

The effect of the Pace of Gender Revolution on Fertility Transition in West Africa: A Comparative Analysis

OnipedeWusu & Uche C. Isiugo-Abanihe

Abstract

The influence of the pace of gender revolution on fertility change in West Africa is examined. Data from two waves of Demographic and Health Survey (DHS) pertaining to 11 countries are analysed using descriptive tools and Poisson regression. The analysis demonstrates the emergence of gender revolution, defined as the emergence of an era where women embrace opportunities in education and labour market, thereby getting involved in the public sphere, at varying degrees across West Africa. A negative and significant association exists between gender revolution and fertility indicator in almost all the countries ($p < 0.05$). Countries that experienced a decline in fertility showed relatively higher percentage increase in either high or medium gender revolution. Chad and Niger, where fertility increased between the two waves of DHS, indicated the lowest levels of gender revolution. The findings suggest that the pace of gender revolution is a significant factor in the rate of fertility decline in West Africa. Therefore, investment in female education, hence, enhancing the social standard of the girl-child, and boosting the economy of respective countries to create employment, would make a significant contribution to fertility transition in West Africa.

Keywords: Gender revolution, fertility, fertility transition, public sphere, West Africa

Introduction

West Africa harbours one of the highest fertility levels in the world with average total fertility rate as high as 5.3 and average growth rate of 2.8 percent (PRB 2017). According to the Population Reference Bureau (PRB), the mid-2017 population for the region was 371 million but could hit 809 million by 2050. Thus, West Africa has a rapidly growing population, with the majority of the countries enmeshed in a low quality of life and the actualisation of the Sustainable Development Goals quite remote in many of the countries.

Fertility is key to reversing this trend, and efforts are still on-going to identify effective means or approaches of bringing it down (Van den Broeck and Maerteus 2015). Sustainable fertility transition (SFT) has been recorded, or is at an advanced stage, in all world regions except Sub-Saharan Africa, particularly in West African countries (Kirk and Pillet 1998; Lesthaeghe 2014a; Sobotka 2017). In the context of this study, fertility transition is conceived as a goal of reducing the number of children per woman from high to low (of two or less) or replacement (i.e. 2.1 children per woman) levels in West African countries. The fact that SFT has eluded Sub-Saharan Africa up to 2018 calls for concern. Furthermore, the incipient transition reported in a few countries in West Africa in the 1990s, but which stalled or stagnated thereafter (Bongaarts 2006; Orubuloye 1995; Shapiro and Gebreselassie 2008), strengthens the concerns to seek further explanations. Hence this study examined the potency of and likely role which gender revolution could play in attaining SFT in West Africa. Gender revolution (GR) is defined as the emergence of an era where women embrace opportunities in education and labour market, thereby getting involved in the public sphere, breaking the barriers of restriction to private sphere (Goldscheider, Bernhardt, and Lappegard 2015).

This study is predicated on the fact that gender revolution (GR) draws women from the private sphere (home making) into the public sphere (schooling and labourforce participation) that has significant influence on their availability for reproductive activities such as early marriage, regular sexual engagement, pregnancy, childbearing, and childrearing (Bongaarts 2010; Wusu 2012). Also, women's involvement in the public sphere provides alternative means of livelihood rather than nearly total dependence on marriage and the domestic realm. As a result, there could be delayed marriage and the opportunity cost of childbearing becomes too high, which is likely to attenuate the frequency of pregnancy and childbearing. Hence, a faster pace of GR is likely to speed up a sustainable fertility transition in West African countries.

Different studies have attempted to explain the persistence of pre-transitional fertility in Sub-Saharan Africa of which West Africa is an integral part. The predicting factors include early marriage, low contraception, low socioeconomic development, limited female education and employment, religious opposition to fertility regulation and violence (Bongaarts 2008, 2010; Isiugo-Abanihe 2010; Izugbara and Ezeh 2010; Kirk and Pillet 1998; McNicoll 2011; Odimegwu, Bamiwuye, and Adedini 2015; Romaniuk 2011; Wusu 2009, 2010, 2014). The role of gender equality or equity in the current fertility regime in the region has also been considered (Odimegwu and Adedini 2014). However, the place of the gender revolution (GR) is alien to the fertility discourse in the entire sub-region except for a recent attempt in a Nigerian study (Wusu and Adedokun 2017).

Most of the documented studies on GR are conducted in North America, Europe and other industrial countries in Asia and Latin America. Scanty information is available in other parts of the world, more especially in West Africa. The examination of the relationship between GR and fertility transition is probably not new; what is new is the investigation of GR as a predictor of fertility transition in a less developed region. Previous studies in the United States and Western Europe had explored the effects of fertility transition on GR (Goldscheider et al. 2015; Lesthaeghe 2010; Oppenheimer 1973). Could we gain some insights into the prospects of a sustainable fertility transition in West Africa if we consider the role of GR?

Fertility transition is an integral component of the Notestein's demographic transition theory developed in 1945 (first demographic transition - FDT), which describes the transformation of the processes of mortality and fertility from high to low regimes in response to socio-economic development (Bongaarts and Watkins 1996). In more industrialised societies, negative relationship between GR and fertility was observed, and explained mainly in terms of the incompatibility hypothesis (Balbo, Billari, and Mills 2013; Brewster and Rindfuss 2000; Shastri 2015). Sub-replacement fertility and dramatic changes in family formation took the transition well beyond the predictions of the FDT, the features captured under the second demographic transition (SDT) (Lesthaeghe 2011, 2014b; Zaidi and Morgan 2017). In the SDT ideational factors gained prominence in driving fertility below replacement level in more industrialised societies (Lesthaeghe 2014b). West Africa has not experienced SFT consistent with the FDT, but the ideational forces pronounced in the SDT may be connected to GR because education and labour force participation are channels of diffusion of new reproductive ideas that can promote SFT. Thus, this study, though predicated more on the FDT theory, also drew some inspiration from the SDT in explaining fertility transition in West Africa.

However, recent studies in industrialised settings have demonstrated that the negative association earlier observed in developed countries between female labour force participation and fertility has reversed or in the process of being reversed (Esping-Andersen and Billari 2015; Rindfuss et al. 2010; Stanfors and Goldscheider 2017). This trend is attributed to the second half of the GR which pushes for gradual but significant movement towards a high level of gender equity in housework (Andersson and Kohler 2015; Goldscheider et al. 2015; Stanfors and Goldscheider 2017). In response to this development Lesthaeghe (2014b) argues that the forces that shaped fertility in the FDT remain potent but self-realisation as motivation for parenthood gained prominence during the SDT, which account for the positive relationship between GR and fertility.

The West Africa fertility pattern is still largely pre-transitional with one or two countries having a stalled or stagnated transitional experience (Shapiro and Gebreselassie

2008). Could a rise in female participation in the public sphere, particularly their involvement in education and paid work impact negatively on fertility as observed in the more developed societies during their period of transition? Wusu and Adedokun(2017) demonstrated in an earlier study in Nigeria that GR indicators have a negative association with fertility. Could this observation be generalised about West Africa? Therefore, this study tested the hypothesis that the pace of GR in West African countries could play a major role in fertility transition in the region. In the light of this hypothesis, we addressed three central questions. What is the pace of GR in the selected countries in West Africa? What is the association between GR and fertility in the selected countries? Moreover, what is the relationship between the pace of GR and fertility change in the selected countries? We selected 11 countries where at least two Demographic and Health Surveys had been conducted, at least, one decade apart to examine these questions.

Data and Methods

Data

This study analysed two waves (the first and last as at 2016) of Demographic and Health Surveys (DHS) conducted in 11 West Africa countries. The analysis used the individual recode data files of Benin, Cameroon, Chad, Cote d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria, Senegal, and Togo. We selected these countries because they have at least two waves of relatively distant surveys, reasonably long enough to observe some change. We downloaded the individual recode data files for the selected countries from www.measuredhs.com after due permission. To arrive at national fertility levels that are representative of reality for the analysis we selected women of age 35 years and above to constitute the sample across the 11 countries. As a result of the selection this study is based on the country-specific weighted sample sizes presented as N in Tables 1a & b. The survey that generated the data sets employed sampling strategies that are consistent with representative procedures. The details of sampling procedures for all countries contained in country report and the data sets are available free at www.measuredhs.org.

Variables

The two key variables in our analysis are gender revolution (GR) and fertility. We constructed the independent variable, GR, by combining education and paid work using 'compute variable' function in SPSS. The selection of education and paid work was based on the assumption that women's participation in the public sphere is a function of the two variables. That is, women could only seek to take up employment in formal sector if they have possessed the requirement. Such demands are usually contingent on minimum educational training that shape individuals in the mould of various disciplines. Also, the GR framework specified education and paid work as the principal indicators (Goldscheider et al. 2015). Across the 11 data sets the categorical

measure of education has four categories, namely none (0), primary (1), secondary (2), and tertiary (3). For the sake of eliminating small or near empty cells we reclassified education into three: none (0), primary (1) and secondary+ (2) (combining secondary and tertiary categories). Furthermore, we determined the pace of GR through percentage change between the two waves of data. The magnitude of the change reflects the pace of the revolution.

We derived the second variable paid work from DHS's variable 'respondent's occupation' consisting of nine categories in the original - not working (0), prof., tech, and managerial (1), clerical (2), sales (3), agric, self-employed (4), agric, employee (5), household and domestic (6), services (7), skilled manual (8), unskilled manual (9), and don't know (98). Categories with codes 1, 2, 5, 6, 7 and 8 were classified into 'yes' (1) and all others 'no' (0) to represent 'involved in paid work' and 'did not do paid work' respectively. The next step was to combine the reclassified education and paid employment to generate GR. We employed the SPSS function 'compute variable' to achieve this. The combination yielded a continuous variable (GR) with values 0, 1, 2, 3, which we used in regression models. At the descriptive level of analysis, we classified the GR into three, namely low (0), medium (1) and high (2+3=2).

Fertility was the dependent variable used in the analysis. This analysis used the DHS variable 'total children ever born' (CEB), a continuous variable, as fertility indicator. We captured fertility transition through the difference in CEB between the first and second waves of DHS. Although CEB has its inherent limitations as a fertility indicator, since the women sampled were in the 35-49 age bracket, CEB as a cohort measure of fertility that considers it as life course issue in women reproductive lifespan is quite appropriate (Hirschman, 1994). Also, in our opinion, it is the most suitable variable in DHS raw data file that one could use as a proxy for fertility. The indicator is also similar to the TFR estimates by Measure DHS and other sources, such as PRB, for various countries (www.measuredhs.com; PRB 2017).

We also included selected confounding variables in adjusted multivariate models that have been reported as determinants of fertility (Isiugo-Abanihe 2010; Oyefara 2012; Ozumba 2012; Shapiro and Gebreselassie 2008). These variables include age, age at first marriage/cohabitation, contraception and marital status. The literature, and more importantly the respective contribution of the variables to the models, guided their inclusion as control variables.

Analysis

We conducted three levels of analysis. The first level involved descriptive statistics of all variables in the first and last waves of the data sets involved in the study by country. The purpose was to describe the social and demographic background characteristics of the respondents, which were also the confounding characteristics.

Also, this level of analysis describes the dependent and independent variables in bivariate and multivariate analyses. The second tier of analysis described the proportion of respondents in the GR categories and the differences in the proportions between the first and the last waves of DHS. Our objective here was to highlight the pace of GR in respective countries, which we captured by the magnitude of the difference between the two waves of the surveys. Also, the analysis determined differences in CEB between the two waves of data for each country. Lastly at this second level of analysis, we compared the degree of change in GR with that of CEB by country graphically to demonstrate the relationship between the two.

The third level of analysis employed Poisson regression to show the association between GR and fertility indicators. We chose the Poisson regression because the fertility indicator is a count variable, and it is the best-suited regression technique for count variables. We constructed unadjusted and adjusted Poisson regression models for the two data sets for each country. The models were to show if GR significantly predicted CEB in the countries.

Results

Tables 1a and 1b show the percentage distribution of the women in the age bracket 35-49 sampled. The distribution of the women between the two waves of data indicates nearly the same proportions. Marginal increase in age at marriage occurred in all countries, but it was relatively substantial in Mali and Senegal, with 3.3 and 2.9 years increases respectively. The table shows that female education improved substantially in all countries; the improvement in Ghana and Nigeria in education at the secondary level or higher deserves special mention. Ghana had about 45 percent increase and Nigeria about 23 percent increase in the proportion of women with secondary or higher levels of education between their two waves of surveys. Women participation in paid work increased slightly in all the sampled countries, but the levels recorded in Ghana, Senegal and Togo were relatively higher.

Table 1a: Percentage distribution of respondents by selected socio-demographic Characteristic by selected countries

Characteristics	Benin N1=1693 N2=4905	Code d'Ivoire N1=1901 N2=5307	Cameroon N1=935 N2=4079	Chad N1=2006 N2=4911	Guinea N1=4212 N2=2701	Nigeria N1=2377 N2=11760
Age						
35-39 1 st wave	41.5	42.1	43.7	43.2	44.3	39.9
2 nd wave	44.1	42.6	41.2	41.9	41.5	40.1
40-44 1 st wave	31.3	32.3	32.9	29.8	29.0	34.8
2 nd wave	33.0	32.1	39.9	30.6	32.2	30.8
45-49 1 st wave	27.2	25.6	23.3	27.0	26.7	25.3
2 nd wave	22.9	25.3	30.8	27.4	26.3	29.1

Age at marriage						
Mean (SD)	18.2(3.7)	18.6(5.1)	16.8(3.8)	16.1(3.4)	16.9(3.9)	17.5(4.5)
1 st wave						
2 nd wave	20.4(5.7)	19.8(5.8)	18.7(5.3)	16.8(3.9)	17.3(4.1)	18.5(5.4)
Education						
None 1 st wave	84.8	78.0	55.1	83.7	86.8	73.5
2 nd wave	72.4	62.2	29.4	77.5	84.6	45.6
Primary 1 st wave	11.5	15.1	32.4	13.7	5.0	19.4
2 nd wave	16.1	24.3	39.9	17.5	7.9	23.5
Secondary+ 1 st wave	3.8	6.9	12.5	2.6	8.3	7.2
2 nd wave	11.4	13.5	30.8	5.0	7.5	30.9
Paid work						
No 1 st wave	40.7	58.3	65.9	60.6	70.9	50.9
2 nd wave	48.9	48.5	50.8	57.6	64.6	32.3
Yes 1 st wave	59.3	41.7	34.1	39.4	29.1	49.1
2 nd wave	51.1	51.5	49.2	42.4	35.4	67.7
Gender Revolution						
Low 1 st wave	37.6	49.6	39.7	54.7	66.7	43.1
2 nd wave	40.5	34.7	19.9	50.5	60.2	11.9
Medium 1 st wave	49.9	35.0	36.8	34.2	22.4	37.1
2 nd wave	37.0	38.1	32.5	33.0	27.5	36.6
High 1 st wave	12.6	15.4	23.5	11.1	10.9	19.7
2 nd wave	22.5	27.2	47.6	16.5	12.3	45.4
CEB (Mean, SD)						
1 st wave	6.7(2.6)	6.3(3.0)	5.9(3.3)	6.5(2.9)	6.0(2.5)	6.0(2.9)
2 nd wave	4.8(2.4)	5.3(2.8)	5.5(2.9)	7.2(2.7)	5.7(2.7)	5.9(2.9)
Current Contraception						
Non-use 1 st wave	85.4	90.5	81.1	96.5	91.8	90.5
2 nd wave	85.6	82.7	77.3	94.4	94.3	81.6
Used 1 st wave	14.6	9.5	18.9	3.5	8.2	9.5
2 nd wave	14.4	17.3	22.7	5.6	5.7	18.4
Marital status						
Never married 1 st wave	0.04	1.8	1.6	0.2	0.2	0.5
2 nd wave	2.4	4.2	2.9	0.6	1.2	1.7
Ever married 1 st wave	99.6	98.2	98.2	99.8	99.8	99.5
2 nd wave	97.6	95.8	97.1	99.4	98.8	98.3

Note: N1=first wave; N2=second wave

Table 1b: Percentage distribution of respondents by selected socio-demographic characteristic by selected countries

Characteristics	Niger N1=1629 N2=3212	Ghana N1=1261 N2=3182	Mali N1=1008 N2=2941	Senegal N1=1051 N2=4145	Togo N1=876 N2=1833
Age					
35-39 1 st wave	45.9	42.1	42.2	45.7	42.2
2 nd wave	45.0	40.7	45.4	43.8	61.3
40-44 1 st wave	31.2	28.9	31.5	28.5	30.0
2 nd wave	30.8	32.4	31.1	33.3	27.6
45-49 1 st wave	22.9	29.0	26.3	25.8	27.7
2 nd wave	24.2	26.9	23.6	22.9	11.1
Age at marriage					
Mean (SD) 1 st wave	14.1(3.1)	18.0(3.9)	15.8(10)	16.5(3.0)	18.4(4.0)
2 nd wave	16.0(3.1)	20.5(5.4)	19.1(5.2)	19.4(6.1)	20.7(5.0)
Education					
None 1 st wave	93.6	62.1	95.3	90.4	80.0
2 nd wave	86.1	30.2	86.1	71.4	54.7
Primary 1 st wave	5.3	33.9	4.1	5.8	16.4
2 nd wave	9.2	19.1	7.2	17.6	32.1
Secondary+ 1 st wave	1.2	4.0	0.6	3.8	3.5
2 nd wave	4.7	50.7	6.6	11.0	13.2
Paid work					
No 1 st wave	57.1	56.7	16.3*	22.2*	12.6*
2 nd wave	63.7	36.1	75.3	49.5	46.4
Yes 1 st wave	42.9	43.3	11.9*	25.5*	25.7*
2 nd wave	36.3	63.9	24.7	50.5	53.8
Gender revolution					
Low 1 st wave	54.6	34.6	85.0	72.6	65.1
2 nd wave	57.6	18.4	66.9	39.5	31.3
Medium 1 st wave	41.3	35.4	13.3	19.2	23.6
2 nd wave	33.2	19.0	23.5	38.6	36.0
High 1 st wave	4.1	30.0	1.7	8.2	11.3
2 nd wave	9.2	62.5	9.6	22.0	32.7
CEB (Mean, SD)					
1 st wave	6.9(3.2)	5.5(2.6)	6.6(3.1)	6.6(3.0)	6.5(2.7)
2 nd wave	7.4(2.7)	4.4(2.3)	5.6(2.7)	5.3(2.9)	5.8(2.3)

Current Contraception

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Non-use 1 st wave	93.4	63.2	85.7	90.6	76.6
2 nd wave	89.2	78.1	89.5	86.0	78.0
Used 1 st wave	6.6	36.8	14.3	9.4	23.4
2 nd wave	10.8	21.9	10.5	14.0	22.0
Marital status					
Never married 1 st wave	0.3	0.3	0.1	-	0.6
2 nd wave	0.5	2.6	0.5	3.7	0.8
Ever married 1 st wave	99.7	99.7	99.9	-	99.4
2 nd wave	99.5	97.4	99.5	96.3	99.2

Note: N1=first wave; N2=second wave; *analysis involved only those who indicated employed, i.e. it excluded the unemployed, because the variable 'respondent's occupation in categories' was not included in the first surveys conducted in Mali, Senegal and Togo.

The marital status of respondents indicates that almost all women in all countries were ever married (between 95.5 and 99.8 percent). Thus, the fertility analysis undertaken in the study is mostly marital fertility. Similarly, the GR analysis here concerns women who were ever married and most must have been mothers. The distribution of the respondents by CEB indicates that with the exception of Chad and Niger where CEB increased by 0.6 and 0.2 respectively, the fertility indicator declined marginally across all the countries. Moreover, CEB declines in Benin (-1.7), Ghana (-0.9), Mali (-0.9) and Cote d'Ivoire (-0.8) were quite substantial. The proportion that reported the use of any contraceptives was low in all selected countries. In fact, the proportions declined in Benin and Mali between the two data waves.

All the selected countries experienced an appreciable positive change in high GR category (Table 2). In order of magnitude, Ghana, Nigeria, Cameroon and Togo had notable increases in proportions of women in the high GR category. Apparently, none of the countries recorded decline in the percentage during the period between their respective two waves of the survey. Similarly, a profound increase in the proportion of women in the medium GR occurred in Senegal, Togo and Mali. Other countries that experienced growth in share of women in medium GR include Guinea, and Cote d'Ivoire. The first three declines in the medium category of GR occurred in Ghana, Benin and Niger. Expectedly, with improvements in high and medium categories of GR, low category declined for almost all the selected countries except in Benin and Niger that experienced a marginal increase in proportions of women. Togo, Senegal and Nigeria exhibited the three highest declines in percentage of women in low GR category.

Table 2: Percentage distribution of selected West African countries by GR and Percent change in each category of GR between first and last DHS

Country	Gender Revolution			Change		
	Low	Medium	High	Low	Medium	High
Benin 1996 (N=1693)	37.6	49.9	12.6	+2.9	-12.9	+9.9
2012 (N=4905)	40.5	37.0	22.5			
Cote d'Ivoire 1994(N=1901)	49.6	35.0	15.4	-14.9	+3.1	+11.8
2012 (N=5307)	34.7	38.1	27.2			
Cameroon 1991(N=935)	39.7	36.8	23.5	-19.8	-4.3	+24.1
2011(N=4079)	19.9	32.5	47.6			
Chad 1996 (N=2006)	54.7	34.2	11.1	-4.2	-1.2	+5.4
2015(N=4911)	50.5	33.0	16.5			
Guinea 1999(N=4212)	66.7	22.4	10.9	-6.2	+5.1	+10.4
2012(N=2701)	60.2	27.5	12.3			
Nigeria 1990(N=2377)	43.1	37.1	19.7	-25.2	-0.5	+25.7
2013(N=11760)	17.9	36.6	45.4			
Niger 1996(N=1629)	54.6	41.3	4.1	+3.0	-8.1	+5.1
2012(N=3212)	57.6	33.2	9.2			
Ghana 1993(N=1342)	34.6	35.4	30.0	-16.2	-16.4	+32.5
2014(N=3182)	18.4	19.0	62.5			
Mali 1987(N=1009)	85.0	13.3	1.7	-18.1	+10.2	+7.9
2013(N=2941)	66.9	23.5	9.6			
Senegal 1986(N=1051)	72.6	19.2	8.2	-33.1	+19.4	+13.8
2011(N=4145)	39.5	38.6	22.0			
Togo 1988(N=876)	65.1	23.6	11.3	-34.2	+12.4	+21.4
2014(N=1833)	31.3	36.0	32.7			

Note: - decline; + increase

Furthermore, we constructed unadjusted and adjusted Poisson regression models to explain the association between GR (as a continuous variable) and CEB in the selected countries. The regression models (Table 3) show that GR significantly predicted CEB in all countries in unadjusted and adjusted models ($p < 0.05$). The association was not significant in Niger and Mali in both unadjusted and adjusted models as well as in Nigeria in the adjusted model, all in the first wave data. The coefficients suggest that significantly negative association between GR and CEB cut across the 11 countries in both unadjusted and adjusted models, especially in the second wave data ($p < 0.05$). Moreover, the coefficients indicate the influence of the pace of GR on fertility. The higher the speed of GR the lower the CEB women were likely to report in all selected West African countries. Also, countries with the lower pace of GR were likely to experience higher CEB. By this significant association between GR

and CEB, we proceeded to compare the changes in GR and CEB between the two waves of data in each country. The objective was to capture a graphic picture of the association between change in GR and fertility indicator.

Table 3: Poisson Regression Coefficients (with 95% Wald Confidence Interval) of association between GR and CEB in selected West African countries, DHS (First & Second Waves)

Country	Unadjusted Exp (B)	Adjusted Exp (B)
Benin	0.89 (0.87 – 0.91)***	0.93 (0.90 – 0.95)***
	0.87 (0.86 – 0.88)***	0.90 (0.89 – 0.92)***
Cote d'Ivoire	0.91 (0.89 – 0.94)***	0.94 (0.92 – 0.96)***
	0.82 (0.81 – 0.83)***	0.85 (0.84 – 0.87)***
Cameroon	0.93 (0.90 – 0.95)***	0.92 (0.89 – 0.96)***
	0.84 (0.83 – 0.85)***	0.88(0.87 – 0.90)***
Chad	0.98 (0.95 – 1.00)*	0.97 (0.94 – 0.99)**
	0.96 (0.95 – 0.97)***	0.97 (0.95 – 0.98)***
Guinea	0.93 (0.92 – 0.95)***	0.95 (0.93 – 0.96)***
	0.85 (0.83 – 0.86)***	0.89 (0.87 – 0.91)***
Nigeria	0.98 (0.96 – 1.00)***	0.99 (0.97 – 1.01)
	0.84 (0.84 – 0.85)***	0.93 (0.92 – 0.94)***
Niger	0.97 (0.94 – 1.00)	0.98 (0.95 – 101)
	0.92 (0.91 – 0.94)***	-
Ghana	0.84 (0.82 – 0.86)***	0.87 (0.85 – 0.90)***
	0.83 (0.82 – 0.84)***	0.88 (0.87 – 0.89)***
Mali	0.97 (0.93 – 1.02)	0.97 (0.92 – 1.02)
	0.94 (0.92 – 0.96)***	0.94 (0.92 – 0.96)***
Senegal	0.92 (0.89 – 0.95)***	0.96 (0.92 – 0.99)*
	0.82 (0.80 – 0.83)***	0.89 (0.87 – 0.90)***
Togo	0.88 (0.85 – 0.91)***	0.95 (0.91 – 0.99)*
	0.83 (0.81 – 0.84)***	0.91 (0.89 – 0.93)***

Note: Adjusted models controlled for age, age at first marriage, ever/current use of contraceptives, marital status and religion. *significant at $P < 0.05$; **significant at $P < 0.01$; ***significant at $P < 0.001$.

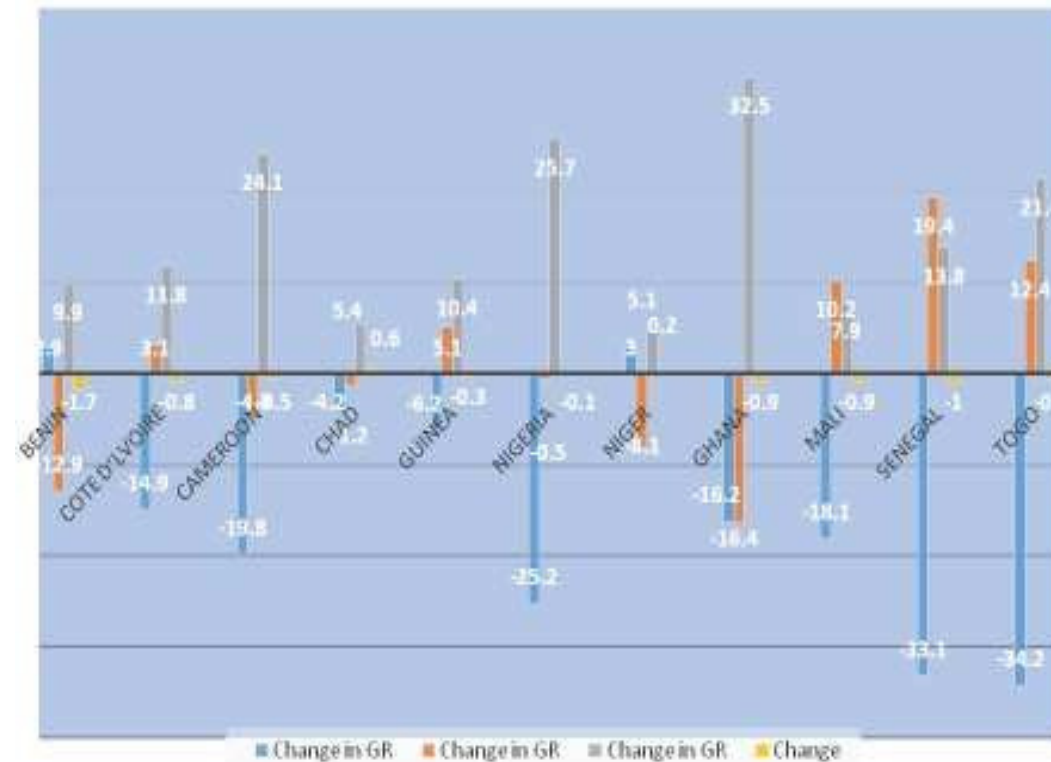


Figure 1: Distribution of selected West African countries by change in GR and fertility between two waves of DHS

Figure 1 shows the changes in GR categories and CEB between the first and second waves of data in each country. The figure indicates that except Chad and Niger, all countries with a positive change in high GR had a negative change in CEB. In other words, countries that experienced improved high GR reported a decline in fertility except in Chad and Niger. In the magnitude of fertility decline, the pattern shows five groups of the apparent association between GR and CEB reflecting the degrees of GR. First, Benin and Senegal exhibited the highest change in CEB. Their corresponding GR reveals that Benin had a relatively notable change in high GR category (+9.9%) while Senegal recorded a high degree of change in medium (+19.4%) and high (+13.8%) GR categories.

The second group consists of Ghana, Mali and Cote d'Ivoire with the second highest decline in CEB. While Ghana recorded the highest change in high GR (32.5%), Mali had a relatively good change in medium (+10.2%) and Cote d'Ivoire reported a small change in medium (+3.1%) and quite impressive change in high (+11.8%) GR categories. The third group include Cameroon and Togo with -0.5 decline in CEB each. Cameroon had impressive improvement in high GR (+24.1%) while Togo had

an appreciable improvement in medium (+12.4%) and relatively very good in high (+21.4%) GR categories. The fourth group with a slight decline in fertility have Guinea with a notable level of improvement in medium GR (+10.4) and Nigeria having the second most significant change in high GR (+25.7%). Chad and Niger constitute the fifth group with an increase in CEB between the two waves of the survey. Incidentally the two had the lowest level of improvement in high GR (+5% each).

The general pattern of the result in Figure 1 suggests that the countries that experienced a decline in CEB showed relatively higher percentage increase in either high or medium GR or substantial percentage decline in low GR. Also, the interrelationship between percentage changes in high GR and CEB suggests the differential influence of high GR on fertility in the countries. In this regard, some countries recorded relatively small percentage change in high GR but the more substantial magnitude of fertility decline. For example, while Mali had higher positive percentage change in high GR than Benin, Benin recorded the highest magnitude of fertility decline (-1.7) than Mali (-0.9).

Discussion

This study has examined the association between the pace of gender revolution (GR) and fertility transition in 11 countries in West Africa. The primary objective of the study was to consider the role GR can play in driving fertility decline in the sub-region where pre-transition fertility level still prevails. The data analysis has demonstrated that within the space of at least one decade, all selected countries recorded substantial improvement in female education and consequently a differential increase in the proportion engaged in paid work. The combination of the increase in women's education and participation in the labour market in various countries accounts for the level of gender revolution. This result suggests that the sex based division of labour is not a permanent gender system but it is amenable to change (Stanfors and Goldscheider 2017). So, although socio-economic development remains limited across West Africa in the last one decade or more, various countries experienced varying degrees of improvement in women participation in the public sphere. The differential improvement in the sampled countries is similar to what the advanced economies experienced at the take-off of the revolution in 19th and 20th centuries (Goldscheider, Turcotte, and Kopp 2001).

The regression models constructed suggest that GR significantly predicted fertility in all countries in both waves of data except in three countries. The negative association observed is indicative of the likelihood of countries with a substantial proportion of women in the higher GR status experiencing fertility decline. Also, the fact that in all the selected countries the association between GR and fertility indicator was inverse, in the second wave of the survey (which is more recent), suggests in West Africa that improvement in GR is capable of reducing marital fertility. Furthermore,

this observed association supports the incompatibility hypothesis in West Africa, namely, that women who participate in the labour market in the sub-region are likely to have limited number of children. Paid work constraints both childbearing and childrearing owing to the high opportunity cost of reproductive activities among such women (Frejka 2016). Such women are usually compelled to adopt contraception and to limit the number of children (Bongaarts 2010). Therefore, as the proportion of such women rises in West Africa, the probability of sustainable fertility decline is very high. Thus, our study findings are consistent with the experience of industrialised societies where the incompatibility hypothesis influenced fertility for decades while they went through the first half of the GR (Balbo et al. 2013; Bongaarts and Watkins 1996; Brewster and Rindfuss 2000; Shastri 2015).

Furthermore, the change in fertility revealed that fertility declined in all the countries, except in Niger and Chad. The marginal decline depicts the commencement of a sort of fragile fertility transition in the selected countries. The challenge of the fragility of the fertility decline in West Africa is that in the 1990s similar observations were made, in almost two decades the same situation persists (Orubuloye 1995). It implies that although the transition has commenced in many countries, it is slow and almost unnoticeable in some countries. The graphical association between GR and fertility indicator suggests there is on-going implicit or explicit influence of the pace of GR on the rate of the decline in various countries. For instance, Niger and Chad that recorded increase in fertility during the period between their two waves also reported the least improvement in high GR.

The situation in Niger and Chad suggests that countries with the low level of female participation in the public sphere (low GR) are likely to experience delayed fertility decline. This is because the real cost of childbearing to women in such settings remains low, and low contraceptive prevalence persists. This kind of situation provides support for natural fertility. In this regard, because the pace of GR is meager in the two countries, CEB rose by 0.6 in Chad and 0.3 in Niger instead of a decline. It is striking to note that the TFR of Niger appears the highest in the world. Islam is the predominant religion in northern Nigeria, Chad and Niger and studies have reported a positive association between Islam and fertility behaviour in that area (Izugbara & Ezeh 2010; Stonawski et al. 2016; Wusu 2014, 2015).

A plausible explanation for the fertility situation in Chad and Niger is the predominance of Islamic fundamentalism. Islamic fundamentalism is strong in the two countries, as well as in core northern Nigeria. It is common for the leaders of different Islamic sects to drive pronatalist agenda. The fundamentalists are averse to female education and formal employment. A typical example is the *Boko Haram* sect that stepped up its activities in northern Nigeria, Niger and parts of Chad since 2006. The influence of the obnoxious anti-Western education teaching of *Boko Haram* is quite

pervasive across northern Nigeria and has spread to Chad and Niger (Wusu 2014). The influence of such teachings on demographic behaviour in the contiguous areas of the three countries must have made a significant contribution to shaping these parts of West Africa as extremely high fertility zone (Mberu and Reed 2014; Stonawski et al. 2016; Wusu 2014).

Conversely, all other countries where some levels of fertility decline occurred had some degree of improvement in medium and high categories of GR between the two waves of data analysed. In fact, to no small extent, the five groups of the selected countries demonstrate the pace of GR in the sub-region and the corresponding CEB indicates the role of GR in fertility decline in West Africa. The implication is that in West Africa women's participation in the public sphere is finding their emerging roles in the labour market incompatible with their role as mothers. As a result, the number of children they now bear has begun to decline. However, because the proportion of women in this category is still limited, and contraceptive prevalence unacceptably low in various countries, the influence is still marginal (PRB 2017). Therefore, the analysis supports the study hypothesis that the pace of GR in West Africa is likely to predict fertility transition.

Furthermore, the few women that are demographically innovative, especially in the second wave survey, are likely to have positive influence in the spread of antinatalist attitude among women in their immediate and remote social groups (Bongaarts and Watkins 1996). The role of social interaction in childbearing intentions and actualisation is well articulated in Bernardi's impressive presentation on channels of social influence in reproduction (Bernardi 2003). This likelihood is expected to be strong in West Africa because communal living still prevails. Social interaction at family and other levels are predominant. These factors are very likely to spread new demographic behaviour, which could push marital fertility in various countries to the transition threshold level. In fact, a few highly educated women who took advantage of labour market opportunities spearheaded the transition experience of industrialised nations during late 19th and early 20th centuries (Esping-Andersen and Billari 2015). In addition, diffusion of new fertility management ideas by demographically innovative women is partly consistent with the emphasis on ideational forces that drove very low fertility levels during the SDT in more industrialised societies (Lesthaeghe 2011, 2014b).

Before concluding this discussion, we considered it necessary to highlight a few limitations we believe the study suffers. First, because we analysed DHS data that are cross-sectional, there is a need for caution in the way the results are interpreted. Since the surveys were not longitudinal direct comparison as if the respondents in the two waves of data analysed were same will be inappropriate. Second, the DHS usually adopts nationally representative sampling approach. Be that as it may, we cannot rule out the possibility of human error in the sampling procedures of surveys in various

countries, which might have distorted the expected representativeness. As a result, for instance, the women sampled in some cases may not be representative of women in the selected countries. However, because DHS invest heavily on sampling procedure possible human errors are usually limited, so, it is unlikely for such errors to have significant influence on the results. Third, our measurement strategy of GR might attract questions such as why adding education to compute the variable. In our opinion, occupation as a variable in DHS alone may not be an adequate proxy for GR. One of the reasons is the possibility for some respondents to have misconstrued some categories of the variable thereby placing themselves into wrong occupational groups. Though it was practically impossible for us to have estimated the magnitude of this misplacement, if any, the addition of education must have limited the influence on the results.

Conclusion

The study has yielded insightful findings that further studies could build upon in Sub-Saharan Africa. The analysis embarked upon has demonstrated that gender revolution (GR) has emerged at varying degrees in West Africa. The results show a significant and negative association between GR and fertility in the two waves of the surveys in almost all the countries. Moreover, it is apparent across virtually all countries that fertility decline corresponded, largely, with the pace of changes in GR. Those with outstanding medium or high GR recorded a significant decrease in fertility. Overall, the countries that experienced a decline in CEB showed relatively more significant percentage increase in either high or medium GR. Chad and Niger where fertility increased between the two waves of the surveys also indicated the lowest levels of high GR category. Thus, the findings suggest that the pace of GR is a significant factor in the rate of fertility decline in West Africa. Therefore, investment in female education, which enhances the status of the girl-child and boosts the economy of respective countries to create employment, would make a significant contribution to fertility transition in West Africa.

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