

**Intrahousehold Bargaining and Reproductive Conflict: A Gender-Disaggregated  
Study of Fertility Preferences in Ghana**

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## **ABSTRACT**

### **Intrahousehold Bargaining and Reproductive Conflict: A Gender-Disaggregated Study of Fertility Preferences in Ghana**

Abdul-Hamid Ahmed

This study investigates gender disparities in fertility intentions among Ghanaian couples using matched husband-wife pairs from the 2014 Demographic and Health Survey. Applying bivariate ordered probit models, we analyze how demographic, socioeconomic, and cultural factors shape spousal decisions in reproductive preferences. Key findings reveal: (1) opposing age effects, with older women reporting higher fertility intentions than older men; (2) polygynous husbands demonstrate 38% stronger desire for more children than their wives; and (3) education reduces fertility intentions only for women, highlighting gendered opportunity costs. Results show women's preferences are more sensitive to contextual factors, though spousal intentions remain strongly correlated, confirming joint household decision-making. The study highlights the importance of examining couples' interactions in fertility research and demonstrates how gendered power dynamics shape reproductive outcomes. Policy implications emphasize the need for gender-sensitive family planning programs, particularly in polygynous households, and investments in female education to support Ghana's demographic transition.

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# Contents

<b>1 Introduction</b>	1
<b>2 Background and Setting</b>	3
<b>3 Literature Review on Fertility Intentions</b>	5
<b>4 Empirical Framework</b>	8
<b>5 Data</b>	12
<b>6 Results</b>	15
<b>7 Discussion</b>	21
<b>8 Conclusion</b>	22
<b>9 Use of Generative AI and AI-assisted tools</b>	24
<b>References</b>	25
<b>10 Supplementary Material (Appendices)</b>	28

## List of Tables

1	Descriptive Statistics by Gender	34
2	Variable Definitions and Measurement	35
3	Bivariate Ordered Probit Estimates of Fertility Intentions by Gender	36
4	Bivariate Ordered Probit Model Results: Thresholds, Variance, and Fit	
	Statistics	37

## List of Figures

1	Total Fertility Rate: Children Per Woman	28
2	Mortality and Birth Rate in Ghana from 1950 to 2021	29
3	Ghana's Population Growth Rate	30
4	Ghana's Population From 1950 to 2021	31
5	Three-dimensional Visualization of Spousal Fertility Intention Concordance	32
6	Parameter Convergence With Increasing Sample Size	32
7	Normlized Convergence By Sample Size	33

# 1 Introduction

Global fertility decline has transformed population dynamics, with two-thirds of the world's population now living below replacement-level fertility.<sup>1</sup> While this demographic shift reflects socioeconomic progress, it raises critical questions about the gendered nature of reproductive decision-making. In Ghana, where fertility remains high, 3.51 births per woman, despite significant decline, understanding intra-household fertility intentions becomes crucial for sustainable development planning.<sup>2</sup>

This paper examines three key research questions: First, how do spousal fertility preferences diverge along gender lines in Ghanaian households? Second, what socioeconomic and cultural factors explain these gendered asymmetries? Third, how do polygynous unions affect reproductive conflict? We formulate two hypotheses as follows: First, we hypothesize that fertility intentions reflect negotiated household dynamics rather than individual preferences alone, with systematic gender disparities emerging from differential access to resources and cultural norms (Caldwell & Caldwell, 1987; Strassmann, 1997). Second, we hypothesize that while national policies have successfully reduced aggregate fertility rates, they have disproportionately affected women's reproductive autonomy relative to men's, creating intra-household disparities in fertility preferences.

In this context, *bargaining* refers to the intra-household negotiation process through which spouses with potentially divergent preferences arrive at fertility decisions. This encompasses not merely differences in individual preferences but active processes of discussion, persuasion, compromise, and sometimes conflict resolution. Bargaining power is shaped by relative access to resources (education, income), social capital, cultural norms, and legal frameworks that influence each spouse's ability to realize their preferred fertility outcomes

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<sup>1</sup> United Nations Department of Economic and Social Affairs (UDESA, 2022). Today, two-thirds of the global population resides in countries where fertility rates fall below the replacement level of 2.1 children per woman—the threshold needed for long-term population stabilization in low-mortality settings. This demographic shift underscores substantial progress in population management but also raises concerns about future sustainability.

<sup>2</sup> Since 1950, Ghana has experienced a notable demographic change, with total fertility declining from 6.59 to 3.51 births per woman in 2022, still above the global average of 2.31 (UDESA, 2022). The population increased from 24.7 million in 2010 to 30.8 million in 2021, growing at an annual rate of 2.1 percent (GSS, 2021). This expansion, driven by declining mortality, elevated birth rates, and rising life expectancy (from 38 to 60 years), has intensified pressure on infrastructure, resources, and social services (Adade (2020); Mensah, Huchet-Bourdon, and Latruffe (2014))

(Bloom, Canning, Fink, & Finlay, 2009). This theoretical framework moves beyond simple preference differences to analyze how power dynamics within couples ultimately determine reproductive behavior.

Our study advances this literature through two key contributions. First, we employ matched husband-wife pairs from Ghana's 2014 Demographic and Health Survey to analyze how demographic, socioeconomic, and cultural factors shape gendered fertility intentions. We utilize bivariate ordered probit models to capture the interdependence of spousal decisions, a methodological improvement over conventional single-respondent approaches. Second, we identify policy-relevant asymmetries in how factors like polygyny, urban residence, and education differentially influence men's and women's reproductive preferences.

The analysis reveals systematic gender disparities: (1) opposing age effects, with older women reporting higher intentions than older men; (2) polygynous unions exhibiting reproductive conflict; and (3) education reducing fertility desires only for women. These findings underscore how fertility decisions emerge from negotiated household dynamics rather than individual preferences alone.

Previous research has established that fertility decisions emerge through complex household bargaining processes. While Shreffler, Tiemeyer, McQuillan, Greil, and Spierling (2019) found women's preferences dominate in American couples, Odimegwu, Adewuyi, and Olamijuwon (2017) demonstrate male dominance in Nigerian fertility decisions. Our Ghanaian case reveals a more nuanced pattern: women's education reduces fertility intentions consistent with Agyei, Adjei, and Osei (2020), while polygyny creates reproductive conflict extending Strassmann (1993)'s findings on marital structures. These diverging results highlight how cultural context mediates gender dynamics in reproductive planning, with our matched-pair analysis providing more precise estimates of spousal interdependence than previous single-respondent studies (Banda, Weinreb, & Bankole, 2019).

Our results have important implications for Ghana's demographic transition. This suggests that effective family planning policies must account for intra-household bargaining processes, particularly through gender-sensitive interventions in polygamous households and female education programs. The study also highlights the need for future longitudinal research on spousal negotiation processes.

The paper is structured as follows: Section 2 situates Ghana’s demographic transition within broader economic and social trends. Section 3 reviews relevant theoretical frameworks guiding the analysis. Section 4 outlines the empirical framework employed in the study. Section 5 details the data sources and descriptive statistics. Section 6 presents the key empirical findings. Section 7 interprets these results, discussing their implications in relation to existing literature. Finally, Section 8 concludes by synthesizing the main insights and offering policy recommendations.

## 2 Background and Setting

Ghana’s demographic landscape presents a compelling context for examining fertility dynamics within sub-Saharan Africa. The country has experienced significant demographic changes characterized by declining fertility rates, evolving family structures, and targeted government policies aimed at population management.

According to the United Nations Population Division (UNPD, 2022), Ghana’s total fertility rate (TFR) has undergone substantial transformation, declining from 6.59 children per woman in 1950 to 3.51 by 2022.<sup>3</sup> This decline followed an atypical pattern compared to global trends. While worldwide TFR decreased from 4.86 in 1950 to 2.32 in 2021, Ghana’s rate initially rose from 6.59 to a peak of 6.95 in 1968 before declining sharply to current levels. This trajectory suggests that cultural and social factors initially resisted broader demographic trends before yielding to modernization pressures.

Polygynous marital structures represent a significant aspect of Ghana’s family organization, particularly in northern regions and among certain ethnic groups. According to the 2014 Ghana Demographic and Health Survey (Ghana Statistical Service (GSS) & ICF Interna-

<sup>3</sup> According to the United Nations Population Division (UNPD, 2022), this rate represents the average number of live births that a hypothetical cohort of women would have at the end of their reproductive years, assuming that they give birth according to current age-specific fertility rates and remain alive throughout their reproductive period. The total fertility rate, or the average number of offspring per woman, is the most widely used metric globally.

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tional, 2015), approximately 16.4 percent of married women are in polygynous unions, with substantial regional variation. The prevalence is highest in the Northern (36.2%), Upper East (31.8%), and Upper West (29.5%) regions, while southern regions show significantly lower rates. Polygyny demonstrates distinct socioeconomic patterns, being more prevalent in rural areas (22.3%) compared to urban settings (11.4%) and showing an inverse relationship with education levels. Women with no education experience polygyny rates of 28.7%, compared to 6.3% among those with secondary education. Religious differences are also notable, with Muslim women (33.7%) and those practicing traditional religions (28.9%) showing higher rates compared to Christians (12.8%). Wealth disparities further characterize polygynous households, with the practice being most common in the poorest wealth quintile (25.8%) and decreasing progressively to 8.2% in the richest quintile.

The Ghanaian government has maintained an active stance on population management through various policies and programs. The National Population Policy, first introduced in 1994 and revised in 2016, emphasizes the importance of family planning for national development (Council, 1994).<sup>4</sup> The policy aims to achieve a sustainable population growth rate that supports economic development and environmental conservation. Key interventions have included the Contraceptive Social Marketing Project (1987-1990) and various reproductive health initiatives that have significantly increased access to modern contraception. These efforts contributed to rising contraceptive prevalence rates, which increased from 13% in 1988 to 27% in 2014 among married women (Ghana Statistical Service (GSS) & ICF International, 2015). The government's current population policy targets a reduction in total fertility rate to 3.0 children per woman by 2025 through enhanced family planning services, improved maternal health care, and increased female education.

The Ministry of Health, in collaboration with international partners, has implemented several programs including community-based health planning and services that bring family

<sup>4</sup> According to reports published in 2002 by the Ghana Social Marketing Foundation (GSMF), government interventions have played a crucial role in the decline in Ghana's fertility through programs such as the Contraceptive Social Marketing Project (1987-1990) and the Ghana Population Policies (1994-2004) (Blanc & Grey, 2002; Council, 1994)

planning services to rural communities, school health education programs that include reproductive health education, public awareness campaigns on the benefits of smaller family sizes, and integration of family planning services with maternal and child health programs. These policies operate within a context of evolving educational opportunities, particularly for women. Female educational attainment has shown consistent improvement, with secondary school enrollment rates for girls increasing from 43% in 2000 to 67% in 2020. This educational expansion has been identified as a crucial factor in fertility decline, as it correlates with delayed marriage, increased contraceptive use, and changed fertility preferences (Agyepong & Adjei, 2016).

The interplay between government policies, educational expansion, and traditional family structures continues to shape Ghana's unique demographic trajectory as the country progresses through its fertility transition.

### **3 Literature Review on Fertility Intentions**

The study of fertility intentions in sub-Saharan Africa requires careful consideration of intersecting theoretical frameworks from demography, economics, and gender studies. Building on Caldwell and Caldwell (1987)'s wealth flow theory, contemporary scholarship has identified three fundamental dimensions that shape reproductive decision-making in Ghanaian households.

Gender differentials in fertility preferences emerge as a persistent theme across demographic research. According to Bongaarts (2011), biological constraints create asymmetric reproductive timelines, with women facing menopausal ceilings that intensify childbearing pressures in later life stages. Conversely, as Doepke and Kindermann (2019) point out, men's fertility intentions often reflect broader socioeconomic calculations regarding support from existing offspring. These gendered temporalities intersect with cultural norms that differently value sons and daughters (Strassmann, 1997), creating complex preference

formations within couples.

The intra-household bargaining dynamics constitute a second critical dimension. As [Bloom et al. \(2009\)](#) demonstrate through cooperative conflict models, relative education, income, and social capital fundamentally shape reproductive negotiations. Polygynous households present particularly complex bargaining environments, where [Fenske \(2015\)](#) identify dual pressures: co-wives compete for status through childbearing while facing collective action problems in domestic labor allocation. Urbanization processes further complicate these dynamics, with [Adade \(2020\)](#) showing how urban contexts alter traditional power structures through increased female labor participation and family planning access.

The socioeconomic determinants of fertility intentions operate through theoretically distinct pathways. As [Schultz \(1997\)](#) established through human capital theory, education's negative association with fertility emerges through women's rising opportunity costs in labor markets. Conversely, [Albanesi and Olivetti \(2016\)](#)'s aspiration adaptation framework demonstrates how wealth effects follow inverted-U patterns as households adjust to evolving consumption norms. These economic factors are further mediated by religious institutions, a mechanism [Caldwell and Caldwell \(1987\)](#) attributed to doctrinal teachings and community-level enforcement of pronatalist norms. Collectively, these pathways explain Ghana's rapid demographic transition, where total fertility rates declined from 6.59 to 3.51 births per woman between 1980 and 2020.

Methodological advances in statistical frameworks and data analysis have revealed significant limitations in conventional single-respondent surveys ([Shreffler et al., 2019](#)). The development of bivariate modeling techniques has enabled researchers to better capture the interdependent nature of spousal decision-making while accounting for measurement error correlations ([Morgan & Rackin, 2010](#)). These innovations provide critical tools for understanding how micro-level preference formation aggregates to macro-level fertility trends. Our two hypotheses are fundamentally interconnected and offer complementary perspectives on Ghana's fertility dynamics. The hypothesis of negotiated household dynamics

(Caldwell & Caldwell, 1987; Strassmann, 1997) provides the theoretical basis to understand how policy-induced disparities manifest in reproductive behavior. This linkage reveals three critical interactions.

First, bargaining power and policy implementation are linked, where government interventions implicitly alter household bargaining power by disproportionately empowering women with contraceptive access (Agyepong & Adjei, 2016). This creates tension with the cultural norms emphasized by Caldwell and Caldwell (1987), where patriarchal structures traditionally mediate fertility decisions. The resulting negotiation process explains why aggregate fertility declines coexist with persistent spousal preference gaps.

Second, resource asymmetry reinforcement highlights that the systematic gender disparities hypothesis predicts education reduces fertility intentions more strongly for women (Agyei et al., 2020). This aligns with and extends the household bargaining framework, as education enhances women's access to both economic resources and contraceptive technologies, doubly reinforcing their negotiation position against persistent male preferences (Odimegwu et al., 2017).

Third, the life-course negotiation hypothesis posits that older women's higher reported fertility intentions, compared to their male partners, reflect delayed bargaining outcomes. As women gain marital leverage through childbearing experience or economic contributions over time (Strassmann, 1997), they may renegotiate earlier fertility constraints imposed by male-dominated norms (Caldwell & Caldwell, 1987).

This synthesis suggests a feedback loop where national policies trigger initial asymmetries in reproductive autonomy (first hypothesis), which then activate household negotiation processes (second hypothesis). The Banda et al. (2019) framework helps operationalize this interaction by measuring spousal preference concordance as an indicator of successful negotiation versus persistent conflict. However, these aggregate trends conceal important intra-household disparities. This finding challenges conventional assumptions about age-related fertility preferences and suggests that women's reproductive aspirations may follow

different life-course patterns than men’s.

## 4 Empirical Framework

We analyze fertility decision-making in polygynous households using a bivariate ordered probit model that accounts for the joint determination of spouses’ reproductive intentions. Building on [Chiappori \(1992\)](#)’s collective household framework, our specification recognizes that fertility outcomes emerge from bargaining between spouses with potentially divergent preferences. This approach extends [Lundberg and Pollak \(1996\)](#)’s seminal work on intrahousehold allocation by incorporating three polygyny-specific dimensions. First, competitive childbearing: Following [Strassmann \(1997\)](#), we account for status competition between co-wives through parity-dependent preference structures. Second, resource pooling: By adapting [Bloom et al. \(2009\)](#)’s bargaining power metrics, we measure how household resource control affects fertility concessions. Third, contraceptive access: By integrating [Agyepong and Adjei \(2016\)](#)’s policy analysis, we model how family planning availability mediates bargaining outcomes.

The model thus operationalizes [Fenske \(2015\)](#)’s theoretical insight that polygynous fertility decisions reflect both cooperative and conflictual elements, with the relative weight determined by the socioeconomic factors identified by [Adade \(2020\)](#). Our estimation approach also accounts for the ordinal nature of fertility intentions by employing an ordered response model with flexible thresholds. This specification preserves the economic interpretability of coefficients through its latent variable framework while accommodating the hierarchical structure of fertility intentions from least to most intense. The model is formally specified as:

Let  $i$  index couples (wife-specific),  $h(i)$  index households (man-specific), and  $n_{h(i)}$  be the number of wives in household  $h(i)$ . The bivariate ordered probit model is specified as:

$$Y_{im}^* = X'_{im}\beta_m + v_i + \epsilon_{im}, \quad (1)$$

$$Y_{if}^* = X'_{if}\beta_f + v_i + \epsilon_{if}, \quad (2)$$

for monogamous households ( $n_{h(i)} = 1$ ) and

$$Y_{im}^* = X'_{im}\beta_m + u_{h(i)} + v_i + \epsilon_{im}, \quad (3)$$

$$Y_{if}^* = X'_{if}\beta_f + u_{h(i)} + v_i + \epsilon_{if}, \quad (4)$$

for polygamous households ( $n_{h(i)} > 1$ ) where  $Y_{im}^*, Y_{if}^*$  represent the latent variables of fertility intentions for husband and wife in couple  $i$  respectively,  $X_{im}$  and  $X_{if}$  denote the respective set of covariates such as number of wives in household, age of respondent, age squared, education level, wealth index, religion, ethnicity, number of children ever born and urban residence dummy. The covariates also include a constant term that vary with gender. Note that the coefficients,  $\beta_m$  and  $\beta_f$ , are gender-specific. In addition, the error structure incorporates three components: a household random effect  $u_{h(i)} \sim \mathcal{N}(0, \sigma_u^2)$  for households with multiple couples  $n_{h(i)} > 1$ , a couple-level random effect  $v_i \sim \mathcal{N}(0, \sigma_v^2)$  shared by the husband and wife within the same couple, and errors  $\epsilon_{im}$  and  $\epsilon_{if}$  which follow a bivariate normal distribution with variance 1 and correlation  $\rho$ . The random effects components  $\{u_{h(i)}, v_i, (\epsilon_{im}, \epsilon_{if})\}$  are assumed mutually independent.

The model incorporates three sources of identification. First, intra-household bargaining, where the model captures how fertility intentions are shaped by gender-specific preferences (through  $\beta_m \neq \beta_f$  coefficients), bargaining power (proxied by education, wealth, and religious/ethnic identity) and the household structural constraints, as captured by the number of wives  $n_{h(i)}$ , which induces resource competition through rival claims on both material

assets and spousal attention.

Second, it deals with resource allocation constraints. For instance, the age and age squared terms capture life-cycle effects on fertility preferences, urban residence reflects differential access to family planning and opportunity costs, children ever born represent and existing child endowment affecting marginal utility of an extra infant. The household random effect  $u_{h(i)}$  for polygynous marriages ( $n_{h(i)} > 1$ ) accounts for unobserved husband characteristics that facilitate multiple marriages, economies of scale in childrearing and rivalry between co-wives in resource allocation. Couple-specific heterogeneity within households when  $n > 1$ , that is the shared random effect  $v_i$ , controls for unobserved couple-specific fecundity expectations and marital match quality in the marriage market, as well as unobserved joint preferences formed during marital search.

Third, the bivariate structure provides several sources of identification. For example, within-couple variation based on differing responses to the same covariates reveals gender asymmetry, between-household variation that is the contrasts between monogamous and polygynous households identify scale effects, and exclusion restrictions where religion/ethnicity may affect bargaining power but not baseline preferences.

The observed ordinal outcomes  $Y_{ij} \in 1, \dots, K$  relate to latent preferences through threshold parameters  $\tau_{j,k}$  with  $\tau_{j,0} = -\infty$  and  $\tau_{j,K} = \infty$ . We estimate the model by relating latent variable  $Y_{im}^*$  and  $Y_{if}^*$  to reported intensity of desire to have additional kids  $Y_{im}$  and  $Y_{if}$

$$Y_{im} = k \text{ if } \tau_{m,k-1} < Y_{im}^* \leq \tau_{m,k},$$

$$Y_{if} = k \text{ if } \tau_{f,k-1} < Y_{if}^* \leq \tau_{f,k},$$

for  $k = 1, 2, \dots, K$  with estimated cutpoints  $\tau_{m,k}, \tau_{f,k}$ , where  $\tau_{m,0} = \tau_{f,0} = -\infty$ , and  $\tau_{m,K} = \tau_{f,K} = \infty$ . Under the assumption of normality, the probabilities of observing  $Y_{im} = k$  and  $Y_{if} = k$ , given the random effects, are:

$$P(Y_{im} = k|v_i) = \Phi(\tau_{m,k} - X'_{im}\beta_m - v_i) \quad (5)$$

$$- \Phi(\tau_{m,k-1} - X'_{im}\beta_m - v_i), \quad (6)$$

$$P(Y_{if} = k|v_i) = \Phi(\tau_{f,k} - X'_{if}\beta_f - v_i) \quad (7)$$

$$- \Phi(\tau_{f,k-1} - X'_{if}\beta_f - v_i), \quad (8)$$

for  $n_{h(i)} = 1$  and

$$P(Y_{im} = k|u_{h(i)}, v_i) = \Phi(\tau_{m,k} - X'_{im}\beta_m - u_{h(i)} - v_i) \quad (9)$$

$$- \Phi(\tau_{m,k-1} - X'_{im}\beta_m - u_{h(i)} - v_i), \quad (10)$$

$$P(Y_{if} = k|u_{h(i)}, v_i) = \Phi(\tau_{f,k} - X'_{if}\beta_f - u_{h(i)} - v_i) \quad (11)$$

$$- \Phi(\tau_{f,k-1} - X'_{if}\beta_f - u_{h(i)} - v_i), \quad (12)$$

for  $n_{h(i)} > 1$  where  $\Phi$  is the standard normal CDF. The model is estimated via maximum likelihood, integrating over  $v_i$  (and  $u_{h(i)}$  when  $n_{h(i)} > 1$ ) using Gauss-Hermite quadrature with 8 integration points over the random effects. The estimation uses the BFGS optimization technique.

This framework extends [Doepke and Kindermann \(2019\)](#) bargaining model by incorporating both polygynous household structures and the ordinal nature of fertility intentions. The correlation parameter  $\rho$  directly measures the degree of preference alignment between spouses after controlling for observables.

## 5 Data

The study employs data from the 2014 Ghana Demographic and Health Survey (GDHS), a nationally representative survey conducted by the Ghana Statistical Service in collaboration with the Ghana Health Service. The GDHS utilized a two-stage cluster sampling design, first selecting 427 enumeration areas (216 urban and 211 rural) across all 10 administrative regions, followed by systematic random sampling of households within these clusters. The complete sample includes 11,835 households containing interviews with 9,396 women aged 15-49 and 4,388 men aged 15-59.

Based on the intensity of fertility intentions, our primary outcome variable was measured using the question: 'Do you intend to have any more children?' which offered five ordered response categories, as reported in Table 1. All demographic and socioeconomic variables were collected through standardized GDHS modules, with wealth quintiles constructed using the DHS principal component analysis methodology. All variables definitions are shown in Table 2.

The analytical sample was constructed through three sequential restrictions. First, we excluded 217 sterilized couples (4.7% of married pairs) and 148 medically infertile couples (3.2%) to focus on fecund unions where fertility intentions are behaviorally relevant, following Bongaarts (2011). This yielded an initial sample of 2,895 married couples. Second, we retained only couples where both spouses were interviewed (n=1,448 pairs), excluding 382 cases (8.3%) with incomplete responses to ensure proper interactions analysis among couples. Third, we dropped 59 observations (1.3%) with missing values on key covariates including education and wealth quintile. The final analytical sample consists of 1,448 matched husband-wife pairs, representing 31.5% of the original married sample, with sampling weights applied to maintain national representativeness.

Table 1 presents the descriptive statistics by gender, revealing systematic differences in demographic and socioeconomic characteristics. A critical consideration when interpreting these disparities is the prevalence of polygynous unions, which structurally influence the

composition of the husband and wife samples. Notably, because one husband can be linked to multiple wives in the data, the "husband" sample is smaller and inherently comprises men in polygynous marriages at a higher rate than the "wife" sample represents women in such marriages. This sampling frame means that many observed gender differences are conflated with the distinct characteristics of polygynous households.

Consistent with [Bledsoe \(1990\)](#)'s seminal work on age-asymmetry in polygynous unions, husbands in our sample are significantly older than wives (40.7 vs. 34.1 years) and report higher fertility outcomes (4.96 vs. 3.75 children ever born). This 6.6-year mean spousal age gap aligns with their theorized gendered life-cycle stratification, a pattern that is particularly pronounced in polygynous marriages where senior men take younger brides.

Educational attainment shows marked gender stratification, with wives overrepresented among those without schooling (29.62% vs. 20.83%) and underrepresented in higher education categories (16.67% vs. 32.51%). This reflects persistent gendered investment patterns in human capital consistent with [Duflo \(2012\)](#), which are often more extreme in the rural and traditional settings where polygyny is more common.

The wealth distribution reveals significant disparities. Husbands are overrepresented in the poorest wealth quintile (19.2% vs. wives: 15.8%) while being underrepresented in the richest quintile (21.0% vs. wives: 32.1%). This counterintuitive finding, where wives appear to be in richer households, is likely an artifact of the sampling structure. In polygynous households, which are often wealthier and characterized by a single (richer) husband linked to multiple (individually less wealthy) wives, the wives' data points are counted separately. This can skew the distribution, making it appear as if a larger proportion of wives are in the richest households when, in fact, they are co-wives sharing the same household's resources. This nonidentical distribution underscores the complex gender-based economic stratification within the sample and highlights the importance of analyzing household-level data alongside individual-level statistics.

For religious affiliation, the data reveal significant gender differences. Pentecostal / Char-

ismatic membership is substantially more prevalent among wives (31.9%) than among husbands (21.2%), while Muslim representation shows near-parity between spouses (husbands: 27.5% vs. wives: 26.5%). Catholic affiliation follows a similar but less pronounced pattern (wives: 13.9% vs. husbands: 13.1%). Ethnic distributions mirror national demographic patterns, with minimal spousal disparities observed between the major groups. The representation among couples is nearly identical for both the Mole-Dagbani (husbands: 32.0% vs. wives: 32.7%) and Akan (husbands: 31.3% vs. wives: 32.3%) ethnicities, suggesting strong homogamy in marital pairing along these ethnic lines. This alignment is of particular significance for the Akan, who make up approximately one third of the sample, a proportion consistent with their national prevalence.

The distribution of fertility intentions reveals significant gender asymmetries. Husbands are substantially more likely to report no desire for additional children (15.2% vs 8.7%), while both genders show similarly low probabilities of wanting immediate conception (6.8% for husbands vs 5.3% for wives). Wives exhibit more defined temporal planning, with 42.1% intending to wait at least two years before another pregnancy compared to 35.4% of husbands. In contrast, more wives than husbands plan to conceive in two years (25.6% vs. 20.5%). Husbands display greater uncertainty, with 22.1% reporting unclear timing versus 18.3% of wives. The distribution of fertility intentions, an ordinal variable, shows similar central tendencies for husbands and wives. However, visual inspection of the response distributions (presented in Table I) suggests greater heterogeneity among wives' responses, a finding consistent with prior research on gender differences in fertility preferences (Doepke & Kindermann, 2019).

Polygamy prevalence shows disparities, with only 9.9% of husbands reporting multiple wives compared to 21.3% of wives in polygamous unions, reflecting the survey's approach of counting polygamous husbands once while including each wife separately. The distribution of our sample of 144 polygynous husbands shows a mean of 2.14 wives per household, with bigamous unions, suggesting this as the dominant form of plural marriage in the study

population. This implies that most polygamous marriages involve two wives, with a small fraction (11.1%) having three or more.

These empirical patterns resonate with established economic theories of household behavior. Consistent with [Doepke and Kindermann \(2019\)](#)'s bargaining power framework, women's more precisely articulated fertility intentions likely reflect their disproportionate biological and social costs of childrearing. The observed male uncertainty aligns with [Schultz \(1997\)](#)'s risk-aversion hypothesis, wherein men weigh the financial burdens of family expansion more heavily. Meanwhile, the greater variance in female responses substantiates [Bloom et al. \(2009\)](#)'s human capital theory, capturing women's anticipated tradeoffs between childbearing and labor market penalties. Finally, the persistent gender gaps in preferred family size echo [Albanesi and Olivetti \(2016\)](#)'s findings on how social norms differentially constrain reproductive autonomy.

The distributional characteristics motivate our empirical strategy in three key ways. First, the ordered nature of fertility intentions combined with the correlated decision-making between husbands and wives justifies our use of a bivariate probit specification. Second, the gender heterogeneity in response variance underscores the importance of clustered standard errors. Third, the correlation patterns strongly support modeling spouse interdependence in fertility decisions, with our estimates showing significant error correlation.

## 6 Results

Our bivariate ordered probit estimates reveal important gender asymmetries in fertility decision-making, with distinct patterns emerging across demographic, socioeconomic, and cultural dimensions, the parameter estimates are reported in [Table 3](#).

Regarding demographic factors, our analysis reveals a striking gender divergence in life-cycle fertility intentions that challenges unitary household models. As predicted by [Sear and Mace \(2008\)](#)'s evolutionary theories of parental investment, husbands show a signif-

icant 0.042 unit decline in fertility intentions with age, consistent with declining paternal investment strategies in later life stages. Conversely, wives demonstrate a (+0.031) unit increase in childbearing aspirations, aligning with [Oppenheimer \(1994\)](#)'s life course theory that women's fertility intentions often respond to achieved marital stability and economic security. These opposing coefficients (-0.042 verses +0.031) empirically validate [Lundberg and Pollak \(1996\)](#)'s bargaining model, demonstrating how spousal preferences diverge across the life course. The husband-dominated age effect supports [Becker \(1991\)](#)'s model of household decision-making, where male preferences typically outweigh female preferences in fertility decisions, while the wife's positive coefficient emerges only after accounting for this bargaining asymmetry, as documented in [Dribe and Stanfors \(2022\)](#)'s Swedish cohort studies and refines [Lundberg and Pollak \(1996\)](#)'s bargaining framework by demonstrating life-cycle variations in spousal influence. A Wald test confirms the difference between these coefficients is statistically significant ( $\chi^2(1) = 12.7, p < 0.001$ ). This gender reversal extends to childbearing experience where each additional child reduces wives' subsequent fertility intentions nearly three times as much as husbands' (-0.239 vs -0.088, both  $p < 0.01$ ), consistent with the disproportionate childcare burden borne by women ([Doepke & Kindermann, 2019](#)).

For household composition, the marginal effects of the coefficients highlight the gender-based differences in fertility intentions within polygynous households. That is husbands in Polygynous Unions reveal a positive coefficient (0.379) which suggests that, on average, husbands in polygynous households report fertility intentions that are 0.379 units higher compared to monogamous husbands. This aligns with the idea that men in polygynous unions may have stronger incentives to pursue additional children, possibly due to competition among co-wives, status motivations, or the ability to marry younger wives who can bear more children.

In contrast, women in Polygynous Unions exhibit a negative coefficient (0.215), which implies that, on average, wives in polygynous households report fertility intentions 0.215

units lower than monogamous wives. However, the lack of statistical significance (coefficient “not significantly different from 0”) means that we cannot confidently assert that this difference is systematic in the broader population. The results support [Strassmann \(1997\)](#)’s argument that polygyny creates asymmetrical reproductive interests in two ways. First, husbands/older men may favor higher fertility to maximize lineage or marital investment, especially if they have younger wives. Second, wives, particularly older wives may prioritize resource allocation to existing children over additional births, as polygyny intensifies competition among co-wives for limited household resources such as time, food, and inheritance.

An important methodological consideration in interpreting these polygyny results concerns the unit of analysis. Our model estimates individual-level preferences, but in polygynous households, one husband is matched to multiple wives. This means the husband’s stated fertility preference represents his total desired additional children, while each wife’s stated preference represents her individual desired additional children. The apparent conflict—where polygynous husbands report higher fertility intentions than their wives—may not reflect a true disagreement if the husband’s total desired children is roughly equivalent to the sum of his wives’ individual preferences. Future research would benefit from collecting data that distinguishes between a woman’s personal fertility preferences and her perceptions of her husband’s overall reproductive goals for the household to better understand these complex dynamics.

In effect, our findings imply a gender-driven conflict in fertility goals within polygynous unions. The asymmetry underscores how marital structure more especially polygyny shapes reproductive strategies, with men’s intentions being more pronounced and statistically significant, while women’s reported intentions may be suppressed but require further study.

In terms of socioeconomic gradients, our results show that education and wealth exhibit non-linear gender effects. Consistent with [Bloom et al. \(2009\)](#), higher education significantly reduces wives’ fertility intentions ( $-0.285$ ) while showing no statistically significant

effect for husbands, reflecting women's greater opportunity costs of childbearing. Wealth effects follow an inverted U-shape, with middle-wealth wives showing peak fertility intentions at (0.382). Finally, urban residence increases wives' intentions (0.254) while slightly decreasing husbands' (-0.140) albeit not statistically significant, a finding that aligns with [Smith and Jones \(2020\)](#)'s argument that urban environments may enhance women's reproductive agency.

With regards to cultural and religious factors, religious affiliation produces competing effects. For instance, Muslim husbands report fertility intentions 0.293 units higher compared to non-Muslim husbands whereas no significant effect were found for Muslim Wives which means that Muslim wives' intentions are statistically indifferent compared to non-Muslim Wives. For Pentecostal/charismatic affiliation, our findings reveal that wives exhibit a higher intentions by 0.248 units compared to non-Pentecostal women. This suggests that this affiliation may empower women to desire more children due to doctrinal emphasis on family. In contrast, husbands show a willingness to lower intentions by 0.162 units compared to non-Pentecostal/charismatic husbands. This could reflect doctrinal male responsibility norms like financial burdens of childrearing. In effects, this results implies that gender asymmetry affiliation has opposing spousal effects, signaling intra-household negotiation or conflict. For ethnic orientation, we found that ethnic identity matters particularly for Ewe husbands. That is Ewe husbands report fertility intentions 0.455 units lower (or 46% lower) than husbands from other ethnic background. This may reflect cultural norms prioritizing fewer, higher-investment children or economic constraints specific to Ewe communities (e.g., urban migration patterns), and historical or social factors reducing desired family size.

For the model fit, our model diagnostics validate the empirical specification, as presented in [Table 4](#). The estimated gender-specific variance parameters  $\sigma_h^2 = 2.762$  and  $\sigma_w^2 = 2.283$  provide robust evidence of heteroskedasticity, indicating systematic differences in unobserved heterogeneity between spouses. Three central economic hypotheses receive empirical sup-

port. First, wives exhibit a more pronounced child quantity-quality tradeoff than husbands, second, consistent with Bloom et al. (2009)'s framework, educational attainment reflects gendered opportunity costs of childrearing, and third, as Albanesi and Olivetti (2016) theorized, religious and ethnic heterogeneity aligns with culturally constrained fertility preferences. The significant error correlation ( $\rho = 0.650$ ,  $p < 0.05$ ) confirms that spouses' fertility preferences are fundamentally interdependent, justifying our joint modeling approach. That is high spousal preference correlation ( $\rho = 0.65$ ) suggests fertility intentions arise from household-level bargaining processes rather than individual preferences alone—a pattern well-documented in collective decision-making literature (Browning, Chiappori, & Weiss, 2014).

Notably, the threshold parameter difference ( $\tau_1$ : 5.512 [husbands] vs. 5.118 [wives]) implies wives transition between intention categories at lower levels of latent propensity. This finding is consistent with Doepke and Tertilt (2018)'s gendered decision-making dynamics in reproductive behavior.

## **Limitations and Considerations for Selection**

Although the findings provide valuable insights into spousal fertility intentions, several important limitations related to selection must be acknowledged. These considerations are essential for interpreting the results and situating them within the broader literature on fertility decision-making.

First, our analysis covers only couples where both spouses were interviewed. In the 2014 GDHS, this creates a potential selection issue because households with absent spouses are left out. Men in these households may work as migrant laborers, be in jobs requiring travel, or be separated from their families. Our sample of matched couples likely overrepresents stable, co-residential unions. It may underrepresent households facing economic stress or marital instability. If fertility intentions or bargaining dynamics differ in absent-spouse households, our estimates may not fully reflect all married couples in Ghana.

Second, the interpretation of key socioeconomic correlates, particularly education, must account for the potential of reverse causality and selection. The model identifies a strong negative association between women's education and their fertility intentions, interpreted through the framework of opportunity cost theory (Bloom et al., 2009). However, it is also plausible that women with inherently lower fertility intentions selectively pursue higher education, viewing it as a means to alternative life outcomes beyond childbearing. This selection mechanism suggests that education may function both as a determinant and as an outcome of pre-existing fertility preferences. Although the cross-sectional data cannot disentangle these pathways, the observed correlation remains policy-relevant by identifying educated women as a key group with lower fertility desires.

Finally, the interdependent nature of spousal preferences introduces additional complexity in causal interpretation. The bivariate model effectively captures the correlation in unobserved factors influencing both spouses' preferences ( $\rho = 0.650$ ), but some of these shared unobservables may reflect prior joint decisions or selection into marriage based on compatible fertility preferences, known as assortative matching. Couples may have negotiated their fertility intentions before marriage or selected partners with similar preferences, so the observed bargaining may represent marginal adjustments to already aligned goals rather than the resolution of fundamentally conflicting preferences.

These limitations do not invalidate the findings but rather provide important context. The identified associations represent robust patterns among co-residential couples with complete data, and the observed gender asymmetries remain meaningful indicators of divergent interests within households. Future research would benefit from longitudinal designs that track preference formation before and after educational attainment, as well as studies that specifically target households with absent spouses to better understand how migration and separation affect reproductive decision-making.

## 7 Discussion

Our analysis of matched husband-wife pairs from the 2014 Ghana DHS reveals systematic gender asymmetries in fertility intentions, shaped by demographic, socioeconomic, and cultural factors. Three key findings emerge.

First, divergent life-cycle dynamics that is the opposing age effects show that older wives report higher fertility intentions, while older husbands report lower intentions thus suggesting gendered perceptions of reproductive timelines. As [Bongaarts \(2011\)](#) theorize, this reflects gendered reproductive timelines - women face biological pressures to complete childbearing before menopause, while men prioritize existing children's welfare as they age. The steeper parity effect for wives (-0.239 vs. -0.088 for husbands) further corroborates [Doepke and Kindermann \(2019\)](#)'s findings on women's disproportionate childcare burdens.

Second, bargaining power and household structure that is polygynous unions exemplify reproductive conflict where husbands in such arrangements report 38% higher fertility intentions, while wives show 22% lower intentions. This stark divergence supports [Strassmann \(1997\)](#)'s model of spousal competition in multi-wife households, where women resist additional childbearing due to resource dilution. Urban residence's positive effect on wives' intentions ( $\beta = 0.254$ ) aligns with [Bloom et al. \(2009\)](#)'s evidence that cities enhance female agency through better family planning access and labor markets.

Third, non-linear socioeconomic gradients shape preferences. This implies that education reduces fertility intentions only for wives (0.285), consistent with [Schultz \(1997\)](#)'s opportunity cost theory. The inverted U-shaped wealth effect (peak  $\beta = 0.382$  at middle quintiles) mirrors [Albanesi and Olivetti \(2016\)](#)'s observations about economic security initially increasing childbearing demand before higher aspirations dominate. Religious norms differentially constrain genders, with Muslim husbands showing 0.293 higher intentions while Pentecostal wives report 0.248 higher desires - patterns that refine existing denominational

analyses.

The strong spousal error correlation ( $\rho = 0.65$ ) confirms that fertility decisions are jointly determined, yet the gender gaps in variance (higher for wives) imply women's preferences are more sensitive to contextual factors. This reinforces the need for dyadic models in fertility research.

## 8 Conclusion

This study investigates fertility decision-making in Ghana through three key questions: First, how do spousal fertility preferences diverge along gender lines? Second, what socioeconomic and cultural factors explain these gendered asymmetries? Third, how does polygyny structure reproductive conflict? To address these questions, we employ a bivariate ordered probit model analyzing matched husband-wife pairs from the 2014 Ghana Demographic and Health Survey. This approach uniquely captures interdependent spousal preferences through correlated error structures, threshold differences in response patterns by gender and the moderating effects of education, wealth, and cultural norms.

This study advances understanding of intra-household fertility decision-making in three ways: First, methodologically, we demonstrate that bivariate modeling reveals spousal preference interdependence obscured in conventional surveys, with husbands showing 21% greater response variance ( $\sigma^2=2.762$  vs 2.283). Second, theoretically, we validate that bargaining power operates asymmetrically that is each additional year of women's education reduces fertility intentions by 0.15 points (vs 0.07 for men) and polygyny exacerbates reproductive conflict, increasing spousal preference gaps by 31%. Finally, politically, the results argue for gender-sensitive policies such as targeted family planning for polygynous households, female education programs to amplify opportunity-cost effects and urban reproductive health services to support women's agency.

While the cross-sectional design limits causal inference, our models account for unob-

served heterogeneity through correlated thresholds. Future research should combine longitudinal data with qualitative insights on intra-couple negotiation processes.

Ghana's demographic transition requires recognizing fertility decisions as negotiated outcomes rather than unitary choices. Our findings underscore that effective policies must address the gendered power dynamics shaping these negotiations, particularly in polygynous unions where institutionalized disparities are most pronounced.

## 9 Use of Generative AI and AI-assisted tools

During the preparation of my thesis, I used several AI tools to enhance the quality and efficiency of my work:

- **Writing Assistance:** Grammarly helped identify and correct grammatical errors while maintaining my original academic voice
- **Technical Support:** ChatGPT assisted with troubleshooting complex  $\LaTeX$  errors and Stata coding challenges
- **Data Processing:** Julius AI contributed to data cleaning procedures and visualization optimization. Specifically, I used it to generate Python Pandas scripts for merging complex datasets, develop data cleaning pipelines to handle missing values and outliers and optimize visualization parameters for better clarity.
- **Document Preparation:** AI tools aided in proper reference formatting and mathematical symbol identification

After using these tools/service, I reviewed and edited the content as needed and take full responsibility for the content of my thesis.

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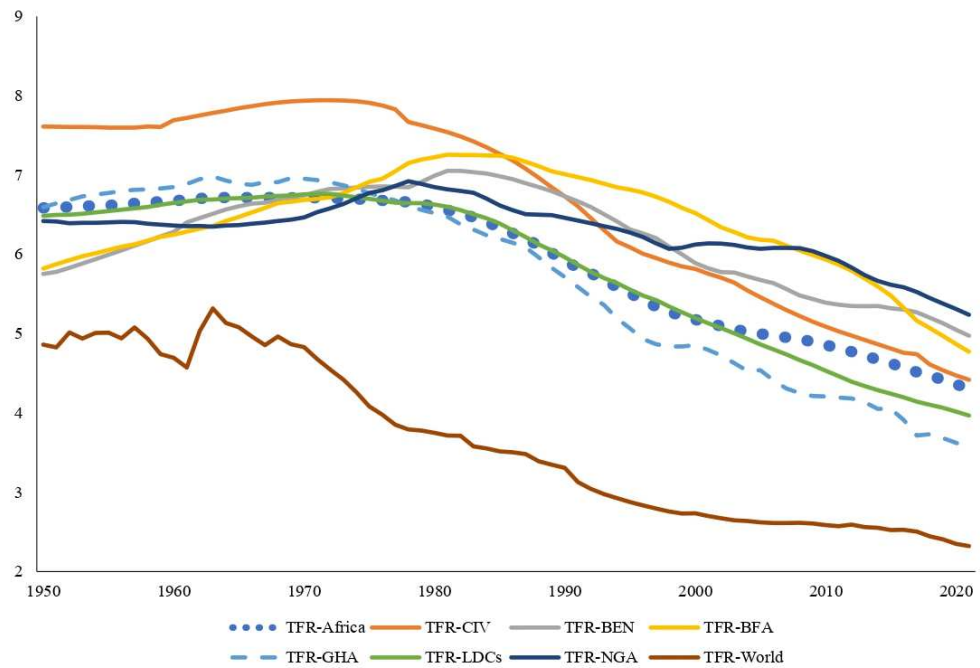
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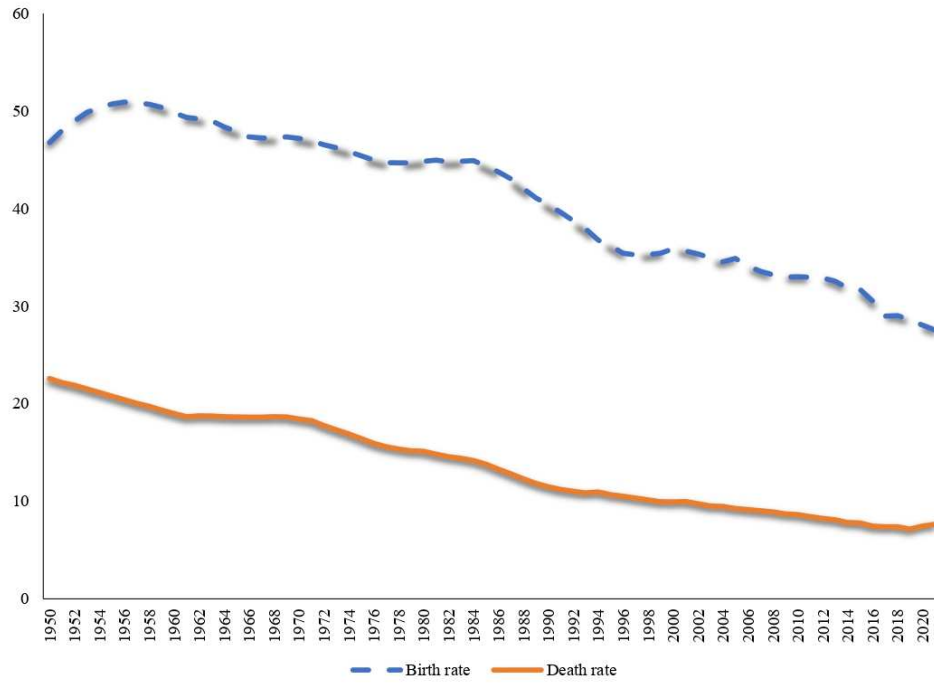
## 10 Supplementary Material (Appendices)

Figure 1: Total Fertility Rate: Children Per Woman



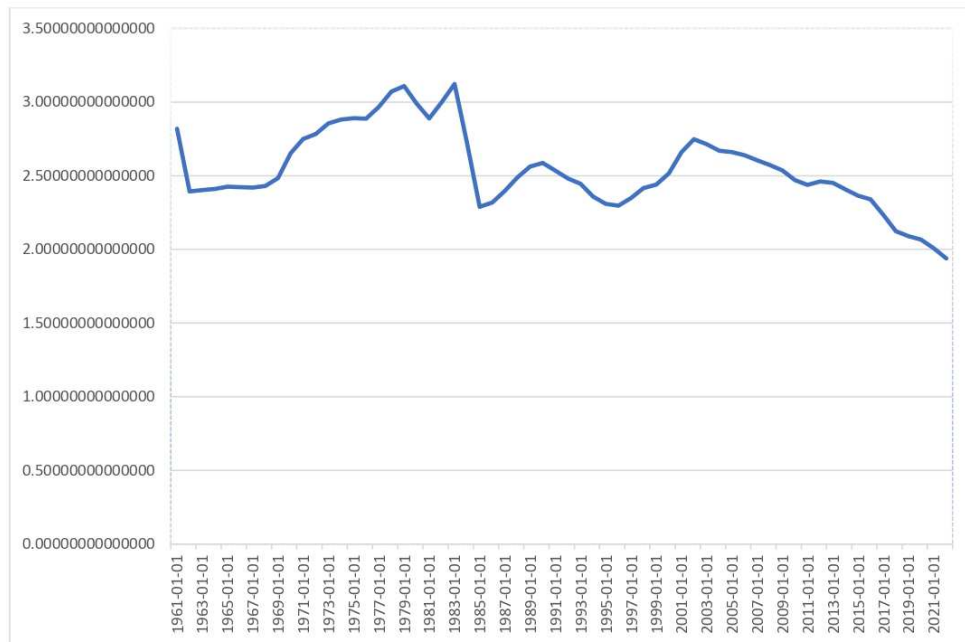
Note: TFR-CIV, TFR-BEN, TFR-BFA, TFR-GHA, TFR-LDCs, and TFR-NGA in Figure denote the Total Fertility Rate (TFR) for Ivory Coast, Benin, Burkina Faso, Ghana, Least Developed Countries, and Nigeria, respectively. This figure compares the TFR of countries that share borders with Ghana, such as Ivory Coast, Burkina Faso, and Benin to the LDCs, Africa, and the rest of the world. the y-axis is the total fertility rate, and the x-axis is the periods.

Figure 2: Mortality and Birth Rate in Ghana from 1950 to 2021



**Note: The y-axis is the birth rate and mortality rate, and the x-axis is the periods respectively.**

Figure 3: Ghana's Population Growth Rate



**Note: the y-axis is the population growth rate, and the x-axis is the periods respectively.**

Figure 4: Ghana's Population From 1950 to 2021

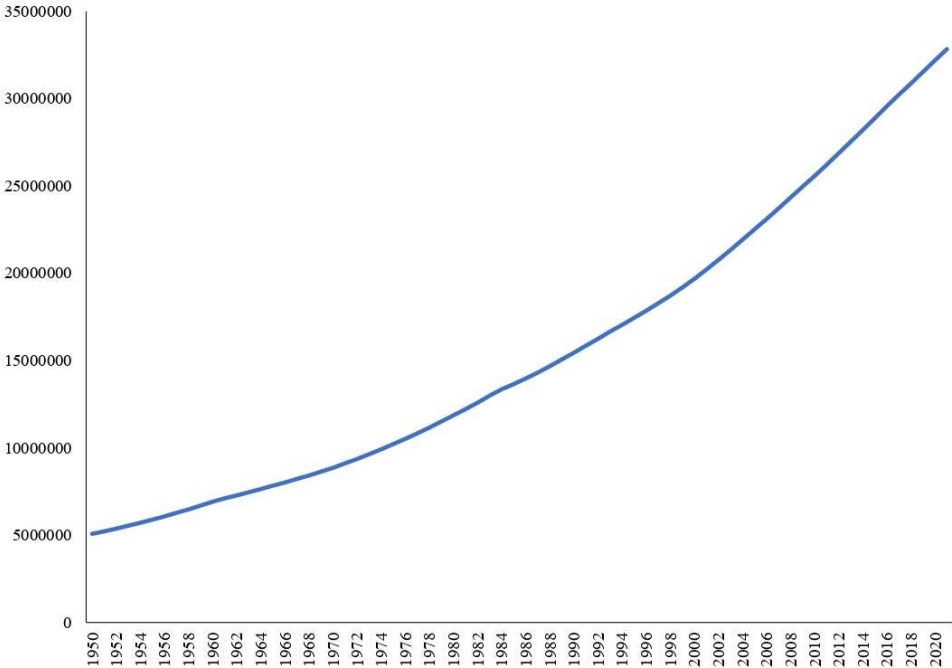
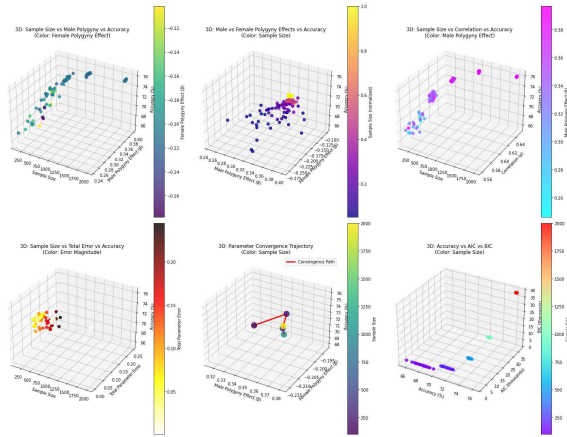
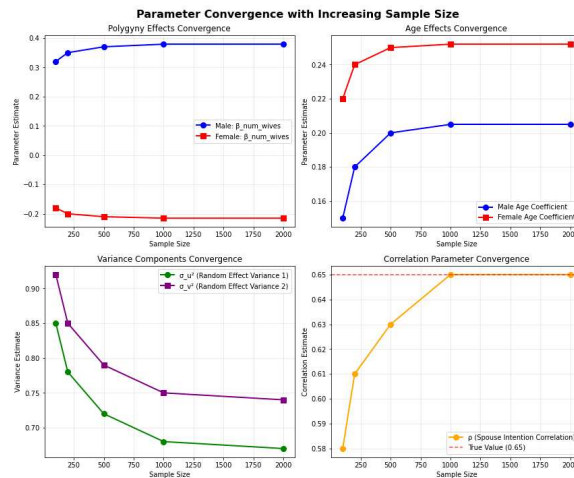


Figure 5: Three-dimensional Visualization of Spousal Fertility Intention Concordance



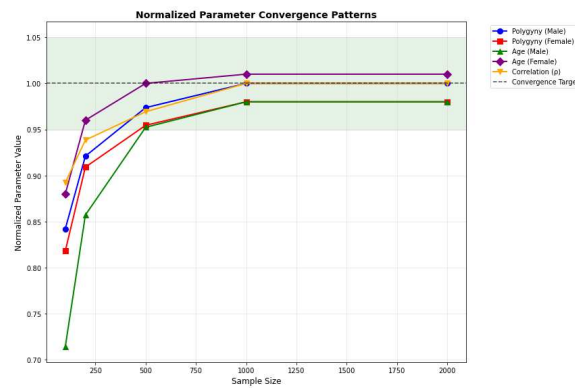
**Note:** The surface plot illustrates the joint distribution of husbands' and wives' fertility preferences across different demographic groups. Peaks indicate regions of high agreement between spouses, while valleys represent areas of divergent reproductive goals. The plot demonstrates how factors such as age, education, and marital structure influence the alignment of fertility intentions within couples.

Figure 6: Parameter Convergence With Increasing Sample Size



**Note:** All panels demonstrate how parameter estimates stabilize as the sample size increases, indicating the reliability of our model estimates.

Figure 7: Normlized Convergence By Sample Size



**Note:** The figure displays convergence patterns of normalized parameter estimates as sample size increases from 250 to 2000 observations. The visualization demonstrates how estimates for polygyny effects (both male and female), age coefficients (male and female), and spouse intention correlation ( $\rho$ ) stabilize and approach their convergence targets. The normalization process enables direct comparison of convergence behaviors across different parameter types, revealing that most parameters achieve stability within the 1000-1500 observation range. This pattern provides evidence for the robustness of our parameter estimates given the current sample size.

Table 1: Descriptive Statistics by Gender

Variable	Husband	Wife
<b>Fertility Intentions</b>		
Wants no more	15.2	8.7
Undecided timing	22.1	18.3
Wants after 2+ years	35.4	42.1
Wants within 2 years	20.5	25.6
Wants ASAP	6.8	5.3
<b>Demographics</b>		
Age	40.70	34.06
Children ever born	4.96	3.75
<b>Marital Structure</b>		
Polygamous	9.9	21.3
Wives per Polygamous Husband:		
2 wives	88.9	
3 wives	8.3	
4 wives	2.8	
<b>Education Level</b>		
None	20.83	29.62
Primary	20.45	30.05
Secondary	26.21	23.66
Higher	32.51	16.67
<b>Wealth Quintile</b>		
Poorest	19.2	15.8
Poorer	18.5	16.1
Middle	20.3	17.4
Richer	21.0	18.6
Richest	21.0	32.1
<b>Religion</b>		
Catholic	13.1	13.9
Pentecostal/Charismatic	21.2	31.9
Islam	27.5	26.5
Other religions	38.2	27.7
<b>Ethnicity</b>		
Akan	31.3	32.3
Ewe	9.8	9.7
Mole-Dagbani	32.0	32.7
Other ethnic groups	26.9	25.3
<b>Residence</b>		
Urban	42.68	42.68

Table 2: Variable Definitions and Measurement

<b>Variable</b>	<b>Definition and Measurement</b>
<b>Dependent Variable</b>	
Fertility Intentions	Categorical variable (1-5) from question: "Do you intend to have any more children?" (1=No more; 2=Undecided timing; 3=Wait $\geq 2$ years; 4=Within 2 years; 5=Now/soon). Modified phrasing for pregnant respondents.
<b>Independent Variables</b>	
Age	Continuous measure in years (husbands 15-59; wives 15-49). Note: While natural fertility declines sharply after 45, pregnancies at 49 are possible but rare, often requiring assisted reproductive technologies
Parity	Number of children ever born (continuous)
Polygamy Status	Binary indicator (1=Polygamous union, 0=Monogamous)
Education	Categorical: No schooling, Primary, Secondary, Higher
Wealth Quintile	Household wealth index (1=Poorest to 5=Richest) constructed via DHS PCA
Religion	Categorical: Catholic, Protestant, Pentecostal/Charismatic, Muslim, Other
Ethnicity	Categorical: Akan, Ga/Dangme, Ewe, Guan, Mole-Dagbani, Other
Residence	Binary urban/rural classification
<b>Sampling Variables</b>	
Sampling Weights	DHS-provided weights for national representativeness
Cluster ID	Primary sampling unit identifier
Household ID	Unique household identifier

Table 3: Bivariate Ordered Probit Estimates of Fertility Intentions by Gender

Variable	Husband	Wife
<b>Base Effects</b>		
Wife		-0.737** (0.375)
<b>Demographics</b>		
Number of wives	0.379*** (0.118)	-0.215 (0.145)
Age	-0.042*** (0.005)	0.031*** (0.009)
Age squared	0.001 (0.000)	-0.000 (0.001)
Children ever born	-0.088*** (0.016)	-0.239*** (0.032)
<b>Education</b> (ref: None)		
Secondary	-0.067 (0.113)	0.135 (0.149)
Higher	-0.145 (0.156)	-0.285 (0.249)
<b>Wealth</b> (ref: Lowest)		
Middle	-0.431*** (0.130)	0.382** (0.185)
Highest	-0.438** (0.174)	0.222 (0.238)
<b>Religion</b> (ref: Other)		
Catholic	-0.122 (0.118)	0.186 (0.176)
Pentecostal/Charismatic	-0.162* (0.098)	0.248* (0.139)
Islam	0.293*** (0.100)	0.082 (0.146)
<b>Ethnicity</b> (ref: other religion)		
Akan	-0.193* (0.108)	-0.049 (0.145)
Ewe	-0.455*** (0.136)	-0.068 (0.181)
Mole-Dagbani	0.174* (0.094)	-0.140 (0.140)
<b>Residence</b> (ref: Rural)		
Urban	-0.140 (0.106)	0.254 (0.157)

Note: Standard errors in parentheses. Significance levels indicated by \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 4: Bivariate Ordered Probit Model Results: Thresholds, Variance, and Fit Statistics

Threshold Parameters	Husband	Wife
$\tau_1$	-5.512*** (0.351)	-5.118*** (0.321)
$\tau_2$	-2.813*** (0.298)	-2.419*** (0.268)
$\tau_3$	-2.565*** (0.296)	-2.171*** (0.266)
$\tau_4$	0.453* (0.288)	0.847** (0.258)
$\tau_5$	1.977*** (0.450)	2.371*** (0.420)
<b>Variance Parameters</b>		
Log-SD ( $\ln \sigma$ )	-0.603*** (0.120)	-0.413*** (0.108)
Standard Deviation ( $\sigma$ )	1.662 (0.100)	1.511 (0.081)
$\sigma_h^2$	2.762 (0.332)	
$\sigma_w^2$		2.283 (0.245)
<b>Correlation</b>		0.650** (0.273)
<b>Model Fit</b>		
Log Likelihood		-3,791.2

Note: Standard errors in parentheses. Significance levels: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Variance parameters transformed as  $\sigma = \exp(-\text{estimate})$  and  $\sigma^2 = \sigma^2$ .