



## IQTISODIYOT & TARAQQIYOT

*Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal*

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# DELAYING MOTHERHOOD: BEHAVIORAL AND SOCIO-DEMOGRAPHIC DETERMINANTS OF EARLY CHILDBEARING IN TAJIKISTAN

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**Abstract.** Empirical studies show that age at first birth is an important factor in family planning in developed countries. However, the role of women's age at first birth in family planning remains relatively underexplored in lower-middle-income countries, including Tajikistan. This study uses the 2023 Tajikistan Demographic and Health Survey (DHS) data and applies an instrumental-variable probit model. The results indicate that behavioral and socio-demographic factors, including contraceptive use, women's educational attainment, and household wealth status, are statistically associated with delaying early motherhood. The findings also show that women's wealth status and their spouses' occupational status have similar associations with early motherhood, as both are linked to a lower likelihood of postponing early motherhood. Compared with women who made contraceptive decisions jointly with their partners, women who made such decisions independently were more likely to have their first birth after age 20. Similarly, cases in which husbands made contraceptive decisions were also positively associated with delaying early motherhood. By contrast, women whose contraceptive decisions were made by another person were less likely to delay early motherhood. Overall, women's higher education and their participation in contraceptive decision-making appear to be important policy priorities for effective family planning. Future research on the causal relationship between women's health and the use of modern contraceptives in Tajikistan and comparable low-income contexts may contribute to the development of more effective health policy.

**Keywords:** contraceptives; family planning; lower-middle-income countries; modern contraceptives; women's education

**Annotatsiya.** Empirik tadqiqotlar rivojlangan mamlakatlarda birinchi farzand ko'rish yoshi oilani rejalashtirishda muhim omillardan biri ekanini ko'rsatadi. Biroq Tojikiston kabi daromadi o'rtachadan past mamlakatlarda ayollarning birinchi farzand ko'rish yoshi va uning oilani rejalashtirishdagi o'rni yetarli darajada o'rganilmagan. Ushbu tadqiqotda 2023-yilgi Tojikiston Demografik va sog'liqni saqlash so'rovi (DHS) ma'lumotlaridan foydalanilib, instrumental o'zgaruvchilar probit modeli qo'llanildi. Natijalar kontratseptiv vositalardan foydalanish, ayollarning ta'lim darajasi va uy xo'jaligining farovonlik holati kabi xulqiy hamda ijtimoiy-demografik omillar erta onalikni kechiktirish bilan statistik jihatdan bog'liq ekanini ko'rsatadi. Shuningdek, ayollarning iqtisodiy holati va turmush o'rtog'larining kasbiy maqomi erta onalik bilan o'xshash yo'nalishdagi bog'liqlikka ega bo'lib, ushbu omillar erta onalikni kechiktirish ehtimolining nisbatan pastligi bilan bog'liq. Kontratseptiv vositalardan foydalanish bo'yicha qarorlarni turmush o'rtog'i bilan birgalikda qabul qilgan ayollar bilan solishtirganda, bunday qarorlarni mustaqil qabul qilgan ayollarda birinchi farzandni 20 yoshdan keyin ko'rish ehtimoli yuqoriroq bo'lgan. Shuningdek, kontratseptiv qarorlar er tomonidan qabul qilingan holatlar ham erta onalikni kechiktirish bilan ijobiy bog'liqlik ko'rsatgan. Aksincha, kontratseptiv qarorlar boshqa shaxs tomonidan qabul qilingan holatlarda erta onalikni kechiktirish ehtimoli pastroq bo'lgan. Umuman olganda, ayollarning yuqori ta'lim darajasi va kontratseptiv vositalardan foydalanish bo'yicha qaror qabul qilish jarayonidagi ishtiroki



samarali oilani rejalashtirishning muhim siyosiy-amaliy yo'nalishlari sifatida namoyon bo'ladi. Kelgusida Tojikiston va unga o'xshash past daromadli mamlakatlarda ayollar salomatligi hamda zamonaviy kontratseptiv vositalardan foydalanish o'rtasidagi sababiy bog'liqlikni chuqurroq o'rganish sog'liqni saqlash siyosatini yanada takomillashtirishga xizmat qilishi mumkin.

**Kalit so'zlar:** kontratseptivlar; oilani rejalashtirish; daromadi o'rtachadan past mamlakatlar; zamonaviy kontratseptiv vositalar; ayollar ta'limi

**Аннотация.** Эмпирические исследования показывают, что возраст женщины при рождении первого ребенка является важным фактором планирования семьи в развитых странах. Однако в странах с уровнем дохода ниже среднего, включая Таджикистан, роль возраста женщины при рождении первого ребенка в контексте планирования семьи остается недостаточно изученной. В данном исследовании используются данные Демографического и медицинского обследования Таджикистана (DHS) за 2023 год и применяется пробит-модель с инструментальными переменными. Результаты показывают, что поведенческие и социально-демографические факторы, включая использование контрацептивов, уровень образования женщин и благосостояние домохозяйства, статистически связаны с отсрочкой раннего материнства. Кроме того, экономическое положение женщин и профессиональный статус их супругов демонстрируют схожую связь с ранним материнством, поскольку оба фактора ассоциируются с более низкой вероятностью его отсрочки. По сравнению с женщинами, которые принимали решения об использовании контрацепции совместно с партнерами, женщины, принимавшие такие решения самостоятельно, с большей вероятностью рожали первого ребенка после 20 лет. Аналогично, случаи, когда решения о контрацепции принимались мужьями, также положительно связаны с отсрочкой раннего материнства. Напротив, женщины, чьи решения о контрацепции принимались другим лицом, с меньшей вероятностью откладывали раннее материнство. В целом более высокий уровень образования женщин и их участие в принятии решений об использовании контрацептивов могут рассматриваться как важные направления политики эффективного планирования семьи. Дальнейшие исследования причинно-следственной связи между здоровьем женщин и использованием современных методов контрацепции в Таджикистане и сопоставимых странах с низким уровнем дохода могут способствовать разработке более эффективной политики в сфере здравоохранения.

**Ключевые слова:** контрацептивы; планирование семьи; страны с уровнем дохода ниже среднего; современные методы контрацепции; образование женщин

## INTRODUCTION

Child marriages in developing countries are often attributed to the lack of socio-demographic capital, including education, ethnicity, and women's autonomy in decision-making regarding their own health [33; 28; 44]. However, the consequences of child marriages may trigger relatively early timing of first birth for the first birth in the family planning process [37]. Empirical research demonstrates that women in developed nations and upper-middle-income countries take the significance of age at first birth seriously when considering family planning [31; 46; 14].

The acceleration in child marriages in Tajikistan started during the post-Soviet era. Local traditions and cultural interpretations have also influenced these demographic shifts. In many rural settings, marriages at age 18 align with prevalent social norms [51; 17]. In contrast to neighboring countries such as Kazakhstan and Uzbekistan, regional reports indicate that Tajikistan has one of the highest adolescent fertility rates in Central Asia, with estimates of approximately 41.3 births per 1,000 among 15-year-olds to 19-year-olds. Moreover, adolescent birth rates in Tajikistan have risen in recent years and early marriage before 18 years, reflecting a key risk factor for early first birth [49]. These demographic trends are significant because early-age birth is associated with unfavorable health, social, and economic outcomes [3; 45; 14; 27]. Studies on early age birth highlight that it is associated with higher risks of low birth weight, preterm delivery, and other serious health-related outcomes compared with adult mothers aged 20–24, as indicated in the empirical evidence across lower and upper-middle-income countries [4; 16; 3]. Societal expectations often shape resource allocation within families, leading to disparate educational and developmental opportunities for boys and girls. Likewise, the gender gap in higher educational attainment is also significant. Women in Tajikistan have moderate literacy rates, and female enrolment in higher education institutions is considerably lower than male enrolment [6; 53; 46; 12]. Furthermore, the use of modern contraceptives is less prevalent in Tajikistan [54]. Investigating



the behavioral and socio-demographic factors associated with delaying early childbearing in Central Asia, particularly in Tajikistan, is vital because it is a pressing public health issue with considerable health-related implications on adolescent mothers. Therefore, it is interesting to examine the potential socio-economic and behavioral factors that could be vital for family planning and delaying early motherhood in lower-middle-income countries, such as Tajikistan.

According to the World Health Organization (WHO), the age bracket (20-24 years) at first birth reduces the risks of eclampsia, puerperal endometritis, and systemic infections. However, in low-income countries, the lack of socio-demographic capital and unawareness of contraceptive measures often may limit the achievement of the recommended age range of 20-24 years for conceiving a pregnancy [54]. Empirical evidence indicates that the relatively early timing of first birth accelerates the range of unfavorable outcomes, such as increased rates of mortality among mothers and children [22; 13]. Likewise, the health-related consequences of early marriage for women instigate a range of health and psychological challenges, including various illnesses, depression, and emotional distress [27]. Low birth weight and malnutrition are also associated with early childbearing [4; 36; 45].

The principal supporters of Human Capital Theory, Theodore Schultz and Gary Becker, argue that investing in education promotes economic growth by improving living standards and fostering a healthier, more prosperous society [8; 29]. Investing in individuals, particularly through education, fosters the development of essential skill sets, including leadership and strategic planning [19]. Korres (2008) notes that in low-income countries, resource constraints often limit the optimal development of the education sector. Women in these countries have limited educational opportunities and job prospects; consequently, social norms may encourage early marriage and childbearing [47; 27]. Improved educational access mitigates social pressures for early childbearing, whereas lower income and limited education are strongly correlated with higher rates of adolescent pregnancy [36; 7].

Recent literature suggests that geographic location, as well as urban and rural dwellings, are associated with teenage pregnancy [22]. Birth rates among rural residents tend to be higher at younger ages compared to urban women. Women who belong to urban areas tend to have better knowledge about current methods of birth control and face lower social pressure to get pregnant [7]. Similarly, Melnikas and Romero (2019) indicate that women residing in urban areas characterized by elevated living costs and challenging job markets tend to postpone childbirth. Negash and Asmamaw (2022) report a positive correlation between adolescent motherhood and urban versus rural residence. Similarly, print and electronic media contribute to delaying motherhood by broadcasting specialized programs focused on family planning [39; 21]. Likewise, the recent studies on adolescent birth highlight that studies on adolescent birth indicate that variations in marriage and childbearing ages frequently correlate with distinct cultural and regional demographics [45]. Research shows that certain traditional communities record earlier average ages for both marriage and first childbirth [41; 35; 13]. Mugarura et al. (2016) and Rindfuss and John (1983) analyze the roles of ethnicity and ideal age at first birth in understanding the decision-making process in family planning.

A thorough review of the determinants of early birth in lower-middle-income countries has revealed that no specific research on this topic has been conducted in Tajikistan. Using data from the Demographic and Health Survey (DHS) for  $n = 3,952$  married women in Tajikistan, we employed an instrumental variable probit model. Addressing potential endogeneity in the key variables of interest (respondents' education) poses methodological challenges, which we acknowledge.

The study is structured as follows: in the next section, we provide a literature review with the regional and intercontinental context of early birth in low- and lower-middle-income countries. Section 3 provides an elaboration on the data source, data methodology, and empirical framework. Section 4 presents the findings and discussion, and Section 5 concludes with the policy implications.

## LITERATURE REVIEW

In recent years, the rate of child marriages has been declining gradually, from 23 percent to 19 percent globally. There was a significant improvement in this matter in the South Asian regions, where the rate of child marriages has dropped from 46 percent to 28 percent. However, according to UNICEF forecasts, about 10 million more girls globally may remain at risk of early marriage. UNICEF reports that approximately 650 million females alive today were married before they reached the age of 18, even though the UN General Assembly considered marriage before 18 years as a serious concern from a rights-based perspective [50; 48; 55].

The incidence of early childbearing predominantly occurs in Sub-Saharan Africa and South Asia [48]. Research indicates that the median age for first childbirth in Sub-Saharan nations is 19 years [37]. Fan and Koski (2022) conclude in their systematic review that child marriage promotes the prevalence of intimate partner



violence. According to Dewau et al. (2021), highlighting the adverse effects of early marriage and establishing a minimum legal marriage age based on health standards may also help reduce the number of early marriages. In addition, this study indicates that contraceptives postpone the onset of early age at first birth.

In South Asia, higher fertility and early marriage increase the risk of lower age at first birth. In these contexts, strong cultural preferences for childbearing within marriage mean that early marriages frequently serve as the primary structural pathway to early reproduction [40; 24]. Maulinda et al. (2021) found that in Indonesia, early marriage increases the risk of labor complications and low birthweight. Chowdhury et al. (2017) highlight the determinants of early birth among young women in Bangladesh. According to Haque and Sayem (2008), one of the most significant factors influencing age at first birth is familial pressure in rural Bangladesh, which affects females and influences whether they have children at a young age. In addition, their study highlights the prospects for working women in family planning: young women with higher levels of education are more likely to work in fields that encourage delaying marriage, which, in turn, delays having a family.

Miri and Moghadam (2018) studied the factors influencing the time interval between a woman's first birth in Iran. They find that higher levels of education, family income, and the use of contraception all have a beneficial effect on delaying motherhood. The use and awareness of contraception are crucial for reducing fertility rates and essential in family planning [38]. The practice of child marriage in Kazakhstan is less prevalent compared to other Central Asian nations. At age 15, 1% of females were married, and by age 18, that number rose to 7%. Ethnicity also plays a significant role in the timing of birth. Kurds have the highest rate of child marriage (6 percent of married women under 18), followed by ethnic Turks (4.3%), Azerbaijanis (3.5%), Dungans (2.5%), and Uighurs (1.5%), according to the Agency for Statistics of the Republic of Kazakhstan [32]. In recent research, young girls from these countries may experience family expectations regarding early childbearing [21; 2].

## RESEARCH METHODOLOGY

### 1.1. Source of Data

We employed data from the 2023 Tajikistan Demographic and Health Survey (DHS) for the present analysis, which examines the sociodemographic determinants of delaying early motherhood. The DHS<sup>1</sup> is a nationally representative household survey that collects information on gender, health, socioeconomics, and demographic indicators [28]. The respondents were married individuals aged 13 to 44 years and had given birth to at least one child. Prior to analysis, the data were cleaned to remove missing observations, yielding a final sample of 3,952 women.

### 1.2. Description of Dependent Variable

The respondent's age at first birth is the dependent variable, measured in terms of a single year. For analysis, women who gave birth at 20 years or earlier are coded 0, and those who gave birth after 20 years of age are coded 1 ( $\leq 20 = 0$ ,  $> 20 = 1$ ). Therefore, for the subsequent analysis, based on the recent literature, we define the binary dependent variable as "appropriate age at first birth if respondents' age  $> 20$  years = 1" versus "early age at first birth if age  $\leq 20$  years = 0".

### 1.3. Independent Variables

We drew on empirical studies and economic theory to identify potential covariates associated with early birth [26], [43]. To analyze the drivers of the appropriate age at first birth, the following independent variables were considered: participation in community meetings to obtain information on family planning, decision maker to use contraception, current type of contraceptive, respondents' education level, place of residence, spouse's occupation, wealth index, and household size.

### 1.4. Econometric Framework

The instrumental variables probit model (IV-probit) was applied to analyze the results. This method is used when one or more independent variables are endogenous. To purge endogeneity bias, we used the following two instruments: respondents' previous place of residence and hearing family planning on the radio [20; 24; 21]. The standard equation of the probit model can be presented as stated below [18]:

$$y_i = \alpha_i + \beta x_i + u_i \quad (1)$$

By introducing endogenous variables, Eq. (1) could be presented in reduced form as:

1 <https://dhsprogram.com/methodology/survey/survey-display-608.cfm>

$$y_{1i}^* = \beta y_{2i} + \delta x_{1i} + u_i \tag{2a}$$

$$y_{2i} = x_{1i}\gamma_1 + x_{2i}\gamma_2 + v_i \tag{2b}$$

In the present case,

$y_1^*$  – the latent dependent variable for the  $i$ th observation (i.e., women who gave birth at the age of 20 or earlier are coded “0”, and those who gave birth after 20 years of age are coded “1” ( $\leq 20 = 0, >20 = 1$ ),

$y_{2i}$  – a vector of endogenous variables (respondents' education level),

$x_{1i}$  – a set of exogenous variables that affect  $y_{1i}^*$ ,

$x_{2i}$  – a set of instrumental variables to identify  $y_{2i}$ ,

$\mu_i, v_i$  – error terms,

$\beta$  and  $\delta$  – the vectors of the structural parameters,

$\gamma_1$  and  $\gamma_2$  – matrices of parameters. We assume that  $(\mu_i, v_i)^T \sim N(0, \Sigma)$ .

## ANALYSIS AND RESULTS

### 1.5. Relevance and Exogeneity Conditions of the Included Instruments

To purge endogeneity of the women’s education, we included two instrumental variables (respondents’ place of previous residence and hearing family planning on the radio). We ensure that the instruments meet the relevance and exogeneity conditions outlined in Table 1. More succinctly, we used Anderson’s canonical correlation statistic to assess under-identification of the included instruments, the Cragg-Donald Wald F-statistic to assess weak identification, and the Sargan statistic to assess over-identification; the results confirmed the instruments’ robustness.

Table 1: The Relevance and Exogeneity Conditions of Instrumental Variables

Test	Null hypothesis	p-value/critical values (Cv)	
Anderson’s canonical correlation statistic	Under identification	$\chi^2(2) = 31.00$	$p < 0.00$
Kleibergen-Paap rk LM statistic	Under identification	$\chi^2(2) = 31.15$	$p < 0.00$
Cragg-Donald Wald F statistic	Weak identification test	$F = 15.54$	$cv = 11.59$
Hansen J statistic	Over identification	$\chi^2(1) = 2.24$	$p = 0.13$
Sargan statistic	Over identification	$\chi^2(1) = 2.01$	$p = 0.16$

Notes: Critical values for weak identification based on Cragg–Donald Wald F statistic under i.i.d. errors [44].

### 1.6. Descriptive Statistics of the Behavioral and Socio-Demographic Variables

Table 2 summarizes the respondents’ socio-demographic characteristics using data from the Tajikistan Demographic and Health Survey (DHS-Tajikistan). The mean age at first birth was approximately 21.2 years, ranging from 13 to 44 years. According to the binary dependent variable, 49% of respondents had their first birth at age 20 or younger, which reflects relatively early timing of first birth within the sample. Furthermore, 52% of the sampled women were from rural areas.

Table 2: Descriptive Statistics

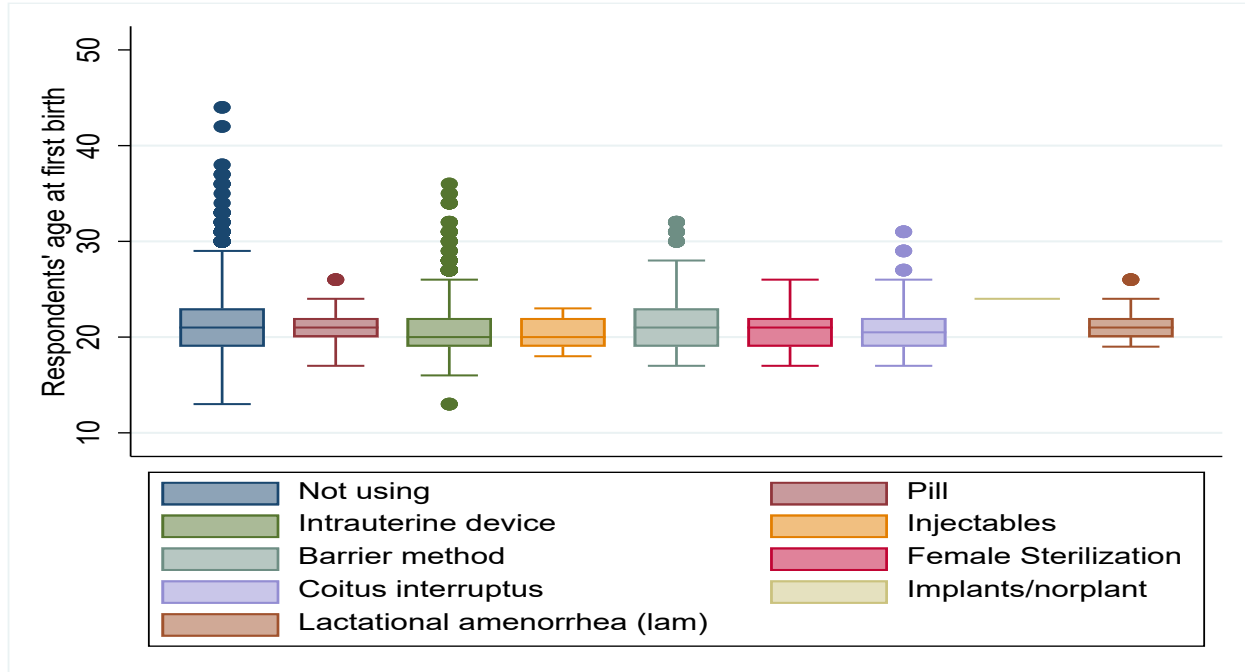
Variable	Mean	Std. Dev.	Min	Max
Respondents’ Age at First Birth	21.23	3.06	13	44
Respondents’ Age at First Birth*	0.51	0.50	0	1
Place of residence (Urban = 2; Rural = 1)	1.51	0.50	1	2
Household member (numbers)	6.88	2.65	1	20
Wealth index*	3.31	1.38	1	5
Spouse Occupation	5.26	2.04	0	8
Participation in a community meeting	0.10	0.30	0	1
Current contraceptive type*	1.39	1.86	0	8
Decision maker to contraceptive use and intention*	2.24	0.92	1	5
Education level*	2.08	0.53	0	3
Place of previous residence (City = 1; Town = 2; Countryside = 3)	2.26	0.82	1	3
Heard family planning on the radio	0.09	0.29	0	1

Notes: \*The detailed frequency distribution of main categorical variables is included in Table 3.

Source: Authors’ own elaboration using the Tajikistan 2023 DHS data.



Figure 1 shows differences in median age at first birth across contraceptive types, with women using contraceptive methods, for example, the pill, barrier method (male condom), and implants/Norplant, tending to have first births at slightly older ages compared to those not using contraception. These observations suggest an association that modern contraceptive types increase the possibility of women conceiving a pregnancy at an appropriate age; however, causality cannot be inferred from this cross-sectional data. In the traditional method and the Lactational amenorrhea (LAM), women tend to have their first births at slightly older ages compared to those not using contraception.



**Figure 1: Comparison of Contraceptive Methods in Relation to Respondents' Age at First Birth**

Source: Authors' own elaboration using the Tajikistan 2023 DHS data.

Table 3 presents the distribution of respondents by their current contraceptive type, decision maker to contraceptive use, and intention to use, and wealth index. The delineation of the wealth index revealed that 30.67% of respondents lacked an acceptable or reasonable wealth index. The results show that, a substantive majority (54.45%) of the sampled women were not using any form of contraception. In addition, only 30% of the respondents can decide about the contraceptive use and intention to use suggesting that women often face structural limits in their independent health-related decision-making. The results also showed that only approximately 18% of the sampled women achieved a higher education level.

**Table 3. Distribution of Key Study Variables from the DHS Data**

Respondents' current contraceptive type	Code	Frequency	Percent	Cumulative
Not using	0	2,152	54.45	54.45
Pill	1	108	2.73	57.19
IUD	2	1,010	25.56	82.74
Injectables	3	24	0.61	83.35
Barrier method	4	248	6.28	89.63
Female sterilization	5	183	4.63	94.26
Withdrawal	6	194	4.91	99.16
Implants/Norplant	7	3	0.08	99.24



Lactational amenorrhea method (LAM)	8	30	0.76	100.00
Total		3,952	100.00	
<b>Decision maker to contraceptive use and intention</b>	<b>Code</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative</b>
Respondent	1	1,169	29.58	29.58
Husband/partner	2	801	20.27	49.85
Joint decision	3	1,903	48.15	98.00
Someone else	4	37	0.94	98.94
Other	5	42	1.06	100.00
Total		3,952	100.00	
<b>Women's Age at First Birth</b>	<b>Code</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative</b>
Early age at first birth	0	1,937	49.01	49.01
Appropriate age	1	2,015	50.99	100.00
Total		3,952	100.00	
<b>Women's highest educational level</b>	<b>Code</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative</b>
No education	0	69	1.75	1.75
Primary	1	209	5.29	7.03
Secondary	2	2,983	75.48	82.52
Higher	3	691	17.48	100.00
Total		3,952	100.00	
<b>Wealth index</b>	<b>Code</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative</b>
Poorest	1	552	13.97	13.97
Poorer	2	660	16.70	30.67
Middle	3	734	18.57	49.24
Richer	4	988	25.00	74.24
Richest	5	1,018	25.76	100.00
Total		3,952	100.00	

Source: Authors' own elaboration using the Tajikistan 2023 DHS data.

### 1.7. Estimates of the Instrumental Variable Probit Model

Given the potential endogeneity of education, we interpret and elaborate on the estimates from the instrumental variable probit model<sup>2</sup> presented in Table 4. More importantly, the last row of Table 4 presents a significant Wald test of Exogeneity. This test rejected the exogeneity hypothesis with a  $\chi^2(1)$  value of 10.89 at the 1% significance level. This indicates that our assumption that the respondents' educational variable is endogenous is supported. Therefore, we were justified in employing the IV-probit model to yield unbiased and efficient estimates. Hence, we interpret and discuss the findings and marginal effect estimates of the coefficients to provide meaningful economic interpretation.

<sup>2</sup> The probit model estimates are not reported here but can be furnished upon request.



Table 4. Marginal Effects Estimates of the Instrumental Variable Probit Model

Respondents' Age at First Birth	Coefficients	Std. error	Marginal effects	Delta-method Std. error
Education	1.48***	0.23	0.72***	0.21
Place of residence	0.09	0.07	0.04	0.04
Household member	0.01	0.01	0.01	0.01
Wealth index	-0.15***	0.02	-0.07***	0.01
Spouse occupation (Not working = reference category)				
Professional	-0.47***	0.13	-0.22***	0.06
Technical	-0.30**	0.12	-0.14**	0.06
Managerial	-0.14	0.13	-0.06	0.06
Clerical	-0.32**	0.14	-0.15**	0.07
Sales and services	-0.14	0.10	-0.06	0.04
Skilled manual	-0.17*	0.09	-0.08*	0.04
Unskilled manual	0.07	0.09	0.03	0.04
Domestic service	-0.07	0.12	-0.03	0.06
Participation in a community meeting	-0.06	0.08	-0.03	0.04
Current contraceptive type	0.01	0.01	0.01	0.00
Decision maker (Joint decision = reference category)				
Decision maker to use a contraceptive (respondents)	0.07*	0.04	0.03*	0.02
Decision maker to use a contraceptive (husband/partner)	0.11*	0.06	0.05*	0.03
Decision maker to use a contraceptive (someone else)	-0.74***	0.20	-0.31***	0.07
Decision maker to use a contraceptive (other)	-0.07	0.18	-0.03	0.08
Constant	-2.67***	0.60		
Correlation between the error terms of education and the dependent variable	-0.71***	0.21		
Standard deviation of the error term in the probit latent variable equation	-0.70***	0.01		
Number of observations 3,952; Wald chi2(18) = 280.26***				
Wald test of exogeneity (corr = 0) chi2(1) = 10.89***				

Notes: \*\*\* = significant at 1%, \*\* = significant at 5%, \* = significant at 10%.

Source: Authors' own elaboration using the Tajikistan 2023 DHS data.

Table 4 presents the marginal effects estimates for age at first birth. The highly significant positive impact of the respondent's education (72%) was pronounced at an early age. Human capital theory suggests that higher education delays the age of first birth because schooling increases the opportunity cost of having children early [52]. The existing literature suggests that being literate decreases the likelihood of a woman's first birth occurring at an early age at first birth. Saurabh et al. (2013) support the idea that women's decision-making skills regarding their children's health and nutrition encourage them to be literate. Dehesh et al. (2022) argue that women are more likely to delay early motherhood as their educational attainment increases. In addition, mothers with higher levels of education are more likely to aim for fewer children and to be aware of the advantages of family planning [39]. Furthermore, lower educational attainment frequently intersects with broader socio-economic vulnerabilities, including limited access to family planning resources and increased exposure to household tensions [10; 2]. In our IV-probit analysis, higher education is associated with a higher likelihood of giving birth after age 20.

Respondents' independent participation in contraceptive decision-making was positively associated with delaying early motherhood. Approximately 30% of the sampled women reported that they were the primary decision-makers regarding contraceptive use. In this context, education may contribute to women's ability to make informed reproductive health decisions and strengthen their role within the family [43]. Contraceptive use remains an important component of family planning, while broader participation of women in reproductive healthcare decisions, including decisions related to maternal health, is associated with improved maternal well-being [38; 15]. This finding is consistent with Miri and Moghadam (2018) and Dewau et al. (2021), who reported that contraceptive use may contribute to postponing the age at first birth. At the same time, women with limited formal education tend to report lower contraceptive use and higher average fertility [25]. By contrast, women



whose contraceptive decisions were made by another person were less likely to delay early motherhood.

The wealth index was negatively and significantly associated with the likelihood of giving birth after the age of 20, with a marginal effect of -7%. As shown in Table 3, 51% of the sampled women belonged to the richer or richest wealth categories. This finding indicates a possible association between higher household wealth status and earlier childbearing in the sample.

A plausible reason for this negative association is that a high wealth index may ensure the affordability of better health facilities, which, in turn, may prompt early-age childbearing [39; 23; 33; 1]. Likewise, a higher wealth index decreases child mortality by enabling access to better health facilities and nutrition for pregnant women, thereby improving maternal health [11]. Therefore, children born into higher-wealth households have lower mortality rates [43]. In contrast, given the constraints faced by many low-income countries (e.g., cultural and severe economic constraints) that may lead to early marriage, the positive and significant probability of giving birth to a child will be high.

The findings also indicate that some categories of spouses' occupation, particularly professional, technical, skilled manual, and clerical occupations, were negatively associated with the likelihood of giving birth after age 20 compared with the reference category of non-working husbands. Other occupational categories were not statistically significant. This result may reflect differences in household socioeconomic conditions, employment patterns, and fertility-related decision-making within families. It also suggests that the relationship between a spouse's employment status and the timing of first birth may vary depending on the type of occupation. Therefore, the occupational status of spouses should be interpreted with caution, as its association with the timing of first birth is not uniform across all categories. This is consistent with previous evidence indicating that changes in a husband's employment may be associated with the timing of first and subsequent births [5]. Lastly, place of residence was positively associated with delaying early motherhood; however, this association was not statistically significant.

## CONCLUSION AND SUGGESTIONS

This study focused on sociodemographic factors influencing early age at first birth. This study used the 2023 Tajikistan Demographic and Health Survey (DHS) data, which included 3,952 women who had given birth to at least one child, to examine age at first birth. Based on recent literature and WHO standards, we constructed the binary dependent variable as "appropriate age at first birth, if respondents' age >20 years = 1" versus "early age at first birth if age ≤20 years = 0". To account for potential endogeneity in the main variables of interest (respondents' education), we employed instrumental variable probit models. The results broadly align with previous research investigating the potential determinants of age at first birth in developing countries. Among the variables assessed, we found that respondents' education level had significant policy implications, making it the most promising policy option for preventing early births among young women. The results also indicate that women's wealth status and their spouses' occupations show analogous associations with early motherhood. In addition, empowering women with more autonomy to decide to use modern contraceptives and promoting higher education for Tajik women are important factors associated with delaying early childbearing. Hence, important policy implications can be drawn from this study, as women's education and women's health guidelines/awareness are closely related to public policy and health-sector priorities and can be improved at a moderate cost. We suggest that policymakers focus on these areas. Future research focusing on the causal relationship between women's health and the adoption of modern contraceptives in Tajikistan and comparable contexts in low-income countries might be helpful in the formation of effective health policy.

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