Fertility Size Decision in Iran: Evidence from Household Income Expenditure Survey

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Abstract

This study examines the factors influencing fertility size decisions in Iran, utilizing data from the Household Income Expenditure Survey. The analysis focuses on the interplay between household income, educational levels, and fertility choices.

Contents

1 Introduction

The fertility size decision is a critical aspect of demographic and economic research, influencing population growth, labor markets, and economic development. Fertility decisions made by households determine the size and age structure of the population, which in turn affects economic growth, the dependency ratio, and the potential for future economic productivity. This study explores the determinants of fertility size decisions in Iran, leveraging data from the Household Income Expenditure Survey (HIES).

In economics, understanding fertility decisions is important for several reasons. First, fertility rates directly impact population growth, which is a key factor in determining the potential labor force and the overall economic capacity of a country. High fertility rates can lead to a young population with a high dependency ratio, placing a strain on resources and public services. Conversely, low fertility rates can lead to an aging population, posing challenges for pension systems and healthcare services.

Second, fertility decisions are closely linked to household economic conditions. Economic theories suggest that household income, educational attainment, and access to healthcare services significantly influence fertility choices. Higher income levels and better education are often associated with lower fertility rates, as individuals prioritize career goals and invest more in the quality of their children's upbringing rather than the quantity. Understanding these dynamics helps policymakers design effective family planning and educational programs.

Third, fertility decisions have profound implications for women's participation in the labor force. Decisions regarding the number of children are influenced by the opportunity cost of time spent on child-rearing versus labor market participation. Policies that support childcare and parental leave can influence fertility decisions by reducing the burden on working parents, thereby promoting gender equality in the workforce.

Moreover, fertility decisions are influenced by cultural, social, and policy environments. Societal norms and values, access to contraception, and government policies on family planning play crucial roles in shaping fertility behaviors. Analyzing these factors provides insights into how different policies can affect demographic trends and economic outcomes.

Given the multifaceted impact of fertility decisions on the economy, this study aims to provide a comprehensive analysis of the factors influencing fertility size decisions in Iran. By utilizing data from the HIES, this research examines the interplay between household income, educational levels, and fertility choices. The findings of this study contribute to understanding demographic trends and economic behaviors in Iran, offering valuable insights for policymakers.

The report proceeds as follows: Section 2 provides a review of the relevant literature. Section 3 outlines the theoretical framework underpinning the study. Section 4 describes the data used in the analysis. Section 5 presents the empirical strategy. Section 6 discusses the results. Finally, Section 7 concludes the report and provides policy implications.

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2 Literature Review

In recent decades, Iran has undergone significant cultural and social transformations that have substantially impacted societal attitudes towards marriage, spouse selection, childbearing, and the desirability of marriage itself. These changes have influenced individual decisions regarding fertility and the number of children. Various studies have explored how different factors contribute to fertility decisions in Iran.

One of the major influences on fertility decisions is the employment and economic independence of women. As women gain more access to education and job opportunities, their economic, cultural, and social independence increases, which in turn affects their fertility choices. Women who are employed and economically independent tend to delay marriage and childbearing, often resulting in fewer children. The availability of family planning services and knowledge of contraceptive methods also play a crucial role in reducing fertility rates by allowing couples to plan their families more effectively.

Studies have shown that economic factors are significant determinants of fertility preferences. For instance, higher costs associated with raising children and economic uncertainties can discourage families from having more children. Research by Maherzi et al. (2017) involving over 20,000 married citizens in Iran identified concerns about securing the future of new children and the fear of increased economic burdens as major reasons for families' reluctance to have more children.

Another important study by Hamidi Ganjeh (2011) focused on women aged 15 to 49 and their desire to have a second child. The study found that higher education and employment status of women were associated with a reduced desire to have more children. Interestingly, the study also noted that socio-economic status and attitudes towards childbearing did not significantly influence the decision to have a second child.

Cultural shifts towards individualism have also been identified as critical factors affecting fertility decisions. Recent research highlights a transition in values, where individual well-being and self-expression are prioritized over traditional familial values. This shift has led to an increase in single-parent families, cohabitation, and a delay in marriage and childbearing. For instance, Erfani (2018) pointed out that the rising individualism and materialistic values in Iran are contributing to lower fertility rates, as people place less emphasis on marriage and family formation.

Furthermore, economic uncertainty and cultural transitions have a combined effect on fertility rates. A study by Wang and Zhong (2022) indicated that economic uncertainties, such as job instability and financial stress, significantly inhibit fertility rates. Additionally, cultural and ideational transitions, such as the acceptance of non-traditional family structures and delayed parenthood, further moderate this effect, reinforcing the trend towards lower fertility.

The study by Moeeni et al. (2014), titled "Analysis of Economic Determinants of Fertility in Iran: A Multilevel Approach," delves into the economic factors influencing fertility rates in Iran. Using a multilevel Poisson regression model to analyze data from the 2010 Household Expenditure and Income Survey (HEIS) and the Iran Multiple-Indicator Demographic and Health Survey (IrMIDHS), the study examines both household-level and provincial-level factors affecting fertility. The results indicate that higher educational and total household expenditures are linked to lower fertility rates, aligning with the quantity-quality trade-off theory. Moreover, both low-income and high-income households tend to have more children compared to middle-income households, suggesting different fertility motivations across economic strata. Provincially, living in areas with higher value added in manufacturing is associated with higher fertility rates, whereas higher average house rents correlate with lower fertility rates. Greater gender inequality, as measured by higher polygamy rates and unmet needs for contraception, negatively impacts women's decision-making power in households, leading to higher fertility rates.

The paper "Economic Uncertainty and Fertility" by Gözgör et al. (2019) explores how economic uncertainty affects fertility rates globally. Using the World Uncertainty Index (WUI), the study analyzes data from 126 countries between 1996 and 2017 to understand the relationship between economic uncertainty and fertility. The findings suggest that increased economic uncertainty significantly reduces fertility rates. This relationship is robust across various model specifications and controls for other factors. Economic uncertainty leads to precautionary saving, reducing both consumption and fertility as households delay childbearing during uncertain times. The negative impact of economic uncertainty on fertility is more pronounced in OECD countries compared to non-OECD countries, likely due to higher levels of parental human capital in OECD countries, making wage fluctuations more impactful on fertility decisions.

Chi-Chu Chou's (1998) paper, "Fertility, the Quality of Children, and Economic Growth," presents a theoretical framework linking fertility decisions with economic growth through the concept of the shadow price of child quality. The study explores how the interplay between the quality and quantity of children influences long-term economic growth. The shadow price of child quality plays a critical role in determining fertility rates; as economic conditions improve, the shadow price of quality decreases, leading families to invest more in the quality rather than the quantity of children. The model shows that as economies grow, fertility rates tend to decline due to the increased investment in child quality. Intergenerational transfers and parental altruism also influence fertility decisions, with higher investments in human capital linked to lower fertility rates but higher economic growth.

The paper "Education and Fertility Decline in Iran" by Aghajanian (1999) examines the role of education in the dramatic decline of fertility rates in Iran over the past few decades. Utilizing demographic and health survey data, the study analyzes the relationship between educational attainment and fertility behavior. Higher levels of education, particularly among women, are strongly associated with lower fertility rates. Educated women tend to marry later and have fewer children. Increased access to family planning services and contraceptives has facilitated the fertility decline, especially among educated women. The decline in fertility is also linked to broader socioeconomic changes, including urbanization and improved child survival rates.

The seminal paper by Barro and Becker (1989), "Fertility Choice in a Model of Economic Growth," integrates fertility decisions into a model of economic growth by considering altruistic parents who make choices about family size, consumption, and intergenerational transfers. This framework is applied to a closed economy where the determination of interest rates and wage rates is simultaneous with population growth and capital accumulation. The model derives paths for fertility, capital-labor ratios, interest rates, wage rates, and consumption per person, with particular attention to steady-state behavior. Changes in the initial capital-labor ratio, variations in child-rearing costs, rates of technological progress, and the degree of altruism significantly affect fertility decisions. An increase in fertility lowers altruism per child and increases the discount on future consumption, leading to a reduction in future consumption relative to current consumption.

These studies collectively underscore the complex interplay between economic factors and fertility decisions. Moeeni et al. (2014) focus on the specific economic conditions within Iran, revealing how household and provincial economic factors, alongside gender dynamics, shape fertility behaviors. Gözgör et al. (2019) extend this analysis globally, demonstrating the broader impact of economic uncertainty on fertility rates. Chou (1998) provides a theoretical framework linking fertility decisions with economic growth, emphasizing the importance of child quality. Aghajanian (1999) highlights the role of education in fertility decline, particularly in Iran. Barro and Becker (1989) offer a comprehensive model for understanding the relationship between fertility decisions and economic growth. These findings are essential for informing policies aimed at managing population growth and supporting sustainable development through informed economic and social strategies.

3 Theoretical Framework

This section outlines the theoretical framework guiding the analysis of fertility size decisions, based on the seminal work by Barro and Becker (1989). Their model integrates fertility choices into a model of economic growth, considering altruistic parents who make decisions about family size, consumption, and intergenerational transfers. This framework is particularly relevant for understanding the economic determinants of fertility decisions in Iran.

3.1 Model Setup

The model assumes a closed economy where parents derive utility from their consumption and the number of children, as well as from the utility of each child. The utility function of an adult in generation i is given by:

$$U_i = v(c_i) + a(n_i)n_iU_{i+1} \tag{1}$$

where c_i is the consumption of the adult, n_i is the number of children, $a(n_i)$ represents the degree of altruism toward each child, and U_{i+1} is the utility of each child.

Assuming a constant-elasticity form for $a(n_i)$:

$$a(n_i) = \alpha n_i^{\epsilon} \tag{2}$$

where $0 < \alpha < 1$ and $0 < \epsilon < 1$. The dynastic utility function, obtained by recursively substituting U_{i+1} in equation (1), is:

$$U_0 = \sum_{i=0}^{\infty} \beta^i \left(\prod_{j=0}^{i-1} n_j \right) v(c_i) \tag{3}$$

where $\beta = \alpha n_i^{\epsilon}$ and $N_i = \prod_{j=0}^{i-1} n_j$ is the number of descendants in generation i.

3.2 Budget Constraint and Optimization

Each adult earns a wage w_i and receives a bequest k_i. They allocate their resources between their own consumption c_i, bequests to their children $n_i k_{i+1}$, and the cost of raising children $n_i p_i$. The budget constraint is:

$$w_i + (1 + r_i)k_i = c_i + n_i(p_i + k_{i+1}) \tag{4}$$

The optimization problem is to maximize the dynastic utility subject to the budget constraint. The first-order conditions for this problem yield the following key relationships:

$$\frac{v'(c_i)}{v'(c_{i+1})} = \frac{\beta(1 + r_{i+1})}{n_i^{\epsilon}} \tag{5}$$

$$v'(c_i)(1 - \epsilon) = v(c_i)\left(\beta(1 + r_i) - w_i\right) \tag{6}$$

3.3 Steady-State Analysis

In the steady state, variables grow at a constant rate. The steady-state conditions for capital per effective worker k, fertility n, consumption c, interest rate r, and wage rate w are derived from the model's equations.

The relationship between the interest rate and fertility is:

$$n = \left(\frac{\beta(1 + r)}{1 + g}\right)^{1/\epsilon} \tag{7}$$

where g is the rate of technological progress. The steady-state capital accumulation equation is:

$$w + (1 + r)k = c + np \tag{8}$$

3.4 Impact of Education and Income

Education and income significantly influence fertility decisions. Higher levels of education increase the opportunity cost of time spent on child-rearing, leading to a preference for fewer children. Additionally, education enhances knowledge about family planning, leading to better fertility control. Income effects are dual-faceted: higher incomes provide the means for better child quality, supporting the quantity-quality trade-off theory, while lower incomes may lead to higher fertility due to limited access to education and family planning resources.

3.5 Urban vs. Rural Differences

Being in a rural or urban setting also impacts fertility decisions. Urban areas typically provide better access to education and healthcare services, which can lower fertility rates through improved family planning and higher opportunity costs of child-rearing. In contrast, rural areas may have higher fertility rates due to limited access to such services and different socio-economic conditions.

3.6 Predictions Based on the Model

Based on the Barro-Becker model and the aforementioned influences, several predictions can be made: 1. **Higher Education Levels**: Increased education leads to lower fertility rates due to higher opportunity costs and better family planning. 2. **Higher Incomes**: Higher incomes may reduce fertility rates as families opt for fewer but higher-quality children. However, very low incomes may increase fertility due to lack of access to education and contraception. 3. **Urbanization**: Urban residents will generally have lower fertility rates compared to rural residents due to better access to education, healthcare, and employment opportunities that raise the cost of child-rearing. 4. **Economic Uncertainty**: Higher economic uncertainty leads to lower fertility rates as families prioritize financial stability and delay childbearing.

3.7 Implications for Fertility Decisions in Iran

Barro and Becker's model provides a comprehensive framework to analyze the determinants of fertility decisions. In the context of Iran, higher costs of raising children, higher wages, and lower degrees of altruism reduce fertility rates. Conversely, higher rates of return on capital and technological progress can either increase or decrease fertility, depending on how they interact with household preferences and constraints. Applying this model to data from the Household Income Expenditure Survey can help derive insights into the economic and social dynamics that shape fertility patterns in Iran.

4 Data

This study utilizes cross-sectional data from the Household Income Expenditure Survey (HIES) for the year 1400 (2021/2022) to examine the factors influencing the number of children in Iranian households. The HIES provides comprehensive information on household income, expenditures, and various socio-economic characteristics of households across Iran.

It is important to note that cross-sectional data, while valuable, can introduce certain biases in the analysis. Since the data captures information at a single point in time, it may not fully account for the dynamic aspects of fertility decisions. For instance, a household that has had a child in the past five years may have made that decision based on anticipated future income. If we include income as an explanatory variable, we implicitly assume that households consider their future income streams when making fertility decisions. Similar issues may arise with other explanatory variables discussed in the methodology section.

4.1 Endogeneity in Cross-Sectional Analysis

Endogeneity is a concern in cross-sectional analysis because the explanatory variables may be correlated with the error term, leading to biased and inconsistent estimates. This can occur due to omitted variable bias, measurement errors, or reverse causality. For example, while analyzing the impact of income on the number of children, it is possible that unobserved factors such as family preferences and future income expectations, which are not captured in the model, influence both the income and the fertility decisions, leading to endogeneity.

4.2 Limitations of the HEIS Data

The HEIS data captures only the children currently living at home, which introduces another layer of bias. If children have left the household due to marriage, education, or employment, they are not recorded in the data. Consequently, the survey does not capture the full family size, potentially underestimating the number of children a family has had. Additionally, the data does not account for future children a household may have, which is particularly relevant for younger families or those still planning to have more children.

4.3 Methodology and Explanatory Variables

Based on previous research, the primary factors influencing fertility decisions and the number of children in a household can be summarized into key variables such as:

- **Education Level of Spouse and Household Head:** Higher education levels are generally associated with lower fertility rates due to increased opportunity costs and better family planning.
- **Age of Spouse:** The age of the spouse, particularly the wife, is a crucial factor as fertility rates typically decline with age.
- **Household Income:** Higher household income may lead to a preference for fewer, higher-quality children, consistent with the quantity-quality trade-off theory.
- **Employment Status of Spouse:** Whether the spouse is employed can significantly impact fertility decisions, as working women may delay childbearing due to career considerations.

4.4 Sample and Variables

The sample includes households from various regions, encompassing both urban and rural areas, to capture a broad spectrum of socio-economic conditions. The key variables used in the analysis include:

- **Number of Children:** The dependent variable representing the number of children in each household.
- **Household Income:** Total income of the household, adjusted for inflation.
- **Education Levels:** The highest educational attainment of both the household head and the spouse.
- **Age:** The age of the spouse.
- **Employment Status:** A binary variable indicating whether the spouse is employed.
- **Urban/Rural:** A categorical variable indicating whether the household is located in an urban or rural area.

By leveraging this dataset, the study aims to provide a detailed analysis of the economic and social factors influencing fertility decisions in Iran. The insights derived from this analysis will inform policy recommendations aimed at supporting family planning and economic stability.

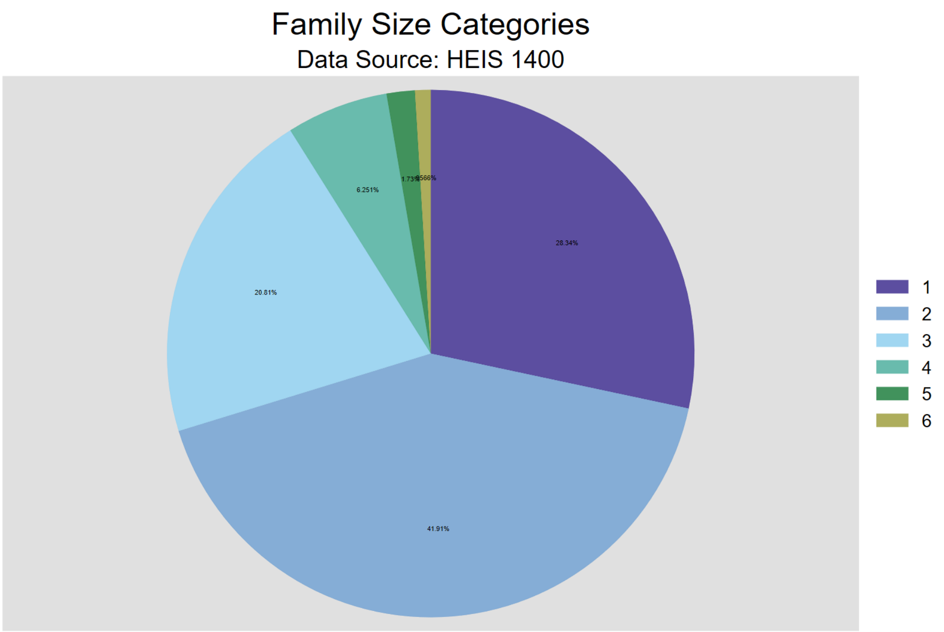

Figure 1: Family Size Categories

5 Stylized Facts

This section presents the key stylized facts about fertility size decisions in Iran, based on various visualizations created using the Household Income and Expenditure Survey (HEIS) 1400 data. The visualizations include pie charts, bar plots, scatter plots, box plots, histograms, and line graphs. These visualizations help to uncover patterns and relationships between fertility size and various demographic and socio-economic factors.

5.1 Family Size Categories

Figure 1 presents a pie chart showing the distribution of family sizes. The categories range from families with one child to families with six or more children.

Interpretation: The majority of families have either two or three children, indicating a preference for smaller family sizes. Families with four or more children constitute a smaller proportion, suggesting that higher fertility rates are less common.

5.2 Mean Number of Children by Partner Activity and Urban/Rural Status

Figure 2 shows the mean number of children based on the partner's activity status, with a distinction between urban and rural areas.

Interpretation: The mean number of children varies significantly with the partner's activity status. In rural areas, unemployed partners tend to have more children compared to other activity statuses. In urban areas, housekeepers and unemployed partners have a higher mean number of children. This suggests that economic activity and employment status are important factors influencing fertility decisions.

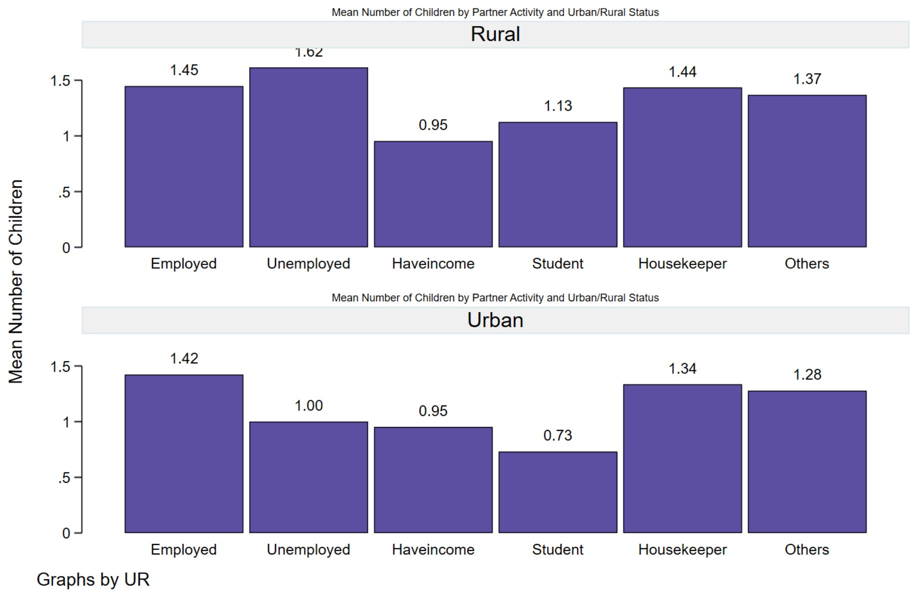

Figure 2: Mean Number of Children by Partner Activity and Urban/Rural Status

5.3 Number of Children vs. Real Income

Figures 3 and 4 show scatter plots of the number of children versus real income for rural and urban households, respectively.

Interpretation: There is no clear linear relationship between real income and the number of children in both rural and urban areas. However, a slight negative trend can be observed, indicating that higher income levels are associated with fewer children, particularly in urban areas. This aligns with the theory that wealthier families invest more in the quality rather than the quantity of children.

5.4 Education Level of Supervisor by Urban/Rural Status

Figure 5 presents a box plot of the education level of household supervisors, differentiated by urban and rural status.

Interpretation: The education level of supervisors is generally higher in urban areas compared to rural areas. This disparity in educational attainment could influence fertility decisions, as higher education levels are often associated with lower fertility rates due to greater career opportunities and family planning awareness.

5.5 Age Distribution of Supervisors by Urban/Rural Status

Figure 6 shows the age distribution of household supervisors, with separate histograms and density plots for urban and rural areas.

Interpretation: The age distribution of supervisors shows that urban areas have a slightly younger population compared to rural areas. The peak age group for supervisors in both areas is around 40-50 years. This age distribution is relevant for fertility decisions, as younger supervisors may still be in their childbearing years, while older supervisors are likely to have

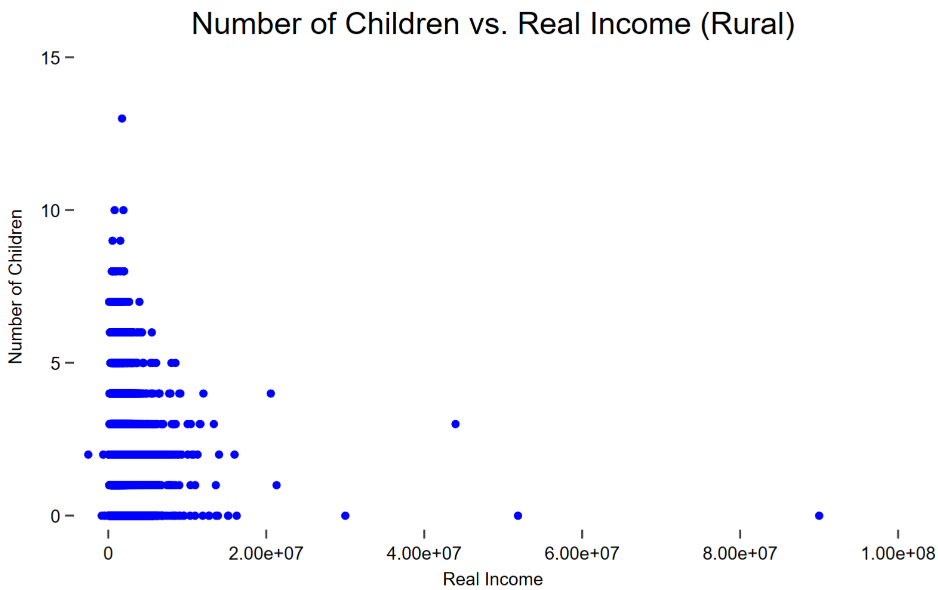

Figure 3: Number of Children vs. Real Income (Rural)

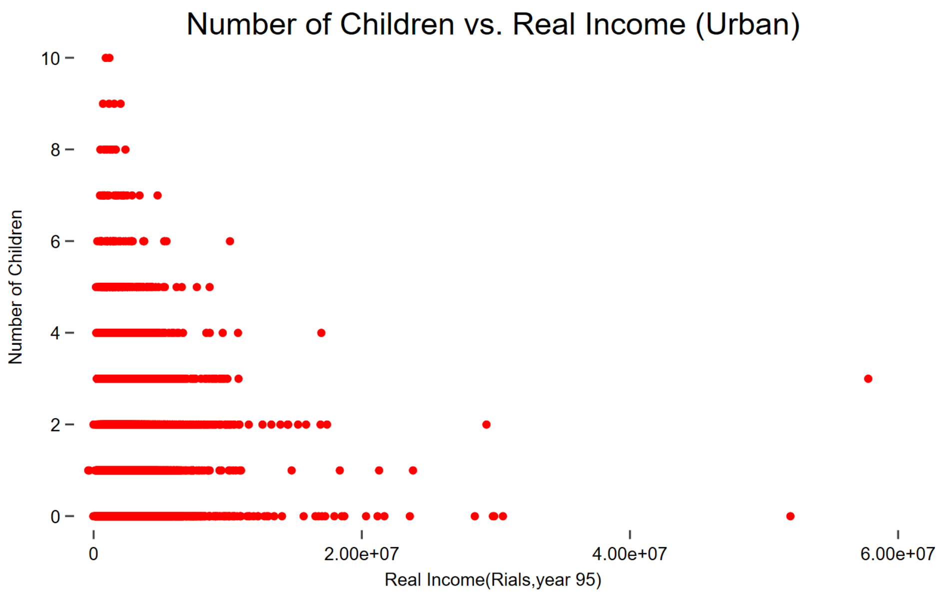

Figure 4: Number of Children vs. Real Income (Urban)

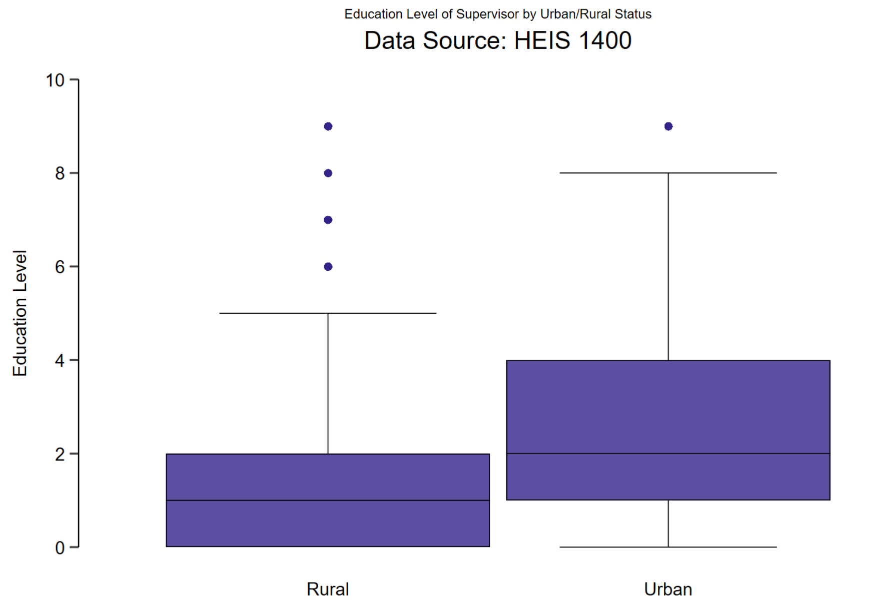

Figure 5: Education Level of Supervisor by Urban/Rural Status

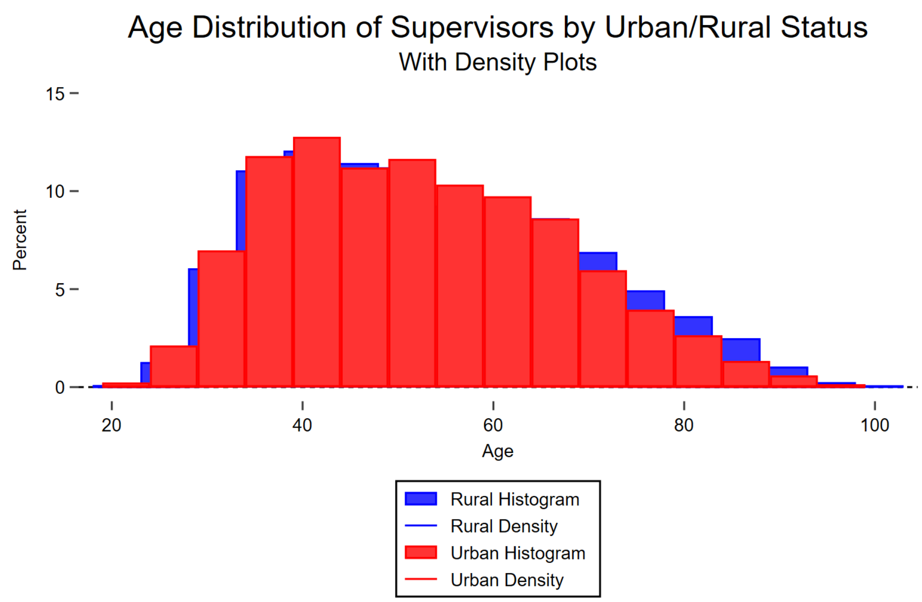

Figure 6: Age Distribution of Supervisors by Urban/Rural Status

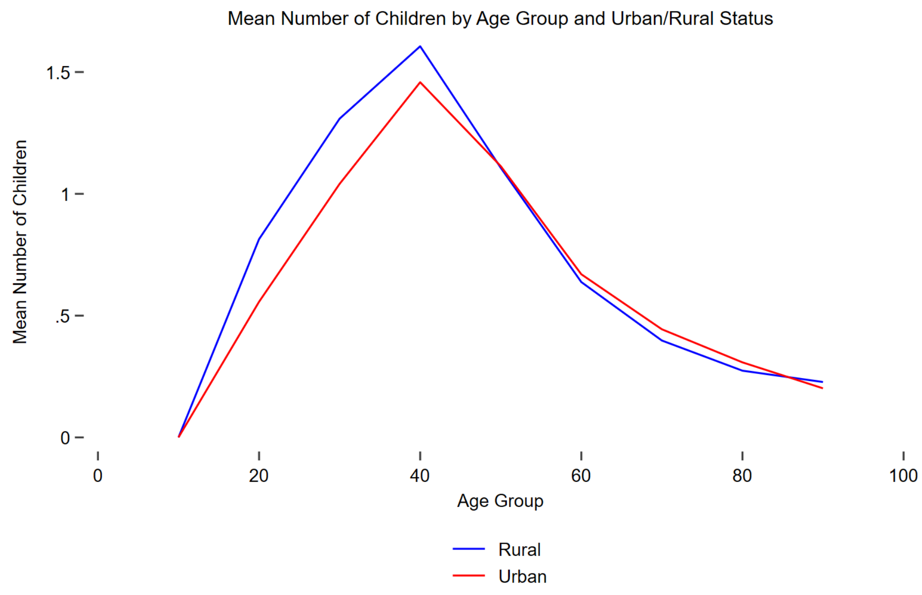

Figure 7: Mean Number of Children by Age Group and Urban/Rural Status

completed their families.

5.6 Mean Number of Children by Age Group and Urban/Rural Status

Figure 7 presents a line graph of the mean number of children by age group, with separate lines for urban and rural areas.

Interpretation: The mean number of children increases with age up to around 40 years and then declines. This trend is consistent in both urban and rural areas, although rural households tend to have more children on average compared to urban households. This pattern reflects the typical childbearing age and suggests that fertility decisions are influenced by the life cycle stage of the household.

These visualizations collectively provide a comprehensive overview of the factors influencing fertility size decisions in Iran. The differences between urban and rural areas highlight the importance of considering geographic and socio-economic contexts when analyzing fertility behaviors.

6 Empirical Strategy

To investigate the determinants of fertility size decisions, we employ two econometric models: Poisson regression using the Berndt-Hall-Hall-Hausman (BHHH) algorithm and multinomial logit regression. The dependent variable in our analysis is the number of children ($ChildNumber_i$), and the key explanatory variables include real income ($Real\_income_i$), partner's education level (PEL_i), supervisor's education level (SEL_i), partner's activity status (PA_i), and husband's age (HA_i). The empirical model can be specified as follows:

$$ChildNumber_i = \beta_1 + \beta_2 income_i + \beta_3 PEL_i + \beta_4 SEL_i + \beta_5 PA_i + \beta_6 HA_i + \epsilon_i \qquad (9)$$

6.1 Poisson Regression with BHHH Algorithm

Poisson regression is suitable for count data, such as the number of children. The Poisson model assumes that the number of children follows a Poisson distribution with a mean that is a function of the explanatory variables. The probability of observing $ChildNumber_i$ children for household i is given by:

$$P(ChildNumber_i = k) = \frac{e^{-\lambda_i} \lambda_i^k}{k!} \tag{10}$$

where λ_i is the expected number of children for household i and is defined as:

$$\lambda_i = \exp(\beta_1 + \beta_2 income_i + \beta_3 PEL_i + \beta_4 SEL_i + \beta_5 PA_i + \beta_6 HA_i) \tag{11}$$

The BHHH algorithm is used for maximizing the likelihood function in Poisson regression. It is an iterative method that updates the parameter estimates by maximizing the log-likelihood function:

$$L(\beta) = \sum_{i=1}^{N} [ChildNumber_i \log(\lambda_i) - \lambda_i - \log(ChildNumber_i!)] \tag{12}$$

6.2 Multinomial Logit Regression

Multinomial logit regression is applied when the dependent variable is categorical with more than two outcomes. In this context, we categorize the number of children into several groups and model the probability of each category. The probability that household i falls into category j is given by:

$$P(Y_i = j) = \frac{\exp(X_i \beta_j)}{\sum_{k=1}^{J} \exp(X_i \beta_k)} \tag{13}$$

where Y_i is the number of children category for household i, X_i is the vector of explanatory variables, β_j is the vector of parameters for category j, and J is the number of categories.

The model is estimated by maximizing the likelihood function:

$$L(\beta) = \sum_{i=1}^{N} \sum_{j=1}^{J} d_{ij} \log(P(Y_i = j)) \tag{14}$$

where d_{ij} is an indicator variable that equals 1 if household i has j children and 0 otherwise.

6.3 Interpretation of the Model

The coefficients obtained from the Poisson regression and multinomial logit regression models provide insights into how each explanatory variable affects the number of children. A positive coefficient indicates that an increase in the explanatory variable is associated with an increase in the number of children, while a negative coefficient indicates the opposite.

7 Results

7.1 Poisson Regression Results

The Poisson regression model provides insights into the factors influencing the number of children in Iranian households. The dependent variable in the model is the number of children (ChildNumber). The independent variables include HusbandAge, SupervisorEducationLevel, PartnerEducationLevel, income, and PartnerActivity.

Table 1: Poisson Regression Results

	Dependent Variable: ChildNumber
Variables	**Coefficients**
HusbandAge	-0.024***
	(0.001)
SupervisorEducationLevel	-0.016**
	(0.005)
PartnerEducationLevel	-0.068***
	(0.006)
income	0.000***
	(0.000)
PartnerActivity	-0.009
	(0.006)
Constant	1.459***
	(0.047)
Observations	15453
Pseudo R^2	0.123

Standard errors in parentheses

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

7.1.1 HusbandAge

The coefficient for HusbandAge is -0.024 and is statistically significant at the 1% level. This indicates that, holding other factors constant, for each additional year of the husband's age, the expected number of children decreases by approximately 2.4%. This negative relationship suggests that older husbands tend to have fewer children, which may be due to delayed marriage or childbearing.

7.1.2 SupervisorEducationLevel

The coefficient for SupervisorEducationLevel is -0.016 and is statistically significant at the 1% level. This result implies that higher educational attainment of the household supervisor is associated with a lower number of children. Specifically, an increase in the supervisor's education level by one unit (e.g., moving from primary to middle school education) leads to a 1.6%

decrease in the expected number of children. This finding aligns with the theory that more educated individuals prioritize career and personal development, often leading to smaller family sizes.

7.1.3 PartnerEducationLevel

The coefficient for PartnerEducationLevel is -0.068 and is statistically significant at the 1% level. This coefficient indicates that higher education levels of the partner (typically the wife) are strongly associated with a lower number of children. An increase in the partner's education level by one unit results in a 6.8% decrease in the expected number of children. This substantial effect suggests that educated women tend to have fewer children, possibly due to better career opportunities and access to family planning resources.

7.2 Income

The coefficient for income is positive and statistically significant at the 1% level, although the value is very small (0.000). This indicates that higher household income is associated with a higher number of children, but the effect size is negligible. This could reflect the nuanced decision-making process where wealthier families might afford more children but also balance this against other factors like education and career goals.

7.2.1 PartnerActivity

The coefficient for PartnerActivity is -0.009, but it is not statistically significant. This suggests that the employment status of the partner does not have a significant impact on the number of children in this dataset. Further investigation might be required to understand the underlying reasons, possibly involving more detailed categories of employment or additional socio-economic variables.

7.2.2 Constant

The constant term is 1.459 and is statistically significant at the 1% level. This value represents the expected number of children when all the independent variables are zero. It provides a baseline from which the effects of the independent variables can be interpreted.

7.2.3 Overall Model Fit

The Pseudo R^2 value of 0.123 indicates a moderate fit for the model. While it does not explain all the variability in the number of children, it provides significant insights into the key factors influencing fertility decisions.

7.2.4 Conclusion

The Poisson regression results highlight the significant impact of education levels (both supervisor and partner) and age on fertility decisions in Iranian households. Income also plays a role, though its effect size is minimal. These findings underscore the importance of educational and economic factors in shaping family size decisions, with potential implications for policy interventions aimed at supporting family planning and economic development.

To analyze the factors influencing the number of children in Iranian households, we estimate a multinomial logit model. The dependent variable, $ChildNumber\_cat$, categorizes the number of children into five groups: 0 children, 1 child, 2 children, 3 children, and 4 or more children. The model includes the following independent variables: husband's age, supervisor's education level, partner's education level, household income, and partner's activity status.

7.3 Multinomial Logit

The multinomial logit model can be specified as:

$$\Pr(Y_i = j) = \frac{e^{\beta_{j1}+\beta_{j2}\text{Real\_income}_i+\beta_{j3}\text{PE}_i+\beta_{j4}\text{SE}_i+\beta_{j5}\text{PA}_i+\beta_{j6}\text{HA}_i}}{\sum_{k=0}^{J} e^{\beta_{k1}+\beta_{k2}\text{Real\_income}_i+\beta_{k3}\text{PE}_i+\beta_{k4}\text{SE}_i+\beta_{k5}\text{PA}_i+\beta_{k6}\text{HA}_i}} \tag{15}$$

where Y_i is the categorical dependent variable representing the number of children, and j ranges from 0 to 4, representing the categories of 0 children, 1 child, 2 children, 3 children, and 4 or more children, respectively.

The results of the multinomial logit regression are presented in Table 2.

Table 2: Multinomial Logit Regression Results

	0 Children	1 Child	2 Children	3 Children	4+ Children
HusbandAge	0	-0.026***	-0.059***	-0.061***	-0.064***
	.	(0.002)	(0.002)	(0.002)	(0.003)
SupervisorEducationLevel	0	-0.015	-0.028**	-0.037**	-0.102***
	.	(0.015)	(0.014)	(0.018)	(0.028)
PartnerEducationLevel	0	0.004	-0.039***	-0.180***	-0.433***
	.	(0.016)	(0.015)	(0.020)	(0.034)
Income	0	1.69e-07***	2.43e-07***	2.75e-07***	2.84e-07***
	.	(2.01e-08)	(1.83e-08)	(2.07e-08)	(2.64e-08)
PartnerActivity	0	0.034	0.021	-0.009	0.034
	.	(0.021)	(0.019)	(0.023)	(0.034)
Constant	0	0.292	2.301***	2.081***	1.715***
	.	(0.156)	(0.142)	(0.174)	(0.242)
Observations			15,453		

Standard errors in parentheses

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

7.4 Interpretation of Multinomial Logit Results

The multinomial logit model estimates the likelihood of having different numbers of children based on various explanatory variables, with the dependent variable categorized into five groups: 0 children, 1 child, 2 children, 3 children, and 4 or more children. The results are presented in Table 2.

7.4.1 HusbandAge

The coefficients for HusbandAge are negative and statistically significant across all categories, indicating that as the age of the husband increases, the likelihood of having more children decreases. Specifically, for each additional year of the husband's age, the log-odds of having 1, 2, 3, or 4 or more children relative to having 0 children decrease by 0.026, 0.059, 0.061, and 0.064, respectively.

7.4.2 SupervisorEducationLevel

The coefficients for SupervisorEducationLevel are negative and statistically significant for categories 2, 3, and 4 or more children. This indicates that higher education levels of the household supervisor are associated with a lower probability of having more children. The log-odds of having 2, 3, or 4 or more children relative to having 0 children decrease by 0.028, 0.037, and 0.102, respectively, for each unit increase in the supervisor's education level.

7.4.3 PartnerEducationLevel

PartnerEducationLevel has a strong negative effect on the number of children. The coefficients are -0.039, -0.180, and -0.433 for the categories 2, 3, and 4 or more children, respectively, indicating that higher education levels of the partner significantly reduce the likelihood of having more children.

7.4.4 Income

The coefficients for income are positive and statistically significant across all categories, although very small. This suggests that higher household income is associated with a slightly higher probability of having more children.

7.4.5 PartnerActivity

The coefficients for PartnerActivity are not statistically significant, indicating that the employment status of the partner does not significantly impact the number of children in this sample.

7.5 Constant

The constant terms are positive and statistically significant across all categories, representing the baseline log-odds of having 1, 2, 3, or 4 or more children relative to having 0 children when all other variables are zero.

7.5.1 Conclusion

The multinomial logit results confirm that age and education levels are significant determinants of fertility decisions in Iranian households. Higher age and education levels for both the husband and partner are associated with a lower likelihood of having more children. Income has a minimal but positive effect on fertility, while partner activity status does not significantly influence the number of children. These findings are consistent with the Poisson regression results and provide robust evidence for the factors affecting fertility decisions.

8 Discussion & Conclusion

9 Discussion & Conclusion

This study aims to analyze the determinants of fertility decisions among Iranian households using the HEIS 1400 data. By employing both Poisson regression and multinomial logit models, we have examined the impact of various socio-economic factors, such as income, education levels, partner activity status, and age, on the number of children in a household.

9.1 Summary of Findings

Our empirical analysis provides several key insights into the fertility decisions of Iranian households:

- **Age:** Both Poisson and multinomial logit models reveal that the age of the husband negatively affects the number of children. As the age increases, the likelihood of having more children decreases significantly. This trend suggests that older couples may prefer smaller family sizes, potentially due to increased economic stability or different life priorities at older ages.
- **Education:** Education levels of both the household supervisor and the partner play a crucial role in fertility decisions. Higher education levels are associated with a lower number of children. This finding aligns with the hypothesis that higher educational attainment, which often leads to better economic opportunities and increased knowledge of family planning, results in smaller family sizes.
- **Income:** Household income shows a positive, albeit small, effect on the number of children. While higher income increases the likelihood of having more children, the effect size is minimal. This suggests that while financial stability may encourage larger families, other factors like education and personal preferences might have stronger influences on fertility decisions.
- **Partner Activity:** The employment status of the partner does not show a significant impact on the number of children in both models. This indicates that the decision to have more children is not strongly influenced by whether the partner is employed, unemployed, or engaged in other activities.

9.2 Policy Implications

The findings of this study have several implications for policymakers:

- **Family Planning and Education:** Enhancing access to education and family planning resources can significantly impact fertility rates. Policies that promote higher education, especially among women, and provide comprehensive family planning services are likely to result in smaller family sizes.
- **Support for Older Parents:** Given the negative relationship between age and the number of children, policies supporting older parents, such as childcare services and parental leave, could help those who wish to have children later in life.

- **Income Support:** Although the effect of income on fertility is minimal, ensuring economic stability through income support programs can create an environment where families feel financially secure to make informed fertility decisions.

9.3 Limitations and Future Research

This study has several limitations that should be addressed in future research:

- **Cross-Sectional Data:** The use of cross-sectional data may introduce biases, as it captures only a snapshot in time. Longitudinal data would provide a more comprehensive understanding of how fertility decisions evolve over time.
- **Unobserved Variables:** There may be unobserved variables, such as cultural attitudes and health factors, influencing fertility decisions that are not captured in this study. Future research should aim to include these variables to provide a more holistic analysis.
- **Geographical Variations:** While this study controls for urban and rural status, there might be significant geographical variations within these categories that affect fertility decisions. Analyzing data at a more granular geographical level could yield additional insights.

9.4 Conclusion

In conclusion, this study provides important insights into the socio-economic determinants of fertility decisions in Iranian households. Age and education levels are significant factors influencing the number of children, while income has a minimal effect, and partner activity status is not a significant determinant. These findings highlight the importance of education and family planning policies in shaping fertility behaviors and underscore the need for targeted support for families to make informed reproductive choices. Future research should build on these findings by addressing the identified limitations and exploring additional factors influencing fertility decisions.

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