shapiro D, Tambashe BO (2002) Fertility transition in urban and rural sub-Saharan Africa: preliminary evidence of a three-stage process. J Afr Policy Stud 8(2–3):105–130
Strulik H (2019) Desire and development. Macroecon Dyn 23(7):2717–2747
Sweet LI (1996) Health and medicine in the evangelical tradition:"Not by Might Nor Power." Pro Ecclesia 5(4):509–510
Takyi BK, Obeng-Gyimah S, Addai I (2006) Religion and fertility behavior of married men and women: an empirical examination of data from Ghana, sub-Saharan Africa. In annual meeting of the Population Association of America, Los Angeles, CA. Retrieved from http://paa2006.princeton.edu/papers/61053
Turner N (2021) Influence of religion and religiosity on fertility and contraceptive use in continental Sub-Saharan Africa: a comprehensive review
Uchudi JM (2001) Spouses'socioeconomic characteristics and fertility differences in Sub-Saharan Africa: does spouse's education matter? J Biosoc Sci 33(4):481–502
United Nations Population Division (2021) World population prospects: the 2020 revision. File 1: total population (both sexes combined) by major area, region and country, annually for 1950–2100 (thousands)
Weil DN, Galor O (2000) Population, technology, and growth: from Malthusian stagnation to the demographic transition and beyond. Am Econ Rev 90(4):806–828
Westoff C.F, Cross AR (2006) The stall in the fertility transition in Kenya (No. 9). ORC Macro.
Williams J, Ibisomi L, Sartorius B, Kahn K, Collinson M, Tollman S, Garenne M (2013) Convergence in fertility of South Africans and Mozambicans in rural South Africa, 1993–2009. Glob Health Action 6(1):19236
Yankson PW, Bertrand M (2012) Challenges of urbanization in Ghana. The mobile city of Accra. 25