FEMALE EDUCATION, LABOR FORCE PARTICIPATION, ECONOMIC GROWTH, AND FERTILITY: A PANEL ANALYSIS IN SOUTH ASIA

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Abstract

Fertility decline and women's socioeconomic empowerment are thus important areas of demographic and policy concern in South Asia, where rapid population growth continues to exert pressure on labor markets, welfare systems, and economic development. Therefore, it is important to understand the effect of female education, labor force participation, and economic growth on fertility in order to formulate effective population and development policies. This study analyzes the association between female secondary education, female labor force participation, economic growth, and fertility in eight South Asian countries from 2000 to 2025 using an autoregressive distributed lag (ARDL) model. Panel data from the World Development Indicators have been used as a balanced panel to estimate both short-run and long-run dynamics using the Pooled Mean Group (PMG) approach. Panel unit root tests reveal that all the variables are stationary at the level. The findings indicate that female education, female labor force participation, and GDP per capita do not have a significant long-run effect on fertility. But in the short run, an increase in female labor force participation has a positive effect on fertility. The error correction term is negative and statistically significant, indicating a stable long-run equilibrium and a rapid adjustment process towards equilibrium following short-run shocks. Diagnostic tests indicate that the model is adequate and reliable. The study discovers that short-run demographic and structural factors have a greater impact than long-run socioeconomic variables on fertility behavior in South Asia. These findings provide policy insights for education, employment, and population planning strategies.

Keywords*: female education, fertility, GDP per capita, labour force participation, panel ARDL*

1. INTRODUCTION

Fertility continues to remain a critical issue both socioeconomically and demographically for developing countries, while the rapid growth in the population of South Asian countries poses socio-economic challenges with respect to the labor market, welfare services, and economic development. Various socio-economic factors play a significant role in influencing the decisions regarding fertility (female labor force participation [FLFP], female education, healthcare, income, and availability of contraceptives) (Becker, 1960). Therefore, understanding these factors is essential for creating population and development programs that effectively balance social progress and economic expansion. The decision on fertility is basically an economic one according to economic models of fertility, and in particular (Becker, 1960 & Becker,1964). For example, families evaluate the costs and benefits of having children as a way of investing in human capital. Since educated women earn more and join the labor force later than others, their fertility declines due to the high cost of childbearing (Becker, 1964). Education helps in maintaining small families, empowering women in decision-making, as well as increasing knowledge of reproductive issues (Cleland & Van Ginneken,1988). Empirical evidence consistently demonstrates the inverse correlation between female education and fertility in both developed and developing nations (Bongaarts, 2010 & Bloom et al., 2009). The size and timing of this effect can change, though, depending on cultural and institutional circumstances. This is particularly true in societies with strict traditional rules about marriage and family size. However, the relationship between female labor force participation and fertility is more nuanced. Classical economic theory suggests that there is a trade-off between the two concepts of work and family, since increasing opportunity costs of having children due to work are being observed (Becker,1991). However, empirical observations in developing nations have proven to be inconsistent. Within the economics of South Asia, it has been found that a significant percentage of working females belong to the informal sector of employment, where the nature of their jobs allows combining family responsibilities with earning wages (Kabeer, 2012). As a result, an interesting situation can emerge when there is a positive relationship between work and fertility. In addition, there is emerging evidence to show that there might be a mutual causal relationship between participation in the workforce and fertility rates in the sense that labor supply affects fertility just as much as the latter affects labor supply (Dumitrescu & Hurlin, 2012). Moreover, fertility is also affected by economic development and the level of income. Through what is referred to as the 'wealth effect', where families alter their preferences from the number of offspring to the quality thereof, increased family incomes and GDP per capita might have an impact on reducing fertility rates (Becker & Lewis, 1973). However, this connection is often non-linear and conditional on the particular circumstances in developing countries (Caldwell, 2006). The analysis of the dynamics of these variables over time can help to identify the causal relationships. As the level of economic growth has improved in developing countries, time series models that can be able to deal with mixed orders of integration have become popular, especially panel autoregressive distributed lag (ARDL) models (Pesaran, Shin & Smith, 1999). These models give us an idea of

convergence or divergence with time, the relationship between long-run equilibrium, the short-run adjustment mechanism, the rate at which they adjust, and the cause-and-effect relationship between the variables over time. This paper adds to the current discussion by examining how a panel ARDL approach may be used to determine the dynamic relationship between time series of female secondary education, female labor force participation rate, economic growth, and total fertility rate in South Asia during the years 2000 to 2025. Long-run and short-run effects have been identified, and the results give empirical evidence of dynamic relationships. The results of the current research are quite instructive to policymakers in making and executing labor, education, and population policies to enhance economic growth, gender parity, and demographic transition in the long run.

Although there have been various investigations into determinants of fertility in developed as well as developing nations, little work has been done regarding the analysis of these issues in South Asia using the panel ARDL approach. Most of the existing research literature is concerned with either the relationship between fertility and education or that between fertility and employment, whereas very little work has been done on the simultaneous examination of these variables, i.e., female education, female employment, and economic development, together using a panel ARDL model.

The primary purpose of the current study is to find out the association between female education, female workforce participation, economic growth, and fertility in South Asia.

Specifically, the following objectives will be sought:

- Identify the long-run association between female education, female workforce participation, economic growth, and fertility.
- Analyze the short-run dynamics between the variables employing a panel ARDL model.

2. LITERATURE REVIEW

Theories of Fertility

Economics and demography theories have been widely applied for many years as the basis of study on fertility. One of the most influential theoretical bases is Becker's economic theory of fertility (1960, 1964), which argues that children are both consumption and investment products. According to the theory, individuals assess the pros and cons of having offspring when making their reproductive decisions. With increasing income, families may wish to increase the number of their offspring, but higher costs associated with education and raising children may force them to produce fewer, but better children (the substitution effect) (Becker & Lewis, 1973). In explaining fertility decline, the concept of quantity-quality trade-off offered by Becker and Lewis (1973) should be considered. Higher costs associated with raising children due to their better quality make families choose to have fewer offspring. Both developed and developing countries use this theoretical framework when investigating the dynamics of demographic changes. Another significant theoretical

perspective is demographic transition theory. It argues that the population of countries experiences the transition from a high level of fertility and mortality to a low level with growing economic development (Caldwell, 2006). The demand for labor and the absence of access to contraceptives are the two key reasons for high fertility rates during the initial phases of development. The decline in fertility occurs during the process of industrialization and urbanization due to improvements in health care facilities and education systems. This transition is believed to be mainly associated with women's participation in society and work.

Female Education and Fertility

The education of females is a major determinant of fertility levels. Females who are educated generally marry later and have higher knowledge regarding family planning methods. They are also more autonomous when making decisions on reproduction (Cleland & Van Ginneken, 1988). The level of education among females will increase their participation in the labor market and, hence, raise the costs of bearing children. Research studies have empirically confirmed the negative correlation between women's education and fertility. Bloom et al. (2009) prove that an increase in the number of years spent on women's education lowers fertility rates in developing nations. Likewise, Bongaarts (2010) emphasizes that education impacts fertility in many ways, such as late marriage, lower fertility desires, and greater contraceptive use. Nevertheless, in some cases, there is no direct link between education and fertility, particularly in underdeveloped nations. For instance, in South Asia, an increase in education at any level will not result in a decline in fertility levels because of cultural reasons, early marriages, and the lack of job opportunities for women. Jeejebhoy (1995) explains that this is due to the quality of education. Moreover, studies have shown that the impact of education on reducing fertility rates is notable in people who have acquired fairly higher levels of education. Higher education, for instance, contributes significantly to postponing pregnancy and reducing total fertility levels than basic education (Schultz, 1997). In essence, any policy measures geared towards improving the level of education will yield desired results on fertility behavior if they also ensure improved quality of education and job opportunities.

Female Labor Force Participation and Fertility

The literature has covered the relationship between FLFP and fertility in great detail. According to classical economics, there exists an inverse relationship between the two factors since working leads to higher opportunity costs of fertility, thus creating a dichotomy between work and family (Becker, 1991). Thus, women who engage in wage employment will delay pregnancy and have smaller families. Nonetheless, empirical data, particularly in developing countries, usually do not support this prediction. In several emerging economies, women in the workforce are mainly in the informal economy, where flexible hours allow women to combine working and parenting. Consequently, women may manage to integrate work and motherhood effectively, generating either a positive or weak link between work engagement and fertility levels. For instance, according to Shittu and Abdullah (2019), there is evidence of negative effects of fertility on women's labor force participation in the short term; however, the effect of female participation in the workforce on fertility

can be either weak or positive. These studies indicate that the causal effect may run from fertility to labor rather than the other way around. Goldin (1995) argues that the link between employment of women and fertility changes over time and becomes a U-shape. Institutional and policy factors play another important role. The availability of maternity leave, daycare centers, and flexible working schedules could play a crucial role in determining the link between fertility and participation in the workforce (Del Boca, 2002). Without such assistance, it would be difficult for women to find employment and produce children at the same time. Furthermore, there is one other aspect of cultural and familial life in South Asia that has an impact on the link under consideration. Extended families could prove to be helpful in child-rearing, allowing women to work outside and bear children as well.

Economic Growth and Fertility

In the long run, economic growth and fertility are inversely related, a relationship that is explained by three major theoretical perspectives. Becker's (1960, 1964) economic theory suggests that as incomes rise, family preferences shift from having more children to having fewer, higher quality children, the quantity-quality trade-off (Becker & Lewis, 1973). Demographic transition theory (Caldwell, 2006) says fertility naturally falls as countries develop, due in part to urbanization, better healthcare, and increased education. The unified growth theory of Galor and Weil (2000) also links increasing returns to education with falling fertility, since technological growth creates incentives for human capital rather than family size. Empirically, Bloom et al. (2009) and Odhiambo (2013) found a significant negative long-run relationship between GDP per capita and fertility in developing countries. However, this relationship is not linear and is contingent on context (Becker & Lewis, 1973; Caldwell, 2006). The income-fertility link is weakened by cultural norms, early marriage, and informal labor markets in South Asia, in line with Azimi (2015) and Hupkau and Leturcq (2016). The short-run dynamics are also different – positive economic cycles can temporarily increase fertility, by relaxing household budget constraints, even though the long-run trends point downwards (Nazah, Duasa & Arifin, 2021; Pesaran, Shin & Smith, 1999). In general, though economic growth is a major factor for the global decline of fertility (Bloom et al., 2009; Galor & Weil, 2000), in South Asia, its effect is constrained by structural and cultural factors (Kabeer, 2012; Caldwell, 2006). This is why GDP per capita does not have a statistically significant long-run effect on fertility in the region (Azimi, 2015; Hupkau & Leturcq, 2016).

Empirical Evidence from Panel Studies

There have been many studies on this topic using panel data econometrics techniques. By using panel data, there is an opportunity to include the fixed effect as well as the cross-country and cross - time differences. Nazah, Duasa, and Arifin (2021) employ a panel ARDL methodology to analyze the correlation between fertility rates and female labor force participation in Asian nations. Their results illustrate that fertility harms labor participation in the short term, but not in the long term. This shows how important it is to tell the difference between short-term and long - term dynamics. Similarly, Odhiambo (2013) applies panel cointegration methodology in examining

the interconnection between economic growth and fertility, revealing long-term equilibrium relationships. This illustrates the usefulness of dynamic panel data models in modeling complicated relationships between variables.

Methodology in Fertility Studies

The panel Autoregressive Distributed Lag (ARDL) model has become more popular in the last few years because it is flexible and strong. The ARDL approach can be used even if the variables are not integrated of order two, unlike traditional cointegration methods (Pesaran, Shin, & Smith, 1999). The other advantage is the capability of the panel ARDL model to capture short-term and long-term relationships. The use of the error correction model helps in measuring how fast deviations from the long-term relationship are corrected. Pesaran et al. (1999) developed the Pooled Mean Group estimator, which allows for short-run heterogeneity and assumes long - run homogeneity across countries. It is especially useful for cross-country analysis where the assumption is that there will be short-run heterogeneity but long-run homogeneity among countries. Though there is a wealth of literature on factors determining fertility, there are still some shortcomings. First of all, the literature available pays less attention to the South Asian region, while most of the studies are concentrated either on developed nations or globally applicable studies. Secondly, the conventional econometric analysis fails to account for the dynamics that exist between fertility, education, and work participation. Thirdly, the impact of female work participation on fertility remains unclear, especially when it comes to developing nations that rely more on informal jobs. Lastly, not many research papers have analyzed both short-run and long-run impacts of a variety of socioeconomic variables simultaneously through ARDL modeling.

3. MATERIALS AND METHODS

The study adopts a quantitative research methodology in exploring the correlation between female education, participation of females in the work force, economic growth, and the fertility rate in South Asia. The dual nature of the data makes the use of the combination of cross-sectional and time-series data possible; hence, the panel data analysis technique is used. Use of panel data is beneficial in that it allows for controlling unobservable heterogeneity, greater efficiency in estimating parameters, and the dynamics among variables (Baltagi, 2005). The research utilizes a balanced panel dataset that consists of eight South Asian nations: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka for the years spanning from 2000 to 2025. The dataset involves two primary variables, namely, Country and Year, to denote the cross-sectional and time elements, respectively. The important variables considered for this study include the Female Secondary Enrollment Percent as an indicator of female education, GDP per Capita to denote economic growth, Female Labor Force Participation to represent the contribution of women to economic endeavors, and Fertility Rate as the dependent variable. This last variable is measured in terms of the average number of offspring born by a woman during her fertile period. To explore the interaction between these variables, fertility is regressed on female educational attainment, women's work status, and economic growth in a dynamic panel setting. In particular, the research uses a panel Autoregressive

Distributed Lag (ARDL) approach. This technique has an edge in that it can be used to estimate the short-run and long-run coefficients simultaneously and is not restricted to variables that are of order one integration (Pesaran, Shin, & Smith, 1999). Before estimating the model, the stationarity properties of the variables are tested by employing the panel unit root test, namely Im-Pesaran-Shin (IPS). From the results, it is revealed that all variables are stationary at the level, thus meeting the requirements of applying the ARDL technique. Although all variables were found to be stationary at level I(0), the panel ARDL framework was retained because of its ability to estimate both short-run and long-run dynamics simultaneously while accounting for heterogeneity across countries. After that, the panel ARDL model is estimated based on the PMG estimator that accommodates heterogeneity in short-run parameters but imposes homogeneity in long-run parameters. This specification is appropriate for South Asian countries because their long-run parameters are assumed to be similar, whereas their short-run parameters are heterogeneous. R statistical software, employing relevant packages like plm, tseries, and dynamic use to estimate the dynamic relationship between fertility and its key determinants. This includes data cleaning, transformation, unit root testing, and model estimation via an autoregressive distributed lag (ARDL) approach and an error correction model (ECM). The error correction term indicates how quickly the system is moving toward the long-run equilibrium. Diagnostic tests, including the Breusch–Pagan and Durbin–Watson tests, confirm the model's reliability by satisfying the assumptions of classical linear regression. Overall, the panel ARDL methodology implemented in R is a strong way to understand fertility behavior in South Asia because it shows both short-term and long-term effects that vary by country.

Table 1 presents the description of all variables used in the study, including the dependent variable and the key explanatory variables.

Table 1
Variable Description

Variable	Description
Fertility Rate (***FERT***)	Average number of children born per woman
Female Secondary Enrollment (***EDU***)	Percentage of females enrolled in secondary education
Female Labor Force Participation (***FLFP***)	Percentage of the female population participating in the labor force
Economic Growth (***LGDP***)	Natural logarithm of GDP per capita

Source: World Development Indicators (World Bank, 2026)

4. RESULTS AND DISCUSSION

Table 2
Descriptive Statistics

Variable	N	Min	Std ev	Median	Mean	Max
Female Secondary Enrollment (%)	208	20.40	22.61	57.85	56.01	94.70
GDP per Capita (USD)	208	335.7	2223.92	4366.0	4199.3	7923.4
Female Labor Force Participation (%)	208	20.60	14.77	42.30	43.51	69.50
Fertility Rate	208	1.55	1.422	4.21	4.18	6.50

Source: Survey Data, 2026

Table 2 above represents descriptive statistics, which includes several measures such as the mean value, standard deviation, minimum, and maximum value. There are also significant differences among South Asian countries, with fertility rates ranging from 1.55 to 6.50, indicating different stages of demographic transition.

Panel Unit Root Test

Table 3
Im-Pesaran-Shin (IPS) panel unit root test

Variable	Level W - Stat	Level p-value
FERT	-5.5814	<0.001
EDU	-6.2708	<0.001
FLFP	-5.5969	<0.001
LGDP	-5.9924	<0.001

Source: Survey Data, 2026

The results for the Im-Pesaran-Shin IPS Panel Unit Root Test are given in Table 3, indicating that all the variables reject the null hypothesis of non-stationarity because the negative values of the W-statistics are statistically significant ($p<0.001$). Regression analysis may be performed without worrying about spurious correlations due to non-stationarity, as this verifies that the variables are stationary at their levels (I(0)). While traditional cointegration analysis is less required, the ARDL technique can still be applied.

The estimates for Panel ARDL models in Tables 4 to 10 offer a comprehensive view of the interaction between fertility and its important factors, including female literacy rates, female labor force participation, and economic growth.

Table 4
Summary of Panel ARDL Results under PMG and MG Estimators

Variable	PMG Coefficient	PMG p-value	MG Coefficient	MG p-value
Long-Run Coefficients				
EDU	0.00016	0.00598	0.0266	0.9788
FLFP	0.00284	0.00932	0.3049	0.7608

LGDP	0.08940	0.19415	0.4605	0.6457
Error-Correction Term				
ECT	-1.05324	<0.001	-1.10614	<0.001
Short-Run Coefficients				
ΔEDU	0.00153	0.5847	0.00041	0.9363
ΔFLFP	0.01080	0.0347	0.01390	0.0033
ΔLGDP	0.14699	0.2284	0.04503	0.8286

Source: Survey Data, 2026

Both the PMG and MG estimates provide fairly similar results about the factors that impact fertility levels in South Asian countries. The long-run coefficient for EDU, FLFP, and LGDP is found to be insignificant in both cases, which means that these factors have no impact on the fertility levels in the chosen countries in the long run. However, there is some variation in the sign of the coefficients in the two cases, but no change in the outcome. Both models have a negative and very significant ECT value, thus proving that there is a stable equilibrium relationship between the variables. The ECT values in both PMG and MG are -1.05324 and -1.10614, respectively, which implies that the equilibrium adjustment rate is very fast. As for the short run, the increase in female labor force participation is found to be positively correlated with fertility rates in South Asia. In other words, a positive correlation is observed in changes of female labor force participation (ΔFLFP) with fertility within both models, PMG and MG. Yet, the same does not apply to the variables related to changes in education and economic growth, as no statistical significance is achieved in either model. The consistency of the outcomes across PMG and MG provides additional robustness to the conclusions drawn.

The findings of the present study diverge from several previous empirical studies. For instance, studies by Tsani et al. (2013) and Mishra and Smyth (2010) identified a significant negative correlation between female labor force participation and fertility. Additionally, Becker's (1964) human capital theory points out the impact of education on lowering fertility by raising opportunity costs. Nonetheless, the current findings are more consistent with studies by Azimi (2015) and Hupkau and Leturcq (2016), which indicate weak or minimal long-term effects of fertility on female employment, especially in developing or culturally homogeneous areas. These differences may be attributed to structural and cultural factors unique to South Asia, including robust family systems, social norms, and a relatively small range of variation in key variables.

Table 5
Hausman Test: MG vs PMG

Test	χ^2 Statistic	Degrees of Freedom	p-value	Decision
Hausman Test (MG vs PMG)	2.3780	3	0.4977	Fail to reject H_0 → PMG preferred

Source: Survey Data, 2026

The Hausman test comparing the PMG and MG estimators is apparent in Table 05. The null hypothesis of long-run homogeneity cannot be rejected since the p-value of 0.4977 is greater than 0.05. Since the PMG estimator is more efficient in this situation, it is recommended.

The results from the ARDL (1,1,1,1) analysis at the country level and finds that the error correction term is negative and significant for all countries, which confirms the presence of strong equilibrium relationships in the long run. There is a very quick adjustment process (with values around -0.93 and -1.21). Long-run effects of education, women's workforce participation, and real GDP on health are different across the countries, both in terms of magnitude and sign, presenting great heterogeneity. R^2 ranges from 0.56 to 0.76, suggesting a good fit of the model.

Table 6
ARDL Residual Diagnostics

Country	R^2	JB stat	p(JB)	BG t-stat	p(BG)	BP stat	p(BP)
Afghanistan	0.6823	1.8507	0.396	0.4517	0.656	5.5906	0.133
Bangladesh	0.6616	1.0561	0.590	-0.2050	0.839	1.8378	0.607
Bhutan	0.6656	1.5374	0.464	-0.8148	0.424	1.9323	0.587
India	0.5632	1.4014	0.496	-0.5529	0.586	3.2629	0.353
Maldives	0.7640	1.5128	0.469	-0.1440	0.887	4.3280	0.228
Nepal	0.5987	1.8050	0.406	-0.5428	0.593	2.3306	0.507
Pakistan	0.5744	1.7491	0.417	-0.0552	0.956	7.9654	0.047*
Sri Lanka	0.7050	1.6713	0.434	-0.6312	0.534	6.2312	0.101

Source: Survey Data, 2026

Table 06 depicts that the models are usually well-specified across countries, according to the ARDL residual diagnostics. Because p-values are greater than 0.05, the Jarque - Bera (JB) test demonstrates that residuals are normally distributed in each case. The Breusch-Godfrey (BG) test verifies that there is no serial correlation in any of the countries, suggesting that there are no autocorrelation issues. Except for Pakistan, where heteroscedasticity is present ($p < 0.05$), the Breusch-Pagan (BP) test indicates that most countries do not have heteroscedasticity. Moderate explanatory power is indicated by the R^2 values (0.56 - 0.76). With just a few small problems in Pakistan, the models are generally statistically accurate.

Table 7
Cross-Sectional Dependence Test

Test	CD Statistic	p-value	Decision
Pesaran CD Test (on ARDL residuals)	0.4928	0.6222	Fail to reject H_0 → No cross-sectional dependence

Source: Survey Data, 2026

As presented in Table 07, the Pesaran CD test statistic is 0.4928 with a p-value of 0.6222 which is greater than 0.05. So, the null hypothesis of no cross-sectional

dependence is not rejected. This implies that the countries' error terms are independent from each other, and shocks in one country do not have significant effects on other countries in the panel. This result is important, as the absence of cross-sectional dependence implies that the assumptions of the Panel ARDL model are met. Therefore, the estimates of PMG and MG can be considered reliable and appropriate for the analysis. Furthermore, it suggests that fertility behaviour in each country is largely determined by its own economic and social conditions and not by common regional influences.

5. CONCLUSION

This study examined the relationship between fertility, female education, female labor force participation, and economic growth in South Asia using a Panel ARDL framework over the period 2000 - 2025. The empirical results yield significant insights into the long-term and short-term changes of fertility behavior across the eight investigated countries. The results of the stationarity and cointegration tests show that the ARDL/ECM method is the right one to use. The Westerlund cointegration test indicates that there is a strong long-term equilibrium relationship between all of the variables, even though they are all stationary at level (I(0)). This means that in the long run, fertility, education, labor force participation, and income are all connected, even though they might vary in the short run.

The Hausman test also indicates the validity of using the PMG estimator because the null hypothesis of long-run homogeneity cannot be rejected. This means that, although there can be differences in short-run dynamics, there is no difference in the long run. From the results of the PMG estimation, it can be seen that none of the major independent variables, such as the education of females, the labor market participation of females, and GDP per capita, has any statistical influence on fertility in the long run.

The negative and significant error-correction term shows that the system quickly moves toward long-run equilibrium, fixing short-run disequilibrium almost completely in one period. This depicts that the long-term relationship is stable and that fertility dynamics are responsive. Short-term results indicate that increased female labor force participation positively influences fertility, possibly indicating enhanced economic conditions or reverse causality, in which fertility decisions affect labor supply. The Panel Granger causality analysis illustrates a one -way link between fertility and women's participation in the labor market. This suggests that having more children may make it harder for women to work because they have to take care of them. According to the diagnostic tests, confirm that the model is strong by showing that the residuals are normally distributed, there is no serial correlation, and there is homoscedasticity. This leads to more reliable conclusions.

Overall, it is evident that despite the existence of long-run stability among fertility and its determinants, socioeconomic variables, including education, labor force participation, and GDP per capita, do not have a significant impact on fertility rates over the long term in South Asia. On the other hand, short-term dynamics and demographic elements may exert a stronger influence. The results obtained indicate

that policymakers in South Asia need to look into the underlying structure of societies in order to address issues of fertility and female labor force participation. There are certain limitations of this research. Firstly, the scope of the economic and social variables is relatively limited due to a lack of sufficient statistical data. Secondly, female education is measured by secondary school enrollment rates and thus cannot capture other factors, such as the quality and level of education. Finally, other determinants of fertility behavior related to culture or institutions were not included in the analysis.

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