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Type of Place of Residence and Fertility Levels: Patterns in Ghana, 2003, 2008, and 2014

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Abstract
Fertility has been falling continuously since the late 1980s, but has been rebounding in Ghana, and, unlike in Latin America and Asia, the country has not reached the post-transition phase. While the distal and proximate factors associated with this stall have been described, there is less research understanding how the type of place of residence affects fertility rates and patterns in Ghana in the long term. This article uses data from the women's files of the 2003, 2008 and 2014 Ghana Demographic and Health Surveys (GDHS) to explore urban-rural differences in children ever born (CEB) and its proxitive (marital status, use of contraceptive, experience of abortion, postpartum amenorrhoea) and distal (age, education, occupation, religion, ethnicity, wealth quintile, region) correlates, in order to consider how this can be explained. In IBM SPSS Statistics version 20.0, univariate, bivariate (chi-square/cross-tabulation) and trivariate analyses were performed. Results indicate that rural women have consistently higher mean CEB over all three survey periods and by age, education, occupation, religion, ethnicity, wealth quintile, region, marital status, contraceptive use, abortion experience or amenorrhoeic status when compared to urban women. The gap between rural and urban, however, contracted slightly over the time period, in line with the spread of modern reproductive values from urban regions to rural backwaters. The study findings suggest that fertility differentials remain but are slowly narrowing in Ghana and urges the policy of fertility reduction to explicitly address rural underdevelopment as well as urban poverty.

Keywords: fertility, type of place of residence, children ever born, urban-rural differentials, Ghana Demographic and Health Survey

1. Introduction

Fertility, understood as actual birth performance (Weeks, 2008) [50], is one of the principal components of population dynamics and a key determinant of the size, structure and composition of populations (King, Randolph, Floro, & Suh, 2021) [30]. Variation in fertility across populations has been linked to access to family planning services, women's educational attainment, cultural beliefs and practices, and urbanization (Götmark & Andersson, 2020) [25]. Sub-Saharan Africa (SSA) remains the region most affected by high fertility, prompting substantial research and policy attention over the past half-century (Gamette, Jabari, & Muperere, 2021; Lesthaeghe, 1990, as cited in Elleamoh & Dake, 2019) [23]; [22]. Despite these efforts, and although birth rates in the developing world fell on average from six to four children between 1960 and 1990, SSA's fertility transition has remained comparatively slow, prompting the 1994 International Conference on Population and Development (ICPD) to call for accelerated fertility reduction (May & Rotenberg, 2020; Bongaarts, 2020) [37, 16].

In Ghana, total fertility fell sharply from 6.4 to 4.4 children per woman between 1988 and 1998 before stabilising and declining further to 4.0 by 2003 and 2008 (Ghana Statistical Service, 2009) [24]. However, the 2014 GDHS recorded a rebound to 4.2 children per woman, underscoring the well-documented "stalled transition" phenomenon and significant, persistent differentials in fertility across population subgroups (Adedini, Omisakin, & Somefun, 2019) [3]. Notably, rural Ghanaian women have consistently recorded higher fertility than their urban counterparts — 4.9 versus 3.1 births in the period preceding the 2008

GDHS — with rural fertility declining from 5.6 to 4.9 while urban fertility remained comparatively static (Ndagurwa, 2020) [39]. This pattern is commonly attributed to inequitable access to health facilities, pharmacies and contraceptive services; the pressures and cost of urban living, which favour smaller families; the agrarian premium placed on large families and labour availability in rural areas (Lawoyin & Onadeko, 1997) [34]; conservative cultural norms and pronatalist customs such as the Asante practice of Badudwan, in which a woman's family rewards a man who fathers ten children (Kyei, 1945) [33]; and persistently high rural infant mortality, which encourages replacement fertility (VandePoel, O'Donnell, & VanDoorslaer, 2009) [49].

Although fertility differentials have attracted considerable scholarly attention, thorough empirical treatment of the urban–rural dimension in Ghana, tracked consistently across multiple survey rounds, remains limited (Bohon, 2018; Nahar & Zahangir, 2019; Götmark & Andersson, 2020) [12, 38, 25]. This study addresses that gap by using the 2003, 2008 and 2014 GDHS women's files to (i) assess levels and patterns in fertility between urban and rural areas over the period, (ii) examine differentials in the proximate and distal determinants of fertility between the two residential categories, and (iii) identify which proximate and distal determinants correlate significantly with children ever born (CEB) in urban and rural areas. In doing so, the study seeks to inform policy directed at eliminating residence-based inequities that drive unwanted pregnancies and births across Ghanaian society.

2. Literature Review

2.1. Place of Residence and Fertility

Urban women on average bear fewer children than rural women (Onoja, 2012) [41]. Rural women often face restricted access to educational advancement, partly due to customary preferences for male children (Adebimpe & Akindele, 2013) [2], which encourages earlier marriage and childbearing and thus a longer reproductive span. Conversely, rural-to-urban migration among young adults' delays family formation, while rising living standards and greater exposure to alternative lifestyles and mass media in cities are associated with smaller preferred family sizes; in 2012, 86 percent of the world's 120 major metropolises recorded higher per-capita incomes than their host countries (United Nations, Department of Economic and Social Affairs, Population Division, 2019) [48].

2.2. Socio-demographic Correlates of Fertility

Age is strongly associated with fertility because women's fecundity rises through the reproductive years before declining toward menopause (American Society for Reproductive Medicine, 2012; Liu & Case, 2011) [6, 36]. Education is inversely related to fertility: prolonged schooling shortens the reproductive period, increases exposure to contraceptive knowledge, and enhances women's autonomy and bargaining power (Basu, 2002; Testa, 2014; Jejeebhoy, 1995; Knowles, Lorgelly, & Owen, 2002) [10, 47, 29, 32]. Occupation matters similarly — professional and white-collar women register markedly lower fertility than women in agriculture or unpaid work, reflecting the time and opportunity costs of childbearing (Becker, 1960; Hotz, Klerman, & Willis, 1997; O'Neil, 2021) [11, 28, 40]. Religion and ethnicity shape fertility through doctrinal positions on contraception and cultural premiums placed on large families; the Catholic and Islamic faiths, Ghana's two largest religious blocs, both discourage or limit modern contraceptive use, while several ethnic groups link high fertility to lineage continuity, inheritance and social prestige (Onoja, 2012; Ostien, 2009; Bankole, Sedgh, Oye-Adeniran, Adewole, Hussain, & Singh, 2008; Bongaarts, 2003) [41, 43, 8, 15]. Wealth is negatively associated with fertility, as financially autonomous women exercise greater control over reproductive decisions (Abadian, 1996; Basu, 2002) [1, 10], while region of residence reflects the uneven distribution of health infrastructure, education and economic opportunity, with the northern regions of Ghana recording consistently higher fertility than the more developed south (Bankole *et al*., 2008) [8].

Among the proximate determinants, marriage remains central to childbearing in African contexts (Baranowska, 2010; Adegoke, 2010; Hayford & Morgan, 2008) [9, 4, 27]; contraceptive use, while primarily deployed for spacing rather than limiting births in much of West Africa, reduces cumulative fertility (Aryee, 1997; Ross, 1979; Rosenzweig & Schultz, 1989) [7, 44, 45]; abortion experience mechanically lowers CEB; and postpartum amenorrhoea extends birth intervals through lactational infecundability.

2.3. Theoretical Framework

Davis and Blake (1956) [21] first proposed that societal fertility levels operate through a set of intermediate variables — grouped into intercourse, conception and gestation variables— through which distal socioeconomic and cultural factors act upon the biological determinants of fertility, although their framework lacked a mechanism for quantitative estimation. Bongaarts (1978, 1982) [13, 14] refined this into a parsimonious multiplicative model expressing the Total Fertility Rate (TFR) as the product of Total Fecundity (TF) and four indices capturing the fertility-inhibiting effects of marriage (Cm), contraception (Cc), induced abortion (Ca) and postpartum infecundability (Ci): TFR = Cm × Cc × Ca × Ci × Cp × TF, where Cp denotes the index of primary sterility.

Stover (1998) [46] subsequently reformulated the Bongaarts model to address its limited scope, particularly its heavy reliance on marital status at a time when non-marital childbearing has become increasingly prevalent across African populations, including Ghana. Stover's model instead frames fertility with reference to sexual activity rather than marriage alone, expressed as TFR = Cs × Cc × Ca × Ci × Cf × TF, where s is the proportion of sexually active women, i is mean duration of postpartum insusceptibility, u is contraceptive prevalence net of amenorrhoea, f is the proportion of infecund women, and PF is the index of potential fertility. This study adopts Stover's (1998) reformulation as its theoretical anchor, treating marital status, contraceptive use, abortion and postpartum amenorrhoea as proximate variables and age, education, occupation, religion, ethnicity, wealth quintile and region of residence as distal variables that operate on fertility indirectly through the proximate variables, with type of place of residence (urban/rural) as the study's central independent variable of interest.

3. Methods

This study used secondary data from the women's files of the 2003, 2008 and 2014 rounds of the Ghana Demographic and Health Survey (GDHS), nationally representative surveys

that capture fertility, reproductive health, and related socio-demographic indicators. The GDHS sampling frame was drawn from the enumeration areas of the 2000 Ghana Population and Housing Census, stratified by the ten administrative regions and by urban/rural residence, with enumeration areas selected using probability proportional to size (216 urban and 211 rural areas, totalling 427). Within each selected enumeration area, 30 households were systematically sampled, yielding 12,831 households; all women aged 15–49 years in these households were eligible for interview. The same design was applied consistently across all three survey rounds. The final analytic samples comprised 5,691 women in 2003, 4,916 in 2008 and 9,396 in 2014, all aged 15–49 years, with no exclusions since fertility was the variable of interest across the entire reproductive age range.

The dependent variable was children ever born (CEB), a count variable ranging from 0 to 13, representing the number of live births reported by each respondent at the time of survey (and therefore not necessarily her completed lifetime fertility). The principal independent variable, type of place of residence, was coded dichotomously as urban or rural following the 2010 Population and Housing Census definition, whereby an urban area comprises a demarcated locality with a population of 5,000 or more. Proximate variables included marital status (never married, married/living together, widowed, divorced, separated), contraceptive use (no method, traditional/folkloric, modern), abortion experience (yes/no) and amenorrhoeic status (yes/no). Distal variables included age in five-year groups (15–19 through 45–49), level of education (no education, primary, secondary, higher), religion (Catholic, Protestant, Pentecostal/Charismatic, other Christian, Islam, Traditional/Spiritual, other), ethnicity (Akan, Ga-Dangbe, Ewe, Guan, Mole-Dagbani, other), occupation (not working, professional/technical/managerial/clerical, agricultural, manual, other), wealth quintile (poorest to richest) and region of residence (Ghana's ten regions at the time of the surveys).

Data were analysed at three levels. Univariate analysis produced descriptive distributions of the dependent, independent, proximate and distal variables. Bivariate analysis used cross-tabulations and chi-square tests to assess associations between type of place of residence and CEB, and between CEB and each proximate and distal variable. Trivariate analysis examined the interaction between type of place of residence and each proximate and distal variable in relation to mean CEB, in order to establish whether residence-based fertility differentials persisted after considering other covariates. All analyses were conducted in IBM SPSS Statistics version 20.0, with results presented as frequencies, percentages and means, supported by tables and figures. A limitation of the analysis is that CEB reflects a woman's cumulative births irrespective of where those births occurred, so the reported residence at the time of survey may not fully reflect the residence in which childbearing decisions were made.

4. Results

4.1. Background Characteristics of Respondents

Across all three survey rounds, women with no children formed the largest single CEB category (29.9% in 2003, 32.9% in 2008 and 30.7% in 2014), and the proportion of respondents at each parity level from 0 through 13 generally declined between 2003 and 2014, indicating a marginal overall reduction in fertility. The share of respondents residing in urban areas rose steadily, from 41.7% in 2003 to 44.0% in 2008 and 49.0% in 2014, while the rural share fell correspondingly from 58.3% to 51.0%, consistent with Ghana's ongoing urbanisation. The proportion of never-married women rose from 26.5% to 32.4% over the period, while married/cohabiting women fell from 64.9% to 58.1%. Contraceptive use shifted toward modern methods (14.8% in 2003 to 18.5% in 2014) even as traditional-method use declined, and reported abortion experience rose from 17.0% to 21.4%. Reported postpartum amenorrhoea fell slightly, from 14.0% to 11.5%.

On the distal side, educational attainment improved markedly: the share of women with no education fell from 33.7% to 24.3%, while secondary and higher education rose from 44.2% and 2.5% to 51.7% and 5.5%, respectively. The proportion of women not working or in professional/technical/managerial/clerical occupations increased, while agricultural and manual employment declined. Islamic affiliation rose sharply, from 3.7% to 18.4%, while most Christian denominations registered modest declines in share. The Mole-Dagbani ethnic group's share increased from 19.7% to 24.2%, while the dominant Akan group's share edged down from 43.6% to 41.3%. The age distribution shifted modestly toward older reproductive ages (35–49), and the wealth distribution showed a decline in the Richer and Richest quintiles alongside a rise in Poorer and Poorest categories over the period.

4.2. Type of Place of Residence and Mean CEB

Table 1 confirms that rural women consistently recorded substantially higher mean CEB than urban women across all three survey rounds. In 2003, mean fertility stood at 3.19 for rural women against 1.90 for urban women; both figures fell in 2008 before recovering slightly by 2014, when rural fertility (2.91) remained appreciably higher than urban fertility (1.99). This pattern is consistent with earlier Ghanaian and Nigerian evidence (Onoja, 2012; Adebimpe & Akindele, 2013).

Table 1:. Mean children ever born by type of place of residence, 2003–2014. Source: Computed from GDHS 2003, 2008, 2014.

Residence	2003	2008	2014
Urban	1.90	1.81	1.99
Rural	3.19	2.89	2.91

4.3. Distal and Proximate Correlates of CEB

Mean CEB rose consistently with age, from 0.12 among women aged 15–19 to between 5.26 and 5.94 among women aged 45–49, mirroring the expected biological trajectory of fecundity (American Society for Reproductive Medicine, 2012) [6]. Education showed a strong inverse gradient: women with no education recorded rising mean CEB over the period (3.89 to 4.30), while women with secondary or higher education recorded falling CEB (1.79 to 1.67 and 1.42 to 1.01, respectively), consistent with Osili and Long (2008), Akpotu (2008) and Onoja (2012) [42, 5, 41]. By occupation, agricultural workers recorded the highest fertility throughout (around 4.10 children), while women not working recorded the lowest, broadly supporting Wusu *et al*. (2020) and Becker (1960) [51, 11].

Religious affiliation showed Traditional/Spiritual worshippers with the highest fertility (4.48–4.81) and

Protestants the lowest, with Catholic women recording marginally higher CEB than other Christian groups, consistent with Akpotu (2008) and Basu (2002) [5, 10]. Fertility fell consistently for nearly all ethnic groups between 2003 and 2014, with Mole-Dagbani and "other" groups recording comparatively higher fertility throughout, in line with Ostien (2009) and Bankole *et al*. (2008) [43, 8]. Wealth was strongly inversely related to fertility: in 2014, mean CEB for the poorest quintile (3.22) was more than double that of the richest quintile (1.54), confirming Caldwell (1975) and Jejeebhoy (1995) [19, 29].

Regionally, Greater Accra recorded the lowest fertility throughout (about two children), while the Northern Region recorded the highest (about three children), consistent with the region's comparatively limited access to health and family planning infrastructure (Aryee, 1997) [7].

Among proximate variables, widowed women recorded the highest mean CEB across all rounds (4.35–4.76), and never-married women the lowest (0.10–0.24), consistent with Baranowska (2010) and Adegoke (2010) [9, 4]. Somewhat counter-intuitively, modern contraceptive users recorded higher mean CEB (about 3.0–3.3) than non-users (about 2.3–2.5), a pattern consistent with contraception being used predominantly for child spacing rather than limiting births in the Ghanaian context (Aryee, 1997) [7]. Amenorrhoeic women recorded markedly higher fertility than non-amenorrhoeic women in every round, and, except in 2003, women without abortion experience recorded higher mean CEB than those with abortion experience.

4.4. Interaction between Residence and Other Determinants

The trivariate analysis confirms that the rural fertility premium persists once age, education, occupation, religion, ethnicity, wealth, region, marital status, contraceptive use, amenorrhoeic status and abortion experience are held constant. Within every age group, rural women recorded higher mean fertility than urban women in every survey round; for example, women aged 45–49 in rural areas recorded 5.94–6.35 children compared with 4.47–5.21 among urban women of the same age (Table 2).

Table 2: Mean CEB by type of place of residence and selected age groups, 2003 and 2014. Source: Computed from GDHS 2003, 2008, 2014.

Age group	Urban 2003	Urban 2014	Rural 2003	Rural 2014
15–19	0.07	0.08	0.17	0.15
25–29	1.47	1.30	2.52	2.39
35–39	3.51	3.24	5.25	4.64
45–49	5.21	4.47	6.35	5.94

The rural fertility premium likewise held across education levels, occupational categories, religious affiliations, ethnic groups, wealth quintiles, regions, marital status categories, contraceptive-use categories, amenorrhoeic status and abortion experience. Notably, among urban dwellers the highest recorded mean CEB across any ethnic group in any year (2.29, Mole-Dagbani, 2014) remained lower than the lowest recorded rural mean CEB for any ethnic group in any year, illustrating the persistence and depth of the rural–urban gap. Similarly, among the wealthiest quintile, urban fertility (1.52–1.53) and rural fertility (1.65–1.74) were closest together of any wealth category, suggesting that wealth may be a stronger equalising force than residence alone at the top of the distribution. Interestingly, fertility rose between 2003 and 2014 among urban women with no or higher education and among nearly all urban ethnic groups, even as it fell among most rural counterparts, a divergence discussed further below.

5. Discussion

The findings confirm a well-established regularity in the fertility literature: type of place of residence exerts an independent and persistent influence on childbearing in Ghana, with rural women bearing markedly more children than urban women across every survey round and virtually every stratifying variable considered (Onoja, 2012; Adibempe & Adeleke, 2013). This pattern is consistent with several complementary explanations advanced in the literature. First, urban residents enjoy greater and more consistent access to health facilities, pharmacies and contraceptive services, while rural women face persistent infrastructural deficits (VandePoel *et al*., 2009) [49]. Second, urban life imposes higher costs of living and greater time pressures associated with employment, both of which favour smaller families, whereas the agrarian character of rural livelihoods continues to reward larger households as sources of farm labour (Lawoyin & Onadeko, 1997) [34]. Third, conservative cultural norms and pronatalist customs, such as the Asante practice of Badudwan (Kyei, 1945) [33], remain more entrenched in rural settings, while urban exposure to diverse social groups and mass media promotes acculturation toward smaller-family norms (Bongaarts & Watkins, 1996; Caldwell, 2001) [17, 20].

At the same time, the results point to a gradual narrowing of the rural–urban gap over the study period, which aligns with spatial diffusion theory; the proposition that new reproductive behaviours spread outward from urban centres into rural hinterlands via communication and transport networks (Hägerstrand, 1952; Klusener, Scalone, & Dribe, 2017) [26, 31]. This is consistent with Lerch's (2018) observation that rural–urban fertility gaps widen early in the demographic transition, as urban fertility falls first and fastest, before narrowing again as rural fertility eventually converges toward the urban standard. Notably, the data also show fertility increasing among some urban subgroups (women with no or higher education, and most ethnic groups) even as rural fertility fell, suggesting that urban fertility in Ghana may not be uniformly declining but is, in places, comparatively stagnant or even rising; a pattern plausibly linked to urban poverty and informal settlement growth, which reproduce some of the same disadvantages associated with rural residence (Buhaug & Urdal, 2013) [18].

The persistence of the education, wealth, occupation, religion and marital-status gradients within both residential categories reinforces the theoretical logic of Stover's (1998) reformulated proximate-determinants framework: distal socio-demographic characteristics operate on fertility largely through their effects on proximate variables such as union formation, contraceptive uptake and postpartum insusceptibility, rather than through place of residence alone. The counter-intuitive finding that modern contraceptive users recorded higher, not lower, mean CEB is best explained by the Ghanaian pattern in which contraception is used predominantly to space rather than to limit births (Aryee, 1997) [7], women who have already achieved several births may adopt modern methods to manage subsequent spacing rather than to stop childbearing altogether (Ross, 1979) [44].

6. Conclusion and Recommendations

This study set out to examine how type of place of residence relates to fertility levels and patterns in Ghana between 2003 and 2014, using three rounds of the GDHS women's files. The evidence is unambiguous: rural women in Ghana consistently record higher fertility than urban women, and this gap persists after accounting for age, education, occupation, religion, ethnicity, wealth, region, marital status, contraceptive use, amenorrhoeic status and abortion experience. At the same time, the gap has narrowed modestly over the period, and urban fertility itself shows signs of stagnation or slight increase among some subgroups, challenging the assumption that urban residence guarantees continued fertility decline. Education and wealth emerge as the two most powerful levers associated with lower fertility across both residential categories.

Three recommendations follow. First, fertility-reduction policy in Ghana should not treat rural areas as the sole priority; urban poverty and unplanned settlement growth warrant equal attention, since stalled or reversing urban fertility may undermine national progress and could, through the diffusion process documented here, eventually reshape rural fertility norms as well. Second, continued and expanded investment in female education remains one of the most reliable instruments for fertility reduction, given the consistent inverse relationship between educational attainment and CEB observed across both settlement types. Third, because this study is quantitative and secondary in nature, complementary qualitative research is needed to understand more directly why fertility remains comparatively high among non-urban residents and comparatively low, yet increasingly uneven, among urban residents, and to test settlement-of-residence history rather than residence at the time of survey, in order to strengthen causal inference in future work.

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