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Delaying Motherhood: Behavioural and Socio-Demographic Pathways of Resistance to Early-Age Birth in Tajikistan

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Abstract

Empirical research demonstrates how individuals perceive the importance of age at first birth in family planning in developed nations. However, the importance of women's age at first birth in family planning in lower-middle-income countries, such as Tajikistan, is little researched. We used the 2023 DHS data for Tajikistan and employed instrumental-variable probit models. The estimates indicate that specific socio-demographic variables, such as contraceptive use, women's educational attainment, and wealth status, have a significant association with delaying early age motherhood. Among these variables, higher education and promoting intention to use modern contraceptive methods appear as the most pressing policy options to delay early motherhood and for effective family planning. Likewise, adolescent mothers' participation in community meetings to learn about specialized family-planning programs will likely delay early motherhood. 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.

Keywords: community meetings; contraceptives; family planning; lower-middle-income countries; women's education

1. 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 (Miri & Moghadam, 2018; MacQuarrie, 2019; Shonazarova & Eshchanov, 2020). However, the consequences of child marriages may trigger the inappropriate age for the first birth in the family planning process (Negash et al., 2022). 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 (Melnikas & Romero, 2019; Talukder et al., 2021; Fan & Koski, 2023).

The acceleration in child marriages in Tajikistan started during the post-Soviet era. The religious beliefs also instigated this pace. In most rural areas, the minimum age for marriage is 18 years, which is considered religiously permissible (United States Department of State, Bureau of Democracy, Human Rights and Labor, 2021; Girls Not Brides, 2025). 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 (UN Women, 2025). These stats are thought-provoking because early age birth is associated with adverse health, social, and economic outcomes (McClure, 2015; Talukder et al., 2021; Fan & Koski, 2023; Lebni et al., 2023). Studies on early age birth highlight that it is associated with higher risks of low birth weight, preterm delivery, and other severe health outcomes compared with adult mothers aged 20–24, as indicated in the empirical evidence across lower- and upper-middle-income countries (Alves et al., 2012; Ganchimeg et al., 2014; Althabe et al., 2015). Gender bias is also persistent; parents tend to give more freedom and opportunity to boys rather than girls because of societal norms that girls will eventually leave home. 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 (Baschieri & Falkingham, 2009; Whitsel, 2009; The World Bank, 2015; DeYoung et al., 2018). On top of that, the use of modern contraceptives is less prevalent in Tajikistan (WHO, 2022).

Investigating the behavioral and socio-demographic pathways of resistance to early-age birth in Central Asia, particularly in Tajikistan, is vital because it is a pressing public health issue with severe health impacts on adolescent mothers. Likewise, early marriage is persistent and decreases opportunities for women to enter the formal labor market. Therefore, it forces women to join the informal labor market, where access to healthcare is limited. Hence, this is a pressing public health issue, and understanding the socio-demographic pathways that guide the design of goal-oriented interventions to improve maternal health and enhance women's reproductive autonomy is crucial (Asia-Plus, 2025). Therefore, it is interesting to examine the potential socio-

economic and behavioural 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 halts the minimum acceptable age bracket of 20-24 years for conceiving a pregnancy (WHO, 2024). Empirical evidence indicates that the inappropriate age accelerates the range of adverse outcomes, such as increased rates of mortality among mothers and children (Haque & Mohammad Sayem, 2008; Dewau et al., 2021). Likewise, the adverse health consequences of early marriage for women instigate a range of health and psychological challenges, including various illnesses, depression, and disruptive emotions (Lebni et al., 2023). Low birth weight and malnutrition are also associated with early childbearing (Alves et al., 2013; Fall et al., 2015; Thirukumar et al., 2020).

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 (Blundell et al., 1999; Maringe, 2015). Investing in individuals, particularly through education, fosters the development of essential skill sets, including leadership and strategic planning (Goldin, 2016). Nevertheless, Korres (2008) observes that the government overlooks the significance of education in low-income countries. Women in these countries have limited educational opportunities and job prospects; consequently, societal beliefs hold that a woman's only prospects are early marriage and having children (The World Bank, 2022; Lebni et al., 2023). Better access to education resists the social pressure to get pregnant, but low income and inadequate education instigate the teenage pregnancy (Neal et al., 2015; Bitew et al., 2021).

Recent literature suggests that geographic location, as well as urban and rural dwellings, are associated with teenage pregnancy (Haque & Sayem, 2008). 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 low social pressure to get pregnant (Bitew et al., 2021). 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 the delay of motherhood by broadcasting specialized programs focused on family planning (Rabbi & Kabir, 2013). Likewise, the recent studies on adolescent birth highlight that girls who practice Islam are more likely to experience early childbirth than their Catholic and Orthodox Christian counterparts (Talukder et al., 2021). In addition, Muslim women are more likely to get married at an underage status and tend to have children at a younger age (Sarkar, 2010; Nahar & Zahangir, 2013; Dewau et al., 2021). Mugarura et al. (2016) and Rindfuss and John (1983) analyze the role of ethnicity and the ideal age for the 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 = 826 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. Most previous research has not addressed the endogenous nature of women's education when examining the determinants of early-age births. Therefore, following Gupta et al. (2003), Hutchinson and Wheeler (2006), and Habibov and Zainiddinov (2015), we considered three instrumental variables specifically: respondents' place of previous residence, access to radio, and hearing family planning information on the radio, which account for endogeneity of women's education.

The study is structured as follows: in the next section, we provide the regional and intercontinental context of early birth in low- and lower-middle-income countries. Section 2 provides an elaboration on the data source, data methodology, and empirical framework. Section 3 presents the findings and discussion, and Section 4 concludes with the policy implications.

1.1. Regional and intercontinental context regarding early age birth

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 will be under pressure to

get married at very early ages. 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 fundamental violation of human rights (UN General Assembly, 2014; UNICEF, 2025).

The incident of underage childbirth predominantly occurs in Sub-Saharan Africa and South Asia (UNICEF, 2025). Research indicates that the median age for first childbirth in Sub-Saharan nations is 19 years (Negash & Asmamaw, 2022). Fan and Koski (2022) conclude in their systematic review that child marriage promotes the prevalence of physical violence from intimate partners. According to Dewau et al. (2021), highlighting the adverse effects of marrying at a young age 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 societies, pregnancy before marriage is totally unacceptable and harshly criticized; hence, in these countries, early marriages are seen as a "cultural gateway" for early reproduction. (Raj et al., 2009; Santhya et al., 2010). Maulinda et al. (2021) studied 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, where females are subject to it, which plays a role in determining 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 (Noormal et al., 2022). The practice of child marriage in Kazakhstan is less prevalent compared to other Central Asian nations. At the age of 15, 1% of females were married, and by the age of 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 (Minority Rights Group International, 2013). In recent research, young girls from these countries face pressure from their parents to get pregnant (Habibov & Zainiddinov, 2015; Alnaeem et al., 2025).

2. Methodology

2.1. 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[1] is a nationally representative household survey that collects information on gender, health, socioeconomics, and demographic indicators (MacQuarrie et al., 2019). Prior to analysis, the data were cleaned to remove duplicate records and missing observations, yielding a final sample of 826 married women. The respondents were married individuals aged 13 to 44 years.

2.2.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 (≤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* "inappropriate age at first birth if age ≤20 years = 0".

2.3.Description of Independent Variables

We drew on empirical studies and economic theory to identify potential covariates associated with early birth (Korres, 2008; Shonazarova & Eshchanov, 2020). 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, use and intention of

[1] https://dhsprogram.com/methodology/survey/survey-display-608.cfm

contraception, current type of contraceptive, respondents' educational attainment, place of residence, spouse's occupation, wealth index, and household size.

Respondents' current contraceptive type was coded as not using "0", pill "1", intrauterine device (IUD) "2", injectables "3", barrier method "4", female sterilization "5", coitus interruptus "6", and lactational amenorrhea method (LAM) "7". Likewise, contraceptive use and intention were coded as: modern method "1", traditional method "2", non-user who intends to use later "3", and non-user who does not intend to use "4". The wealth index measures a household's living standard (Ali et al., 2020). The wealth index was coded as poorest "1", poorer "2", middle "3", richer "4", and richest "5" (see Table 2). We acknowledge the potential endogeneity of respondents' educational attainment; therefore, we use respondents' previous place of residence, having a radio, and hearing family planning on the radio as instrumental variables.

2.4.Econometric framework

The instrumental variables probit model (IV-probit) was applied to analyse the results. This method is used when one or more independent variables are endogenous. To purge endogeneity bias, following Gupta et al. (2003), Hutchinson and Wheeler (2006), and Habibov and Zainiddinov (2015), we used the following three instruments: respondents' previous place of residence, having a radio, and hearing family planning on the radio. Following Gitto et al. (2015), the standard equation of the probit model can be presented as stated below:

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

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

$$y_{1i}^{*} = \beta y_{2i} + \delta x_{1i} + u_1 \quad (2a)$$

$$y_{2i} = x_{1i}\gamma_1 + x_{2i}\gamma_2 + v_i \quad (2b)$$

In the present case,

y_1^* – the latent dependent variable for the *ith* 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" (≤20 = 0, >20 = 1),

y_{2i} – a vector of endogenous variables (respondents' years of education completed at the highest education level),

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

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

μ_i, ν_i – error terms,

β and δ – the vectors of the structural parameters,

γ_1 and γ_2 – matrices of parameters. We assume that $(\mu_i, \nu_i)^{\mathrm{T}} \sim \mathrm{N}\ (0, \Sigma)$.

3. Results and Discussion

3.1. Relevance and exogeneity conditions of the included instruments

To purge endogeneity of the women's education, we included three instrumental variables (respondents' place of previous residence, having a radio, and hearing family planning on the radio). We ensure that the instruments meet the relevance and exogeneity conditions, as detailed in the supplementary materials. 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 robustness of the instruments. In addition, a correlation matrix for the dependent variable, the instruments, and the endogenous regressors is provided[2]. The correlation matrix reveals no statistically significant association between the instruments and the dependent variables; however, a highly significant association is found with the endogenous variable.

3.2. Descriptive statistics of the behavioural and socio-demographic variables

Table 1 presents a descriptive summary of the socio-demographic variables of respondents, as collected from the Demographic and Health Survey for Tajikistan (DHS-Tajikistan). Most notably, the average age at first birth was approximately. 21.5 years, ranging from a minimum of 13 years to a maximum of 44 years. However, the binary dependent variable revealed that 45% of the respondents had given birth at the age of twenty years or younger, and can be regarded as women at inappropriate ages at first birth. Most of the sampled women belonged to rural areas. The results also showed that only 23% of the sampled women achieved a higher education level.

[2] Please refer to the supplementary materials file suppl. Table 1 and suppl. Table 2.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Respondents' Age at First Birth	21.57	3.33	13	44
Respondents Age at First birth (Appropriate age = 1; Inappropriate age = 0)	0.54	0.49	0	1
Place of residence (Urban = 1; Rural = 0)	0.49	0.50	0	1
Household member (numbers)	7.24	2.81	3	20
Wealth index*	3.44	1.34	1	5
Spouse Occupation	2.31	1.03	0	4
Participation in a community meeting	0.07	0.26	0	1
Current contraceptive type*	1.13	1.86	0	7
Intention to use a contraceptive*	2.82	1.32	1	4
Years of education	5.19	1.40	1	7
Place of previous residence (City = 1; Town = 2; Countryside = 3)	2.24	0.83	1	3
Heard family planning on the radio	0.08	0.27	0	1
Household has radio (Yes = 1; No = 0)	0.08	0.27	0	1

*Notes: *The detailed frequency distribution of prime categorical variables is included in Table 2.*
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, male condoms, and the intrauterine device (IUD), 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.

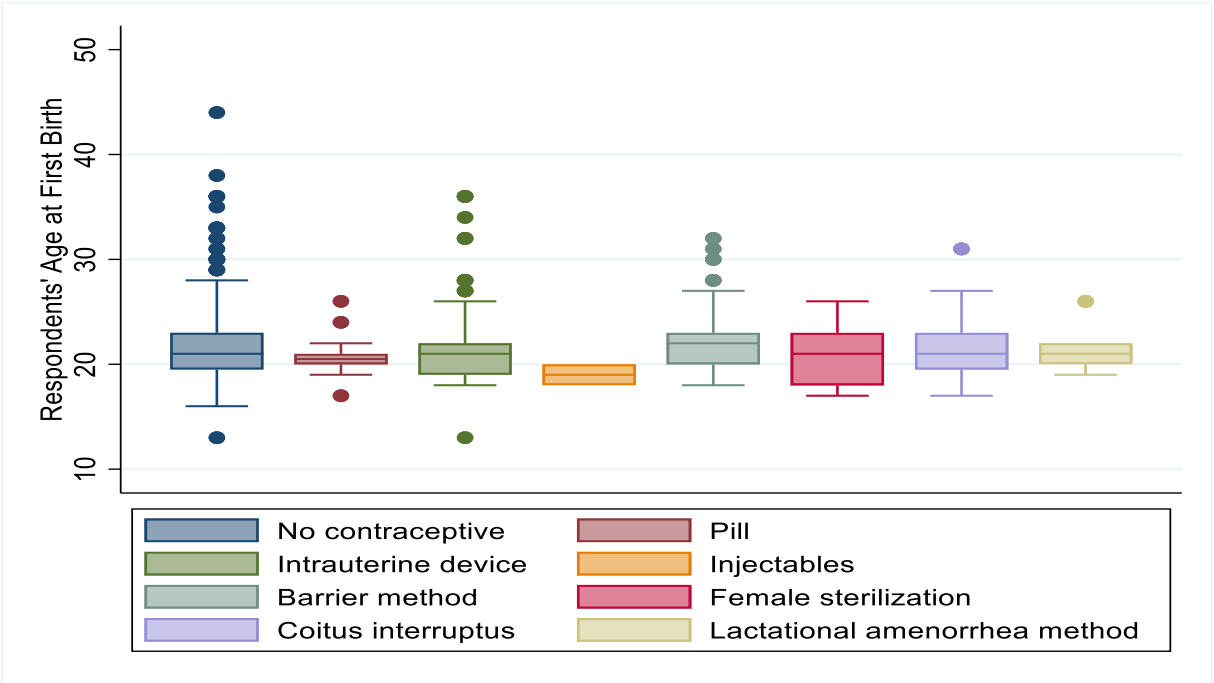


Figure 1: Comparison of Contraceptive Methods in Relation to Respondents' Age at First Birth

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

Table 2 presents the distribution of respondents by their current contraceptive type, contraceptive use, intention to use, and wealth index. The delineation of the wealth index revealed that 44.92% respondents lacked a representative wealth index. Most importantly, a substantive majority (65%) of the sampled women were not using any form of contraception. Interestingly, the majority (49%), almost half of the sample women, revealed that they do not intend to use contraceptives in the future as well, and only 16% showed intention to use them later.

Table 2: Classification of wealth index and contraceptive use, type, and intention from DHS Data

Respondents' current contraceptive type	**Code**	**Frequency**	**Percent**	**Cumulative**
Not using	0	536	64.89	64.89
Pill	1	18	2.18	67.07
IUD	2	152	18.40	85.47
Injectables	3	3	0.36	85.84
Barrier method	4	51	6.17	92.01
Female sterilization	5	15	1.82	93.83
Withdrawal	6	32	3.87	97.70
Lactational amenorrhea method (LAM)	7	19	2.30	100.00
Total		826	100.00	
Contraceptive use and intention	**Code**	**Frequency**	**Percent**	**Cumulative**
using modern method	1	258	31.23	31.23
using the traditional method	2	32	3.87	35.11
non-user - intends to use later	3	134	16.22	51.33
does not intend to use	4	402	48.67	100.00
Total		826	100.00	
Women's Age at First Birth	**Code**	**Frequency**	**Percent**	**Cumulative**
Inappropriate age	0	373	45.16	45.16
Appropriate age	1	453	54.84	100.00
Total		826	100.00	
Women's highest educational level	**Code**	**Frequency**	**Percent**	**Cumulative**
primary	1	35	4.24	4.24
secondary	2	604	73.12	77.36
higher	3	187	22.64	100.00
Total		826	100.00	
Wealth index	**Code**	**Frequency**	**Percent**	**Cumulative**
Poorest	1	100	12.11	12.11
Poorer	2	118	14.29	26.39
Middle	3	153	18.52	44.92
Richer	4	225	27.24	72.15
Richest	5	230	27.85	100.00
Total		826	100.00	

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

3.3.Estimates of the instrumental variable probit model

Table 3 presents the probit model results on whether respondents' age at the first birth is associated with socio-demographic variables, including contraceptive use and education. The results confirmed a strong association between the respective variables and age at first birth. However, given the potential endogeneity of education, we interpret and elaborate on the

estimates from the instrumental variable probit model presented in the second-to-last column of Table 3.

More importantly, the last row of Table 3 presents a significant Wald test of Exogeneity. This test rejected the exogeneity hypothesis with a $\chi 2(1)$ value of 2.94 at the 10% 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.

Table 3. Marginal effects estimate of the instrumental variable probit models

Respondents' Age at First Birth	Probit Model		IV-probit Model	
	Marginal effects	Delta-method Std. error	Marginal effects	Delta-method Std. error
Years of education	-0.04***	0.03	-0.15**	0.06
Place of residence	0.07**	0.09	0.06	0.03
Household member	-0.01***	0.01	-0.01***	0.00
Wealth index	-0.02	0.03	-0.02*	0.01
Spouse Occupation	-0.04***	0.04	-0.04***	0.01
Participation in a community meeting	0.26***	0.19	0.23***	0.06
Current contraceptive type	0.01*	0.03	0.01	0.01
Intention to use a contraceptive	0.02	0.05	0.03*	0.01
Constant	1.13***	0.30	2.48***	0.71
athrho2_1 (corr. between the error terms of the years of education and the dependent variable)			0.41*	0.24
lnsigma2 (std.dev of the error term in the probit latent variable equation)			0.34***	0.02
Akaike criterion (AIC) 1095.95				
Bayesian criterion (BIC) 1138.40				
Number of observations 826; Wald chi2(8) = 77.83**				
Wald test of exogeneity (corr = 0) chi2(1) = 2.94*				

*Notes: *** = significant at 1%, ** = significant at 5%, * = significant at 10%.*
Source: Authors' own elaboration using the Tajikistan 2023 DHS data.

The second-to-last column of Table 3 presents the marginal effects estimates for age at first birth. The highly significant negative impact of the respondent's education (-15%) 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 (Walker & Zhu, 2019). The existing literature suggests that being literate decreases the likelihood of a woman's first birth occurring at an inappropriate age. 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 (Rabbi & Kabir, 2013). Likewise, a lack of literacy is coupled with domestic violence because of a lack of understanding of family planning (Dadras et al., 2022; Alnaeem et al., 2025).

In our IV-probit analysis, however, higher education appears to reduce the likelihood of giving birth after the age of 20. This result likely reflects a life-cycle timing effect: the instrumented increase in education mainly influences younger women who are still completing their schooling and have not yet reached the recommended age for first birth, so more education is associated with early childbirth (Ferre, 2009). This empirical finding supports the respondents' distribution of education levels, as presented in Table 2, indicating that substantive women were able to achieve a secondary level of education. These findings suggest that policies should not rely solely on the provision of primary and secondary education to delay early motherhood; complementary measures, such as reproductive health programs, participation in community meetings to raise awareness about the use of modern contraceptive methods, are necessary to ensure that increased education translates into later childbearing in line with WHO guidelines. Moreover, education empowers women to make informed decisions and enhances their position within the family (Shonazarova & Eshchanov, 2020).

The significant positive impact (+0.3%) of the use of the contraceptive or intention to use was exclusively evident in increasing the probability of women conceiving a pregnancy at an appropriate age. Almost half of the sample women revealed that they do not intend to use contraceptives in the future. The use of contraception is one of the essential matters in family planning (Noormal et al., 2022); likewise, empowering women's autonomy by legalisation to terminate the pregnancy due to fetal congenital disabilities is a positive step to compensate their grievances (Fernández-Heredia et al., 2025). The finding aligns with Miri and Moghadam (2018) and Dewau et al. (2021), who found that contraceptives delay the onset of early age at first birth. In contrast, illiterate women are less likely to use contraceptives and have a high number of children (Imam et al., 2017).

The wealth index was negative and significant, decreasing the probability (-2%) of being in the appropriate age at first birth. A substantial percentage (55%) of the sampled women were categorized as richer to the richest class according to the wealth index (see Table 2). Women from these households were more prone to the underage birth process. 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 (Rabbi & Kabir, 2013; Hossain & Majumder, 2018; Miri & Moghadam, 2018; Ali et al., 2020). Likewise, a higher wealth index decreases child mortality by enabling access to better health facilities and nutrition for pregnant women, thereby improving maternal health (Dehesh et al., 2022). Therefore, children born into households of higher wealth status have lower mortality rates (Shonazarova & Eshchanov, 2020). In contrast, given the constraints faced by many low-income countries (e.g., cultural and extreme poverty) that may lead to early marriage, the positive and significant probability of giving birth to a child will be high.

An interesting finding regarding policy implications emerged from respondents' participation in community meetings to raise family planning awareness and access to information. The finding aligns with previous research that if a woman participates in such meetings, it is likely (+23%) to increase the appropriate age at first birth (Hutchinson & Wheeler, 2006; Habibov & Zainiddinov, 2015). A vital policy message can be drawn from this finding because awareness of reproductive health programs can be raised during participation in community meetings to raise awareness about the use of modern contraceptive methods, which is necessary to ensure that increased participation in community meetings translates into later childbearing in line with WHO guidelines. Intriguingly, findings also indicate that respondents' spouses' occupations are likely to decrease the probability of having a child at an appropriate age (-4%). This may suggest that the potential benefits of occupational status are outweighed, as the husbands of these women hold highly skilled, professional jobs, which may enable them to overcome economic constraints and provide better access to health and dietary support for their pregnant partners. In contrast, this may also reflect lower social and economic pressure to have children early when the spouse is not working. This is consistent with evidence that changes in a husband's employment are associated with the timing of first and subsequent births (Amialchuk, 2011). Lastly, as expected, place of residence was positively associated with delaying early motherhood; however, this association was not statistically significant.

4. Conclusion with Policy Implications

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 826 married respondents, to examine age at first birth. Based on recent literature and World Health Organization standards, we constructed the binary dependent variable as "appropriate age at first birth, if respondents' age >20 years =1" *versus* "inappropriate 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 (IV-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 the respondents' participation in community meetings to acquire information on family planning and their intention to use modern contraceptives revealed essential policy implications, and these may be the most promising policy options for preventing early births in young women. Surprisingly, a woman with a high level of wealth and a spouse with a good occupation is less likely to give birth at an appropriate age. Based on IV-probit estimates, we proposed efforts to promote education, coupled with the effective dissemination of family planning information through community meetings among Tajik women. On top of that, awareness regarding the intention to use modern contraceptives is another vital determinant of resisting inappropriate age at first birth. Hence, vital policy messages could be drawn from this study. Because women's education and women's health guidelines/awareness fall under the government's immediate jurisdiction 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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Data Availability: The data related to this study can be obtained from: https://www.dhsprogram.com/Countries/Country-Main.cfm?ctry_id=225&c=Tajikistan&Country=Tajikistan&cn=&r=3

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