

# THE IMPACTS OF SPOUSES' EDUCATION AND MATERNAL HEALTH ON FERTILITY IN PAKISTAN: AN ECONOMETRIC ANALYSIS

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# Abstract

**Purpose of the study:** This paper primarily aims to recognize, develop, and examine the impacts of spouses' education and maternal health status in cooperation with a variety of other covariates (demographic, social, economic, cultural, and attitudinal) on fertility in Pakistan.

**Methodology:** This study mainly aimed to discover how spouse's education and maternal health inputs help in controlling high fertility using four data sets of Pakistan Demographic and Health Survey (1990-91, 2006-07, 2012-13 and 2017-18) through count data model (Poisson regression).

**Main Findings:** Our empirical results proved the hypotheses that educated spouses and healthy mothers practice family planning tools (contraceptives) to lower down the total fertility rates.

**Application of this study:** Educated husband and wife will keep their family size smaller to devote more on children's nutrition, health, and education. In general, rise in intentional birth control method make the education policy more helpful in reducing fertility. Findings draw government attention for embarking on public enlightenment campaigns to generate wakefulness regarding the long-term significance of fertility regulation in Pakistan.

**Novelty/Originality:** The study is one of its kind because it attempted to explore the link among spouse's education, maternal health inputs, and child's health outcomes with fertility that could be used to benchmark for additional research in Pakistan.

*Keywords*: Demographic, Socioeconomic and Cultural Determinants, Spouse's Education, Maternal Health Inputs, Fertility, Poisson Regression Model, Pakistan.

# INTRODUCTION

The rapid population growth is one of the beholding issues of the developing world; Pakistan is no exception. Pakistan's population was 107.60 million in 1990, increased to 22.4977 million in 2021, which is around 2.83 percent of the world's total population (world meters, 2021)<sup>1</sup>. With an annual inclusion of more than 3.7 million people, the population is expected to reach 338.01 million by 2050, likely to get 5<sup>th</sup> rank globally. Although, Pakistan's crude birth rate and crude death rate had decreased over time, from 40.39 births/1,000 population to 27.034 births/1,000 population, and from 10.77 deaths/1,000 population to 6.835 deaths/1,000 population during 1990 to 2021, respectively. The statistic showed that infant mortality rates have dramatically reduced from 106.4 deaths/1,000 live births in 1990 to 57.998 deaths/1000 live births in 2021 (UNICEF and WHO, 2021)<sup>2</sup>. A downward trend in total fertility rate is observed from 5.4 in 1990-91 to 3.363 births per woman in 2021. The reduction in fertility rate was found quite considerable in rural (5.58 to 3.9 births per woman) and urban (4.9 to 2.9 births per woman) areas during 1990 and 2017-18 (Figure 1). Fertility {primarily modelled through total children ever born to women during childbearing ages (15-49 years)} has enormous significance in modern demographic research as it is one of the utmost attitudes of discontinuity between national policies and individual's targets. Several determinants have been recognized to influence fertility, but still, disparities in its levels, trends, and determinants in different regions and individuality amongst population stratum remained the most enveloping discoveries in demographic studies. Pakistan is tackling various challenges, consisting of economic and monetary constraints, low literacy rates, inadequate quality of schooling services and health, higher unemployment rates, power crisis, food insecurity, water shortage, and lower status of women. Nevertheless, other developing countries are also facing similar challenges, but Pakistan has another high population growth rate. Most countries have successfully reduced high population growth rates through aggressive policy measures in

<sup>&</sup>lt;sup>1</sup>Source: www.worldometers.info//

<sup>&</sup>lt;sup>2</sup>Source: Estimates developed by the United Nation Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at www.childmortality.org.



the education and health sectors. These countries have procured comprehensible plans to balance population through resource allocations. As a result, growth rates have become nearer to one percent, whereas Pakistan persists in having a population growth rate of approximately 2.03% in 2021. Pakistan has a diversified record of investments, and the main primary preference conferred toward population problems and remained distant in its fertility transition. Therefore, the speedy population growth rate corroded growth enhancements and composited disputes of general scarcity, social unfairness, fiscal slowdown, and appalling ecological conditions. Keeping in view, the poor health status of women, this study aimed to investigate factors influencing reproductive health within socioeconomic, demographic, and cultural frameworks.



Figure 1: Trends in the total fertility rate of Pakistan from 1990-2018.

Source: PDHS data 2017-18

# LITERATURE REVIEW

This segment reviews the accessible literature on the demographic, socioeconomic, and cultural factors, influencing fertility differences, high fertility rates, and reasons for subsequent slow reduction of fertility in Pakistan. The main factors affecting high fertility are classified into three extensive groups such as demographic, attitudinal, and socioeconomic status of women. These three classifications are relatively inter-connected with each other. It is a fact that an individual's fertility is a function of multiple factors, and an appropriate understanding of these factors would have supreme significance in undertaking such a dilemma of uncontrolled or unchecked fertility. The association among these different demographic, socioeconomic status, and fertility has obtained a great concentration equally from sociological and economic approaches. Historically, fertility reduction is ascribed to multifaceted factors, linked to urban development, industrialization, social and economic advancement. The fertility experts have made various-efforts to elucidate fertility reduction by employing casual explanatory variables and various socio-economic and demographic determinants. The socioeconomic factors including household's income, the residence of urban region and employment of women in a formal sector outside the house, professional position (Nuwaha, 1999) and living conditions of household (Magadi et al., 2000) have been confirmed as powerful determinants of woman's likelihood of using healthcare services. Sound earnings are one of the highly influencing indicators of contraceptives usage (Nanda et al., 2011). Barbara et al. (2019) examined a causal link between education and maternal and child health in low and middle-income countries. The study discovered significant effects of education on child's health using OLS models. The health and survival of a child are considerably influenced by the education and fertility of the mother. The framework to elucidate the association between maternal education and child mortality (probability of dying between age one and five years) have been well-recognized in demographic, social, economic, and reproductive health literature. Based on this structure, an association between women's health and child's health, and education had been confirmed (Basu, 1994; Chen, 2009; Makate, 2016). Götmark (2020) estimated the current levels of fertility along with five determinants including education, Gross Domestic Product (GDP), religion, contraceptive prevalence rate (CPR), and strength of family planning programs. Their findings showed that in declining order of strength, fertility correlates inversely by education, CPR, and GDP while positively by religion. Kebede (2021) analyzed the DHS data of 34 sub-Saharan African (SSA) countries and compared the comparative role of dissimilar socioeconomic factors on fertility desires at the individual, community, and country levels. The findings proved that women's education has stronger effects on fertility compared to family wealth and place of residence at all levels. Education successfully improves the effectiveness of generating health investments using the appropriate use of health-related information. Hence, the marginal productivity of individual's health inputs would likely increase through their years of schooling (Ali, 2018; Sheikh, 2018). A few earlier research works have determined a direct relationship between maternal own health and a child's health status and education. Notwithstanding, some works have also proved an inverse relationship between a child's mortality and the education of the mother.



Nevertheless, the effects of maternal education on a child's mortality are normally overstated because of the incapability of controlling other unobservable characteristics of mothers like inherited talent (Sandiford et al., 1997). Abayomi (2018) used DHS to estimate the effect of maternal education and fertility on child survival in the Islands of Comoros by employing a two-stage probit regression method. The outcomes revealed that around seventy-five percent of mothers with no formal education, gave birth to one to five children, and child survival condensed significantly with maternal age, education, urban region, and breastfeeding instantly after birth. One more line of reckoning is an analytical relationship that in general exists between educated parents. The work of Bagavos et al. (2017) and Shakya (2016) proved the fact that development in a mother's education is helpful in persistent fertility reduction. Maternal education influences fertility to a great extent and contraceptive use in Turkey (Dincer, 2014). The impacts of maternal education accounted for nurturing healthy children and usually notice fewer frequencies of low birth weights children (Gunes, 2015). Furthermore, due to the beginning of worldwide primary education, maternal fertility is condensed to a great extent in Nigeria (Osili, 2008). In Bangladesh, a study accounted for about 38 to 45 percent less mortality among infants whose mothers accomplished secondary education than uneducated mothers (Akter et al., 2015). Gakidou et al. (2010) estimated data for 175 countries and recognized the fact that maternal education reported approximately 51.2 percent of 8.2 million drops in child mortality between 1970 and 2009. Rafi et al. (2021) studied the maternal age less than 18 or greater than 34 years, short inter-pregnancy birth interval, and higher birth order are high-risk fertility behaviors in Asian and African countries. The study concluded that maternal age and preceding birth interval if less than 24 months came out as significant risk factors for child mortality. The patriarchal family system in Pakistan doesn't allow women to communicate with husbands about essential issues, including the practice of contraception; that is to say, women are unable to desire alone about the number of children. Modifications in social standards of smaller family sizes and contraceptive practice are promoted to bring changes in the prevailing cultural system (Hakim and Miller, 2000). Open communication between spouses is a vital step toward increasing the involvement of women in reproductive health care decisions. <u>Khattak (2017)</u> employed bivariate and multivariate analysis in conjunction with Poisson regression on PDHS (2012-13) and found that female work status, female exposure to mass media, age at marriage, education, and child mortality are the significant determinants of adolescent fertility in Pakistan.

# METHODOLOGY AND DATA SOURCES

This study discovers the impacts of demographic and socioeconomic factors, mainly parental education and health status, on fertility, using four data sets of PDHS (1990-91, 2006-07, 2012-13 and 2017-18) through the Poisson regression model of married women and staying with their husbands. Statistical Package for Social Science (SPSS-20) and Stata (12) software is used to analyze the data.

#### Regression Modeling for Count Data (Poisson Regression)

Count data is mainly exercised, by the Poisson model, named after a French Mathematical Physicist, *Poisson, Simon-Denis*, who contributed a lot in probability theory and improved and built-up numerous concepts. The Poisson regression model is described as an authentic model used for count data (<u>Winkelmann, 1995</u>). The probability distribution we employed as a base is Poisson, not average or logistic. If 'Y' is a Poisson random variable, its probability function would be as follows.

$$f(y_i/x_i) = P(Y = y) = \frac{e^{-\lambda_i} \lambda^{y_i}}{y_i!} \dots (1)$$
$$y_i = 0, 1, 2, \dots$$

This probability function has one parameter;  $\lambda_i$  symbolizes intensity or rate parameter, and we assign distribution as P ( $\lambda$ ). The initial two moments are the mean and variance of *Y* in regression as a function of various independent variables.

$$E[Y] = (V[Y]) = \lambda_i \dots (2)$$

Poisson regression model resulted from Poisson distribution through parameterizing association connecting mean parameter  $\lambda_i$  and covariates (explanatory variables)  $x_i$ . The normal assumption is to employ the exponential mean parameterization,

$$E[Y] = V[Y] = \lambda_i = \exp(x_i'\alpha) \dots (3)$$
$$i = 1, \dots, n$$

Using assumption, there exists 'k' linearly independent covariates, generally consisting of a constant. Since  $V(y_i/x_i) = \exp(x_i'\alpha)$ , by eq.2 and eq.3, Poisson regression is mainly heteroskedastic. Given eq. (1) and eq. (2) and assumption that observations are independent, majority of a natural estimator is the maximum likelihood (MLE). Log-likelihood function as;

$$lnL(\alpha) = \sum_{i=1}^{N} [y_i x_i' \alpha - \exp(x_i' \alpha) - ln y_i!] \dots (4)$$



*Poisson Maximum Likelihood Estimator* (PMLE): It stood for  $\alpha_p^{\uparrow}$ , the key to 'k' non-linear equations equivalent to the first-order condition for MLE.

$$\frac{\sigma lnL}{\sigma \alpha} = \sum_{i=1}^{N} (y_i - \exp(x_i' \alpha) x_i = 0 \dots (5))$$
$$y_i = \exp(x_i' \alpha) \dots (6)$$

Where;

- *y<sub>i</sub>* Dependent variable (total number of children ever born to woman)
- $x_i^{\prime}$  Vector of explanatory variables
- $\alpha$  Coefficient of explanatory variables

The Marginal Effect of a variable on the average number of events can be as follows.

$$\frac{\sigma E\left(\frac{y_i}{x_i}\right)}{\sigma x_j} = \alpha_j \exp\left(\left(x_i'\alpha\right)\dots(7)\right)$$

The outcomes of marginal effects may be interpreted as one unit increase in x will increase or decrease the average number of the dependent variable by the marginal product.

*The incidence Rate Ratio* (IRR) is occasionally employed to construe the outcome from the Poisson model along with the Poisson maximum likelihood estimates. We can simply interpret the results of the incidence rate ratios as if the value of IRR equals to 2 it shows that the incidence rate for product y increases by 2 for each one-unit increase on predictor x.

#### **RESULTS / ANALYSIS**

To study various impacts of spouses' education and health on fertility, we exercised data on the number of children to connect with education (years), health inputs, region, age, and other control variables. As explained earlier in the methodology section, analysis is based on a sample of 5666, 8561, 11523, and 12241 married women and currently living with their spouses. The definitions and description of estimated variables, along with their expected outcomes, are given in Annex A.

#### **Descriptive Analysis**

The percentage of women regarding mean fertility set against appropriate demographic and socioeconomic characteristics are shown in Table 1. Over the estimated period, the mean number of children increases with age from 1.73 and 1.39 children per woman (20-24 age groups) to 6.73 and 5.58 children per woman (45-49 age cohorts), respectively. Women with no education showed higher fertility (4.48 to 4.09 births) compared to highly educated women 2.39 to 2.23 births. The estimated fertility remained significantly higher in rural regions (4.23 to 3.66 births) than urban areas (4.29 to 3.24 births). Among all areas, fertility had remarkably declined, Punjab (4.24 to 3.32 children), Sindh (4.35 to 3.31 births), Khyber Pakhtunkhwa (4.30 to 3.51 children), Balochistan (4.06 to 3.73 births), Gilgit Baltistan (4.41 to 4.08 children), Islamabad (3.19 to 2.89 children), Azad Jammu and Kashmir (3.40 births) and Federal and Tribal Area (3.83 children). The poorest wealth quintile showed higher (4.25-4.10 births) while the wealthiest people lower fertility (3.30 to 2.74 births) per woman. Husband and wife, who are first or second cousins, tend to have more children (4.20 to 3.54 children) compared to nonconsanguineous couples (4.34 to 3.31 children). Fertility is higher among monogamous marriages (4.28 to 3.45 births) than polygamous marriages (3.98 and 3.45 births). Women who agreed that beatings are justified in any case showed higher levels of fertility (4.38 to 3.77 births) relative to those who negate and counteract with husbands for hitting their wives in five different cases (3.25, 3.30,3.23, 3.27, and 3.34 births). Women usually marry husbands (with no education) is connected to higher fertility of 4.55, and 4.09 children relative to 3.42 and 2.9 children for whom wedded to husbands have higher schooling. Surprisingly, women who are practicing any method of contraceptives, folkloric or traditional or modern, are correlated with higher fertility (5.29 and 4.28 children) contrasted to those who do not practice any technique (4.09 and 2.99 births) over time. Family planning message regarding fewer children leads to a prosperous life serves (3.69 to 3.07 children) as an effective instrument for fertility cut. Women's receiving tetanus injections (4.15 to 4.18 births), prenatal care with a trained health professional (4.09 to 3.41), intake of iron tablets or syrup (3.72 to 3.35 births), and antenatal visits (3.8 to 2.93 births) all contributed to healthy pregnancy and preferences for fewer children (low fertility). A woman with a normal Body Mass Index (18.5 to 24.9) showed a lower level of fertility (3.29 to 3.15 children) as compared to thin (3.67 to 3.43 births) or obese (3.88 to 3.77 births) women. Pregnancy risks are higher among those whose birth intervals are less than 24 months (5.33 to 4.41 children) relative to those who extend longer birth intervals (low fertility) 5.22 to 4.44 children. Children who



ever breastfed indicated low fertility (4.45 to 3.61 births) compared to those who never breastfed (4.63 to 3.58 births). Children who received vaccination showed somewhat low fertility (4.56 to 3.81) compared to those who do not receive (4.62 to 3.95 children). Multiple births also contributed to raising fertility 2 to 3 times more than single birth, but the percentage of these twins or triplets' births are very rare in Pakistan. Male child or son preferences (4.75 to 3.93 births) have also shown a strong upshot on high fertility. The fertility declined for husbands with higher education (3.42 to 2.9 children) while increased for husbands with no education around 4.55 to 4.09 children.

Table 1: Mean number of children by some socioeconomic and demographic characteristics of women in Pakistan

Variables	2017-1	8	2012-1	3	2006-0	7	1990-91	
Characteristics of Women	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age Cohorts								
15-19	0.55	0.69	0.50	0.64	0.53	0.73	0.67	0.80
20-24	1.39	1.18	1.38	1.17	1.51	1.27	1.73	1.46
25-29	2.45	1.65	2.57	1.73	2.77	1.76	3.27	1.96
30-34	3.60	2.00	3.93	2.11	4.24	2.24	4.70	2.31
35-40	4.47	2.33	4.86	2.44	5.25	2.54	5.71	2.55
40-44	5.18	2.58	5.55	2.62	6.01	2.84	6.53	2.96
45-49	5.58	2.70	6.30	2.98	6.66	2.89	6.73	3.06
Educational levels								
No education	4.09	2.79	4.52	2.98	4.44	3.04	4.48	3.07
Primary	3.40	2.31	3.47	2.46	3.50	2.63	4.08	2.61
Secondary	2.74	1.92	2.77	2.02	2.84	2.18	3.33	2.33
Higher	2.23	1.58	2.31	1.59	2.35	1.69	2.39	1.75
Place of Residence								
Rural	3.66	2.70	3.98	2.88	4.08	3.02	4.23	3.00
Urban	3.24	2.33	3.59	2.62	3.78	2.70	4.29	2.94
Regions								
Sindh	3.31	2.37	3.65	2.84	3.92	3.00	4.35	3.01
Punjab	3.32	2.57	3.67	2.65	3.93	2.76	4.24	2.93
Khyber-Pakhtunkhwa	3.51	2.56	3.73	2.68	4.19	3.02	4.30	2.99
Balochistan	3.73	2.80	4.18	3.04	3.84	2.96	4.06	2.93
Gilgit Baltistan	4.08	2.63	4.41	2.85				
Islamabad	2.89	1.99	3.19	2.05				
AJK	3.40	2.35						
FATA	3.83	2.78						
Wealth Quintiles								
Poorest	4.10	2.88	4.38	3.01	4.25	3.16		
Poorer	3.78	2.73	4.13	2.96	4.21	3.13		
Middle	3.58	2.51	3.99	2.848	4.15	2.90		
Richer	3.12	2.28	3.60	2.684	3.94	2.82		
Richest	2.74	1.93	3.09	2.179	3.30	2.34		
<b>Consanguinity (Blood Relations)</b>								
Yes	3.54	2.58	3.85	2.79	3.96	2.94	4.20	2.96
No	3.31	2.43	3.70	2.71	3.97	2.85	4.34	2.98
Polygamy								
No other wife	3.45	2.53	3.80	2.75	3.97	2.90	4.28	2.96
Other wives	3.45	2.59	3.80	3.05	3.83	2.87	3.98	3.11
Beating is justified in any case if;								
Yes	3.77	2.722	4.38	2.97				
Wife goes out without telling husband	3 25	2 370	1 16	2.86				
(No)	5.25	2.317	4.10	2.00				
Wife neglects the children (No)	3.30	2.40	3.97	2.93				
Wife argues with husband (No)	3.23	2.36	4.07	2.89				
Wife refuses to have sex with husband	3 27	2 30	3 77	2 71				
(No)	5.41	2.39	5.11	2./1		<b>_</b>		



Wife burns the food (No)	3.34	2.44	3.51	2.58				
Current contraceptive use								
Using folk or traditional or modern	1 28	216	1 13	2 34	1 97	2 / 9	5 29	2.54
method	4.20	2.10		2.34	ч.)/	2.47	5.27	2.54
Not using	2.99	2.60	3.40	2.92	3.53	2.96	4.09	2.99
Family Planning message conveyed: (fe	wer chi	ldren, pr	osperous li	fe)				
No	3.07	2.26	3.33	2.49	3.69	2.69		
Yes	3.14	2.12	3.30	2.36	3.94	2.62		
Indicators of Mother's Health								
Received tetanus injections before pregna	ncy							
Not Received	4.07	2.59	4.38	2.73	4.45	2.81	4.64	2.79
Received	4.18	2.08	4.36	2.35	4.41	2.39	4.15	2.55
Prenatal care with a trained health profess	ional							
No care	4.62	2.67	4.86	2.76	4.61	2.71	4.73	2.78
Yes	3.41	2.17	3.48	2.28	3.75	2.52	4.09	2.58
Mother received iron tablets or syrup duri	ng preg	nancy						
No	4.00	2.45	4.27	2.62	4.34	2.71		
Yes	3.35	2.15	3.33	2.21	3.72	2.46		
Number of antenatal visits during pregnar	ncy							
Antenatal visits (No)	4.62	2.67	4.86	2.76	4.62	2.718	5.73	2.49
Antenatal visits (1-20) Yes	2.93	2.40	2.03	2.00	3.67	2.69	3.80	2.37
BMI								
Thin (BMI<18.5)	3.43	2.52	3.67	2.95				
Normal (BMI 18.5-24.9)	3.15	2.52	3.29	2.58				
Overweight (BMI ≥25)	3.77	2.54	3.88	2.76				
Birth Intervals								
Less than 24 months	4.41	2.08	4.84	2.52	4.10	2.61	5.33	2.67
More than 24 months	4.44	2.29	4.75	2.29	3.72	2.65	5.22	2.45
Indicators of Child's Health								
The child was ever breastfed								
Never Breastfed	3.58	2.45	4.04	2.74	3.72	2.65	4.63	2.97
Ever breastfed or still on breastfeeding	3.61	2.29	3.83	2.47	4.10	2.62	4.45	2.70
Child ever received vaccination.								
Not vaccinated	3.95	2.56	4.21	2.56	3.98	2.72	4.62	2.80
Vaccinated	3.81	2.38	4.08	2.54	4.28	2.66	4.56	2.74
Child Mortality								
Yes	5.62	2.50	5.84	2.55	5.83	2.73	6.04	2.72
No	2.96	2.26	3.28	2.57	3.69	2.83	3.99	2.91
The child is from multiple births.								
Single Birth	3.92	2.31	4.26	2.55	4.48	2.70	4.72	2.74
Multiple Births (Twins or Triplets)	5.01	2.43	5.60	2.85	5.80	2.62	6.12	2.77
Sex of first child								
Male	3.93	2.30	4.26	2.52	4.53	2.72	4.75	2.73
Female	3.95	2.34	4.30	2.59	4.46	2.64	4.73	2.75
Education of Husband								
No education	4.09	2.87	4.60	3.06	4.58	3.14	4.55	3.07
Primary	3.65	2.55	3.91	2.85	4.19	3.02	4.47	3.05
Secondary	3.21	2.27	3.45	2.52	3.45	2.61	3.94	2.84
Higher	2.90	2.22	3.08	2.26	3.26	2.37	3.42	2.31
Total Fertility	3.45	2.53	3.79	2.76	3.96	2.90	4.26	2.97

Source: PDHS data (1990-91, 2006-07, 2012-13 and 2017-18)



#### Quantitative Analysis

#### Poisson Regression

Table 2 represents the results of Poisson regression, conditional marginal effects, and incidence rate ratios of spouse's education and maternal health on high fertility (1990-2018) in Pakistan. A significant opposite association was observed between a woman's age (square term) and fertility. The co-efficient values (0.104 and 0.081) entailed the realism that fertility, even though, boosts with age, however, turns down after a definite stage of life when women's fertility started to reduce. The outcomes align with many studies (Hondroyiannis, 2004; Caldwell et al., 2002). Similarly, the husband's fertility although increased over time around 2.29 and 3.30% but naturally declined after reaching a particular stage. The outcomes are in the exact directions (Zafar, 2002; Nanda, 2005). The inverse link between maternal education with (coefficient value, 0.05) and fertility confirmed the discernment that development in women's education is a supportive and the main factor contributing to continued fertility drop. Likewise, educated men (0.012 and 0.018) want to get married later and generally prefer an educated woman as a life partner for a smaller family size. The results are consistent with various works (Price, 1999). In addition, the negative impact of education of both spouses on live births may be due to the higher contraceptive prevalence rate amongst educated couples (Martin, 1995). Likewise, urban regions surprisingly showed higher fertility than rural counterparts due to various factors like rural to urban migration flow, better employment opportunities, and educational as well as health facilities (Zahid et al., 2020; Sheikh et al., 2017; Arif, 2009; Hasan, 2010). Poisson regression accounted that likelihood of fertility increases in all quintiles as compared to the benchmark category. Orsal and Goldstein (2010) also discovered the effect of the economic condition of households on fertility. In most upper-class families, preferences for more significant the larger number of children are highly supported due to the availability and extravagant presence of wealth. The outcomes showed that couples who are cousins have a positive association with fertility and showed a significant rise of 2.64% during 2017-18. In polygamous marriages, the relative rate for fertility was 5.8% less than in monogamous marriages. This might be due to the lesser frequencies of sexual association among polygamous marriages (Timaeus, 1998). Highly empowered women produced 1.61 percent points fewer children than less empowered women. The results seem relatively consistent with (Sathar, 2001; Hakim, 2003; Gudbrandsen, 2013). The positive association of contraceptives with fertility is due to the fact that in the prevailing customary society, the majority of males refuse to exercise contraceptives in the early years of marriages. Another reason might be the late initiation of birth control tools for limiting the family size. Couples prefer to practice contraceptives once desired number of sons is achieved (Butt, 1993; Mahmood, 1996; Saleem et al., 2008). Mass media messages about a family planning modify people's outlook towards family structure which results in lower fertility (Gupta et al., 2003; Rabbi, 2012). In Pakistan, mostly people desire more sons due to the reality that they believe their sons (assets) will serve and support them financially in their old age. Higher mortality leads to higher fertility in Pakistani culture. This is because couples produce more children after losing the former children that results in shorter birth intervals hence, eventually high fertility (Rashida and Donald, 1996). Women, who usually breastfeed their young once longer, can easily delay their next pregnancy due to the contraceptive properties of lactation, thus result in lower fertility and improved child survival. These results are in line with (Kabir, 2002; Marquis et al., 2002; Nausheen et al., 2021). In general, resistance power of vaccinated children seems somewhat more profound than nonvaccinated children, which results in a better survival rate and health. Due to lesser health hazards, mother and child are more prone to a healthy pregnancy and more extended existence. Mother's vaccination against tetanus before or during pregnancy leads to the healthy live birth of a child and less risk exposure to a further threat to existence. Mother's intake of iron tablets or syrup during pregnancy for combating against anemia (lack of red blood cells) came out as an insignificant determinant. Generally, antenatal visits throughout pregnancy for healthy live birth significantly reduces the further conception of women hence, lower fertility. Shorter birth intervals lead to different concepts, including conservative orthodoxy tradition of a higher number of children, preference for formula milk, child mortality, eagerness for more sons, lack of family planning service, and low level of education. These outcomes are in line with Mturi (1997).

### Conditional Marginal Effects

The results tell us that, after controlling for other variables, on average a woman's age contributed from 0.238 to 0.396. In contrast, an additional increase in the fertility due to her husband's age is marginal, i.e. 0.526 to 0.056 over the estimated time. Women's education caused 0.1144 and 0.083 whereas 0.02761 and 0.0314 of husband's education level additional decrease in the fertility. Possession of various physical assets added 0.0139 and 0.0246 additional rise in the fertility.

Consanguinity additionally augmented fertility by 4.53% during 2017-18. Polygamy caused an additional reduction in fertility by 0.0082 and 0.101 points. An additional increase of 0.1893 and 0.1798 caused by contraceptive use in the fertility. Birth intervals of less than 24 months additionally raise the number of children by 0.281 and 0.179 percent points. Tetanus injections before pregnancy reduce fertility by 0.049 to 0.0083 points, while the BMI of overweight women boosts fertility from 6.9 to 6.6%, respectively. The sex of a male child increased fertility by 0.069 and 0.311 points. Multiple births contributed 0.94 and 0.7211 marginal rises in the fertility. The child mortality too increased deliveries by 28.63 to 39.1 percent points. Child was ever breastfed marginally increased fertility by 0.029 and 0.0074 while vaccinated children



increased deliveries by 0.6 and 1.99%. The education of women furthermore cut the fertility by 11.44 to 8.3 percentage points whereas; husband's education also reduced deliveries by 2.761 to 3.14%. Women's response against wife's beating in different cases, additionally shrinks the fertility by 0.72 and 2.7 percentage points. Family planning message about fewer children leads to a prosperous life decreased live births by 0.147 to 0.38% points.

### Effects of Incidence Rate Ratios

During the estimated period (1990 and 2018), the coefficients tell us that, adjusting for all other factors, each additional year of women's age, productivity gets multiplied by IRR values, that is to say, there is around 10.97 and 8.47% decrease per child. For each additional unit, birth in Sindh (1.97 and 7.35%), Punjab (2.2 and 10.5%), Khyber-Pakhtunkhwa (0.8 and 5.01%), Balochistan (8.35 and 2.3%), Gilgit Baltistan (9.4 and 5.3%) increases per child as compared to Balochistan, Islamabad and FATA regions, respectively. In terms of the exponentiated parameters, every unit change in wealth index, for those in the poorest, poorer, middle, and richer quintiles get multiplied by IRR values (19.63 and 18.19%), 14.77 and 12.9%, 13.27 and 9.8%, and 6.11 and 5.5%, respectively, increase per child as compared to the richest quintiles, adjusting for all other factors. The estimated values of IRR for physical assets (0.6 and 1.44%), contraceptive use (8.68 and 11.4%), number of tetanus injections before pregnancy (2.17 and 0.48%), number of antenatal visits during pregnancy (0.26 and 0.2%), BMI of overweight women (2.93 and 4.4%), birth intervals less than 24 months (13.06 and 11%), male child (3.08, and 1.82%), twins or triplets (50.6 and 52.3%), child mortality (13.29 and 25.6%), the child was ever breastfed (12.3 and 0.43%), child ever received vaccination (0.26 and 1.1%) and husband's age (2.32 and 3.35%). With an increase in age square term, women produce fewer children than younger women, around 0.08, 0.07, and 0.1%. Women with more years of schooling have 0.79, 2.8, and 0.1 lower IRR than those who have no year of education. Polygamous weddings also reduce the additional births by 0.4 and 5.7% than monogamous marriages. Women who are relatively more empowered produce 0.3 and 1.62% fewer children compared to those who are not empowered. Family Planning message conveyed regarding fewer children leads to a prosperous life declines the number of births by 0.1 and 0.3%.

# DISCUSSIONS

Nowadays rapid population growth has turned out to be a big problem for the development of Pakistan The recognition of magnitude and direction about the effect of various socioeconomic and demographic indicators helps in understanding and formulation of population policy implications. This study is a model-based estimation of fertility by the number of children (ever born) to a woman. Count model (Poisson regression) is applied for measuring the impacts of spouse's education and maternal health on fertility. The negative relationships of spouses' education and conveyed messages regarding family planning with fertility proved the fundamental need for education and mass media in reducing the huge population.

### CONCLUSION

Our results proved the proposed objective by investigating the significant inverse relationship among educated spouses, maternal health, and family planning tools (contraceptives) to lower down the total fertility rates. The empirical results revealed that there exists positive and significant association among the ages of wife and husband, wealth quintiles, physical assets, consanguinity, current contraceptive usage, number of tetanus injections, number of antenatal visits, Body Mass Index for overweight women, birth intervals, sex of the first child, multiple births, child mortality, breastfeeding, vaccination, and fertility. Age squares of wife and husband, spouses' education along with their square terms, polygamous marriages, beating is justified in various cases, family planning message; antenatal visits have shown a negative and significant relationship with fertility. Based on our research findings, we propose that policymakers should formulate more women-centric policies with particular emphasis on women's education by providing more awareness and education opportunities to them. The research findings also draw government attention for embarking on public enlightenment campaigns to generate wakefulness regarding the long-term significance of fertility regulation in Pakistan.

### LIMITATIONS AND STUDY FORWARD

This study depends on cross-sectional population data, which restricts our understanding of underlying processes related to fertility and timing of events (antenatal visits and taking of iron tablets during pregnancy). The respondents may have underreported fertility when asked to give a total number of children they were ever born. In Pakistan, women usually find it problematic to account for their dead children among their earlier born alive children and per se can lead to under-reporting of births. The researchers should also follow a better understanding of the multifaceted association among spouse's education, maternal health, and fertility using longitudinal data, which did not exist in the current analysis.

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#### **AUTHORS CONTRIBUTION**

The first co-author wrote the literature review and discussion, the second contributed to writing the introduction and literature review, and last contributed in the reference section.

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Variables	Definition and Description	Expected Outcomes
Total Fertility	Total number of children ever born to a woman	
Characteristics of Women		
Age	Age in years (15-49)	+ve
Age square	It is utilized to find out the levels to which age affects total fertility of women	-ve
Education	Number of years of schooling (completed)	-ve
Education square	It is used to expose the intensity to which education level influences the total fertility	-ve
Characteristics of Households	· · · · · · · · · · · · · · · · · · ·	
Place of Residence		
Urban/Rural	Dummy equals to one if urban and 0 otherwise	-ve
Regions		
Sindh/ Punjab/ KPK/ Balochistan/ GB/ Islamabad/AJK/FATA	Dummy equals to one if Sindh, Punjab, KPK, Balochistan and GB, AJK and FATA or 0 otherwise	+ve/-ve
Wealth Ouintiles	· · · · · · · · · · · · · · · · · · ·	
Poorest/ Poorer/ Middle/ Richer/ Richest	Dummy equals to one if poorest, poorer, middle and richer or 0 otherwise	+ve/-ve
Physical Assets	Dummy equals 1 if household holding various assets (radio, T.V, fridge, bicycle, motorcycle or car) and 0 otherwise	-ve
Consanguinity (Blood Relations)	Dummy equals 1 if first cousin on father's or on mother's side or second cousin and 0 otherwise	+ve
Polygamy	Dummy equals 1 if polygynous and 0 otherwise	-ve
Beating is justified in different cases	Dummy equals to 1 if women denied beating is justified in any of the five cases and 0 otherwise	-ve
Current contraceptive use	Dummy equals 1 if currently practicing any method (traditional or folk or modern)	-ve
Family Planning message conveyed	Dummy equals 1 if believed on less children leads to a prosperous life and 0 otherwise	-ve
Indicators of Mother's Health		
Number of tetanus injections before pregnancy	Dummy equals to one if women had tetanus injection or 0 otherwise	+ve
Prenatal care with a trained health professional	Dummy equals to one if received care from any trained health professional or 0 otherwise	-ve
Mother received iron tablets or syrup during pregnancy	Dummy equals to one if received iron tablets or syrup or 0 otherwise	+ve
Number of antenatal visits	Total number of antenatal visits to doctor and ranges from 1-20	+ve/-ve
BMI		
Thin/ Normal/ Overweight	Dummy equals to one if underweight or 0 otherwise	+ve/-ve
Birth Intervals	Dummy equals to one if birth interval <24 months or 0	+ve

Annex A: Description list of variables and expected outcomes



	otherwise	
Indicators of Child's Health		
Child was ever breastfed	Dummy equals to one if child ever had breastfeeding or 0 otherwise	+ve/-ve
Child ever received vaccination	Dummy equals to one if child ever received any vaccination (DPT3, Polio3 or Measles) or 0 otherwise	+ve
Child Mortality	Dummy equals to one if woman experience death of at least one child or 0 otherwise	+ve
The child is from multiple births	Dummy equals to one if children are twins or 0 otherwise	+ve
Sex of first child	Dummy equals to one if sex of child is male or 0 otherwise	+ve
Characteristics of Husband		
Age	Age in years (15-99)	+ve
Age square	Same as described for women's age <sup>2</sup>	-ve
Education	Number of years of schooling (completed)	-ve
Education square	Same as described for women's education <sup>2</sup>	-ve



Table 2: Poisson regression, conditional marginal effects, and Incidence Rate Ratios (IRR) of spouse's education and maternal health on high fertility in Pakistan

<b>Dependent</b> <b>Variable:</b> Total Fertility	2017-18			2012-13			2006-07			1990-91		
Explanatory Variables	Poisson Coefficients	Delta- method (dy/dx)	IRR	Poisson Coefficients	Delta- method (dy/dx)	IRR	Poisson Coefficients	Delta- method (dy/dx)	IRR	Poisson Coefficients	Delta- method (dy/dx)	IRR
Characteristics	s of Women											
Age	0.0813 (11.36) ***	0.1396 (11.10)***	1.0847 (11.36)***	0.0905 (13.74)***	0.0905 (13.81)***	1.0949 (13.74)***	0.0815 (7.86)***	0.2765 (7.91)***	1.0850 (7.86)***	0.10414 (12.07)***	0.2388 (11.54)***	1.1097 (12.07)***
Age square	-0.0007 (-7.23)***	-0.0012 (-7.17)***	0.999 (-7.23)***	-0.0008 (-8.87)***	-0.0019 (-8.91)***	0.9992 (-8.88)***	-0.0006 (-4.16)***	-0.0021 (-4.17)***	0.999 (4.16)***	-0.0009 (-8.28)***	-0.0023 (-8.11)***	0.999 (-8.28)***
Education	-0.050 (-4.53)***	-0.083 (-4.51)***	0.952 (-4.53)***	-0.0078 (-1.98)**	-0.0188 (-1.98)**	0.9921 (-1.97)**	-0.0286 (-1.51)	-0.0958 -1.51	0.9720 (-1.51)	-0.0499 (-4.79)***	-0.1144 (-4.75)***	0.951 (-4.79)***
Education square	-0.0027 (-1.13)	-0.0048 (-1.33)	0.9972 (-1.33)	-0.0013 (-4.16)***	-0.0031 (-4.17)***	0.9986 (-4.16)***	-0.0079 (-1.89)*	-0.0266 (-1.89)*	0.9921 (-1.89)*	-0.01054 (-4.33)***	-0.0241 (-4.30)***	0.9895 (-4.33)***
Characteristics	of Household	s										
Place of Reside	ence											
Urban/ Rural	0.0083 (0.70)	0.01425 (0.70)	1.0083 (0.70)	0.0190 (1.55)	0.0455 (1.55)	1.0191 (1.55)	0.0183 (1.08)	0.0665 (1.08)	1.0198 (1.08)	0.02789 (1.80)*	0.0640 (1.80)*	1.0282 (1.80)*
Regions	~ /	. ,	~ /	. ,		~ /			· · · ·		~ /	
Sindh	-0.076 (-3.34) ***	-0.1309 (- 3.32)***	0.9265 (-3.34)***	0.0460 (2.02) ***	0.1108 (2.02) ***	1.0471 (2.02)**	0.0994 (4.09) ***	0.3354 (4.09) ***	1.1041 (4.09)***	0.01951 (0.91)	0.0447 (0.91)	1.0197 (0.91)
Punjab	-0.110 (-4.79) ***	-0.189 (-4.75)***	0.8952 (-4.79)***	0.0088 (0.39)	0.0211 (0.39)	1.0088 (0.39)	0.0319 (1.35)	0.1097 (1.35)	1.03293 (1.35)	-0.0215 (-0.98)	-0.0494 (-0.98)	0.978 (-0.98)
КРК	-0.0513 (-2.24)***	-0.0881 (-2.24)***	0.9499 (-2.24)***	0.0062 (0.26)	0.0150 (0.26)	1.0062 (0.26)	0.0986 (3.90)***	0.3416 (3.90)***	1.1061 (3.90)***	-0.00765 (-0.34)	-0.0175 (-0.34)	0.992 (-0.34)
Balochistan	-0.0230 (-0.98)	-0.0395 (-0.98)	0.9772 (-0.98)	0.0802 (3.24)***	0.1930 (3.26)**	1.0835 (3.24)***	Reference Category	Reference Category	1.000	Reference Category	Reference Category	1.000
GB	-0.0543 (-2.04)***	-0.0933 (-2.04)***	0.9470 (-2.04)***	0.0899 (3.36) ***	0.216 (3.36)***	1.0940 (3.36) ***						
Islamabad	-0.1225 (-4.31)***	-0.2103 (-4.28)***	0.8846 (-4.31)***	Reference Category	Reference Category	1.000						
AJK	-0.097 (-3.71)***	-0.1674 (- 3.69)***	0.907 (-3.71)***									
FATA	Reference Category	Reference Category	1.000									
Wealth Quintil	es	- 1										

G	
C	

Poorest	0.61671	(0.287)	1.1819	0.0923	0.2221	1.0967	0.1800	0.6070	1.1963			
Toolest	(6.22)***	(6.16)***	(6.22)***	(3.58)***	(3.58)***	(3.58)***	(4.78)***	(4.78)***	(4.78)***			
Poorer	0.1216	0.2089	1.1293	0.0872	0.2099	1.0912	0.1380	0.4666	1.14775			
100101	(5.41)***	(5.37)***	(5.41)***	(3.87)***	(3.87)***	(3.87)***	(4.15)***	(4.15)***	(4.15)***			
Middle	0.0936	0.1606	1.098	0.0938	0.226	1.0984	0.1242	0.4220	1.1327			
	(4.78)***	(4.75)***	(4.78)***	(4.78)***	(4.78)***	(4.78)***	(4.10)***	(4.10)***	(4.10)***			
Richer	0.0536	0.0922	1.055	0.0619	0.1489	1.0638	0.0588	0.2010	1.0611			
	(2.99)***	(2.99)***	(2.99)***	(3.55)***	(3.56)***	(3.55)***	(2.13)***	(2.13)***	$(2.13)^{***}$			
Richest	Reference	Reference	1.000	Reference	Reference	1.000	Reference	Reference	1.000			
	Category	Category	1.0144	Category	Category	1 0005	Category	Category	1.0100	0.0070	0.0120	1.000
Physical	0.0143	0.0246	1.0144	0.0094	0.0227	1.0095	0.0189	0.0638	1.0190	0.0060	0.0139	1.006
Assets	(2.87)***	(2.87)***	(2.87)***	(2.14)**	(2.14)**	(2.14)**	(3.18)***	(3.18)***	(3.18)***	(1.09)	(1.09)	(1.09)
Consanguinity	0.0264	0.0453	1.0267	0.0130	0.0313	1.0131	0.0135	0.0458	1.0136	0.00160	0.00367	1.0016
	(2.52)***	(2.52)***	(2.52)***	(1.38)	(1.38)	(1.38)	(1.06)	1.06	(1.06)	(0.13)	(0.13)	(0.13)
Polygamy	-0.0589	-0.1011	0.9427	-0.064/	-0.1557	0.93/3	-0.04351	-0.1461	0.95774	-0.00356	-0.0082	0.9964
Destine	(-2.24)***	(-2.23)***	(-2.24)***	(-2.80)***	(-2.80)**	(-2.80)***	(-2.42)***	(-2.42)***	(-2.42)***	(-0.31)	(-0.31)	(-0.31)
Beating is	-0.0161	0.0276	1.0162	-0.0029	-0.0072	0.9970						
Justified in	(1.60)*	(1.59)*	(1.46)	(-1.96)**	(-1.96)*	(-1.96)**						
Comment cases												
Current	0.1048	0.1798	1.1104	0.0787	0.1893	1.0818	0.07480	0.2528	1.0775	0.08331	0.1911	1.0868
	(10.01)***	(9.77)***	(10.01)***	(7.60)***	(7.60)***	(7.60)***	(4.64)***	(4.64)***	(4.64)***	(4.56)***	(4.52)***	(4.56)***
Family												
Family	0.0022	0.0038 (	0.007	0.0023	0.0056	0.0076	0.00046	0.00147	0.0005			
Family Planning	-0.0022	-0.0038 (-	0.997	-0.0023	-0.0056	0.9976	-0.00046	-0.00147	0.9995			
Family Planning message	-0.0022 (-1.60)*	-0.0038 (- 1.59)*	0.997 (-1.60)*	-0.0023 (-1.85)*	-0.0056 (-1.85)*	0.9976 (-1.85)*	-0.00046 (-0.24)	-0.00147 (-0.24)	0.9995 (-0.24)			
Family Planning message conveyed	-0.0022 (-1.60)*	-0.0038 (- 1.59)*	0.997 (-1.60)*	-0.0023 (-1.85)*	-0.0056 (-1.85)*	0.9976 (-1.85)*	-0.00046 (-0.24)	-0.00147 (-0.24)	0.9995 (-0.24)			
Family Planning message conveyed Indicators of M Tetanus	-0.0022 (-1.60)* Iother's Healt	-0.0038 (- 1.59)* <b>h</b>	0.997 (-1.60)*	-0.0023 (-1.85)*	-0.0056 (-1.85)*	0.9976 (-1.85)*	-0.00046 (-0.24)	-0.00147 (-0.24)	0.9995 (-0.24)			
Family Planning message conveyed Indicators of M Tetanus injections	-0.0022 (-1.60)* Iother's Healt	-0.0038 (- 1.59)* <b>h</b>	0.997 (-1.60)*	-0.0023 (-1.85)*	-0.0056 (-1.85)*	0.9976 (-1.85)*	-0.00046 (-0.24)	-0.00147 (-0.24)	0.9995 (-0.24)	0.0215	0.0492	1 0217
Family Planning message conveyed Indicators of M Tetanus injections before	-0.0022 (-1.60)* Iother's Healt	-0.0038 (- 1.59)* h 0.0083 (3.20)***	0.997 (-1.60)* 1.0048 (3.20)***	-0.0023 (-1.85)* 0.0045 (2.95)***	-0.0056 (-1.85)* 0.0108 (2.95)**	0.9976 (-1.85)* 1.0045 (2.95)***	-0.00046 (-0.24) 0.00417 (2 50)***	-0.00147 (-0.24) 0.0144 (2.50)**	0.9995 (-0.24) 1.0042 (2.50)***	0.0215	0.0492	1.0217 (1.28)
Family Planning message conveyed Indicators of M Tetanus injections before pregnancy	-0.0022 (-1.60)* <b>Iother's Healt</b> 0.0048 (3.20)***	-0.0038 (- 1.59)* h 0.0083 (3.20)***	0.997 (-1.60)* 1.0048 (3.20)***	-0.0023 (-1.85)* 0.0045 (2.95)***	-0.0056 (-1.85)* 0.0108 (2.95)**	0.9976 (-1.85)* 1.0045 (2.95)***	-0.00046 (-0.24) 0.00417 (2.50)***	-0.00147 (-0.24) 0.0144 (2.50)**	0.9995 (-0.24) 1.0042 (2.50)***	0.0215 (1.28)	0.0492 (1.28)	1.0217 (1.28)
Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care	-0.0022 (-1.60)* Iother's Healt 0.0048 (3.20)***	-0.0038 (- 1.59)* h 0.0083 (3.20)***	0.997 (-1.60)* 1.0048 (3.20)***	-0.0023 (-1.85)* 0.0045 (2.95)***	-0.0056 (-1.85)* 0.0108 (2.95)**	0.9976 (-1.85)* 1.0045 (2.95)***	-0.00046 (-0.24) 0.00417 (2.50)***	-0.00147 (-0.24) 0.0144 (2.50)**	0.9995 (-0.24) 1.0042 (2.50)***	0.0215 (1.28)	0.0492 (1.28)	1.0217 (1.28)
Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained	-0.0022 (-1.60)* Iother's Healt 0.0048 (3.20)***	-0.0038 (- 1.59)* h 0.0083 (3.20)***	0.997 (-1.60)* 1.0048 (3.20)***	-0.0023 (-1.85)* 0.0045 (2.95)***	-0.0056 (-1.85)* 0.0108 (2.95)**	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827	-0.00046 (-0.24) 0.00417 (2.50)***	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065	0.9995 (-0.24) 1.0042 (2.50)***	0.0215 (1.28) -0.01105	 0.0492 (1.28) -0.0253	 1.0217 (1.28) 0.9890
Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained health	-0.0022 (-1.60)* Iother's Healt 0.0048 (3.20)*** 0.0111 (0.66)	-0.0038 (- 1.59)* h 0.0083 (3.20)*** 0.0190 (0.66)	0.997 (-1.60)* 1.0048 (3.20)*** 1.0111 (0.666)	-0.0023 (-1.85)* 0.0045 (2.95)*** -0.0174 (-1.27)	-0.0056 (-1.85)* 0.0108 (2.95)** -0.0420 (-1.27)	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827 (-1.27)	-0.00046 (-0.24) 0.00417 (2.50)*** -0.0019 (-0.11)	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065 (-0.11)	0.9995 (-0.24) 1.0042 (2.50)*** 0.998 (-0.11)	 0.0215 (1.28) -0.01105 (-0.65)	 0.0492 (1.28) -0.0253 (-0.65)	1.0217 (1.28) 0.9890 (-0.65)
Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained health professional	-0.0022 (-1.60)* Iother's Healt 0.0048 (3.20)*** 0.0111 (0.66)	-0.0038 (- 1.59)* h 0.0083 (3.20)*** 0.0190 (0.66)	0.997 (-1.60)* 1.0048 (3.20)*** 1.0111 (0.666)	-0.0023 (-1.85)* 0.0045 (2.95)*** -0.0174 (-1.27)	-0.0056 (-1.85)* 0.0108 (2.95)** -0.0420 (-1.27)	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827 (-1.27)	-0.00046 (-0.24) 0.00417 (2.50)*** -0.0019 (-0.11)	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065 (-0.11)	0.9995 (-0.24) 1.0042 (2.50)*** 0.998 (-0.11)	 0.0215 (1.28) -0.01105 (-0.65)	 0.0492 (1.28) -0.0253 (-0.65)	1.0217 (1.28) 0.9890 (-0.65)
Family Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained health professional Mother	-0.0022 (-1.60)* <b>Iother's Healt</b> 0.0048 (3.20)*** 0.0111 (0.66)	-0.0038 (- 1.59)* h 0.0083 (3.20)*** 0.0190 (0.66)	0.997 (-1.60)* 1.0048 (3.20)*** 1.0111 (0.666)	-0.0023 (-1.85)* 0.0045 (2.95)*** -0.0174 (-1.27)	-0.0056 (-1.85)* 0.0108 (2.95)** -0.0420 (-1.27)	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827 (-1.27)	-0.00046 (-0.24) 0.00417 (2.50)*** -0.0019 (-0.11)	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065 (-0.11)	0.9995 (-0.24) 1.0042 (2.50)*** 0.998 (-0.11)	 0.0215 (1.28) -0.01105 (-0.65)	0.0492 (1.28) -0.0253 (-0.65)	1.0217 (1.28) 0.9890 (-0.65)
Family Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained health professional Mother received iron	-0.0022 (-1.60)* <b>Iother's Healt</b> 0.0048 (3.20)*** 0.0111 (0.66) 0.0002	-0.0038 (- 1.59)* h 0.0083 (3.20)*** 0.0190 (0.66) 0.0004	0.997 (-1.60)* 1.0048 (3.20)*** 1.0111 (0.666) 1.0002	-0.0023 (-1.85)* 0.0045 (2.95)*** -0.0174 (-1.27) 0.0141	-0.0056 (-1.85)* 0.0108 (2.95)** -0.0420 (-1.27) 0.0338	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827 (-1.27) 1.0141	-0.00046 (-0.24) 0.00417 (2.50)*** -0.0019 (-0.11) 0.0062	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065 (-0.11) 0.0215	0.9995 (-0.24) 1.0042 (2.50)*** 0.998 (-0.11) 1.0063	 0.0215 (1.28) -0.01105 (-0.65)	0.0492 (1.28) -0.0253 (-0.65)	 1.0217 (1.28) 0.9890 (-0.65)
Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained health professional Mother received iron tablets/syrup	-0.0022 (-1.60)* <b>Iother's Healt</b> 0.0048 (3.20)*** 0.0111 (0.66) 0.0002 (0.02)	-0.0038 (- 1.59)* h 0.0083 (3.20)*** 0.0190 (0.66) 0.0004 (0.02)	0.997 (-1.60)* 1.0048 (3.20)*** 1.0111 (0.666) 1.0002 (0.02)	-0.0023 (-1.85)* 0.0045 (2.95)*** -0.0174 (-1.27) 0.0141 (1.08)	-0.0056 (-1.85)* 0.0108 (2.95)** -0.0420 (-1.27) 0.0338 (1.08)	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827 (-1.27) 1.0141 (1.08)	-0.00046 (-0.24) 0.00417 (2.50)*** -0.0019 (-0.11) 0.0062 (0.37)	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065 (-0.11) 0.0215 (0.37)	0.9995 (-0.24) 1.0042 (2.50)*** 0.998 (-0.11) 1.0063 (0.37)	 0.0215 (1.28) -0.01105 (-0.65)	 0.0492 (1.28) -0.0253 (-0.65)	 1.0217 (1.28) 0.9890 (-0.65)
Family Family Planning message conveyed Indicators of M Tetanus injections before pregnancy Prenatal care with a trained health professional Mother received iron tablets/syrup during	-0.0022 (-1.60)* Iother's Healt 0.0048 (3.20)*** 0.0111 (0.66) 0.0002 (0.02)	$\begin{array}{c} -0.0038 \\ 1.59)^{*} \\ \hline \\ \hline \\ 0.0083 \\ (3.20)^{***} \\ \hline \\ 0.0190 \\ (0.66) \\ \hline \\ 0.0004 \\ (0.02) \end{array}$	0.997 (-1.60)* 1.0048 (3.20)*** 1.0111 (0.666) 1.0002 (0.02)	-0.0023 (-1.85)* 0.0045 (2.95)*** -0.0174 (-1.27) 0.0141 (1.08)	-0.0056 (-1.85)* 0.0108 (2.95)** -0.0420 (-1.27) 0.0338 (1.08)	0.9976 (-1.85)* 1.0045 (2.95)*** 0.9827 (-1.27) 1.0141 (1.08)	-0.00046 (-0.24) 0.00417 (2.50)*** -0.0019 (-0.11) 0.0062 (0.37)	-0.00147 (-0.24) 0.0144 (2.50)** -0.0065 (-0.11) 0.0215 (0.37)	0.9995 (-0.24) 1.0042 (2.50)*** 0.998 (-0.11) 1.0063 (0.37)	 0.0215 (1.28) -0.01105 (-0.65)	 0.0492 (1.28) -0.0253 (-0.65)	 1.0217 (1.28) 0.9890 (-0.65)

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Number of												
antenatal	-0.0017	-0.0029	0.998	-0.0050	-0.0122	0.995	-0.0003	-0.0008	0.990	0.00263	0.0060	1.0026
visits during	(-1.49)	(-1.49)	(-1.50)	(-2.34)**	(-2.34)**	(-2.34)**	(-0.37)	(-0.37)	(-0.37)	(3.71)***	(3.67)***	(3.71)***
pregnancy												
BMI												
Thin	-0.040	-0.0694	0.9603	0.0041	0.0097	1.0040						
(BMI<18.5)	(-1.65)*	(-1.65)*	(-1.65)*	(0.13)	(0.14)	(0.13)						
Normal (BMI	0.0005	0.0009	1.0005	-0.0357	-0.0860	0.9649						
18.5-24.9)	(0.04)	(0.04)	(0.04)	(-1.33)	(-1.33)	(-1.33)						
Overweight	0.0386	0.0663	1.040	0.0289	0.0696	1.0293						
(BMI ≥25)	(2.67)***	(2.67)***	(2.67)**	(1.60)*	(1.60)*	(1.60)*						
Birth Intervals	0.1043	0.1791	1.1100	0.1163	0.2799	1.1234	0.1045	0.3539	1.1102	0.1227	0.2816	1.1306
Birtii Intervais	(37.32)***	(30.74)***	(37.32)***	(38.84)***	(40.71)***	(38.84)***	(27.50)***	(29.33)***	(27.50)***	(28.69)***	(23.70)***	(28.69)***
Characteristics	s of the Child											
Sex of first	0.0181	0.0311	1.0182	0.1477	0.3552	1.1591	0.0093	0.0317	1.0094	0.03037	0.0696	1.0308
child (male)	(1.92)*	(1.93)*	(1.92)**	(21.47)***	(23.63)***	(21.47)***	(0.66)	(0.66)	(0.66)	(2.41)**	(2.43)**	(2.41)**
Child is from	0 4206	0 7211	1 523	0.4448	1 0701	1 5602	0 2311	0 7805	1 259	0 40952	0.939/	1 5060
multiple	(21 20)***	(31 58)***	(21 20)***	(13 /0)***	(13 65)***	(13/10)***	(3 05)***	(3.05)***	(3.05)***	(13.77) * * *	(18 71)***	(13 22)***
births	(21.29)	(51.56)	(21.29)	(13.49)	(13.05)	(13.49)	(3.93)	(3.93)	(3.93)	(13.22)	(10.71)	(13.22)
		0.0010										
Child	0.2282	0.3918	1.256	0.1594	0.3836	1.1729	0.1491	0.5045	1.1606	0.12484	0.2863	1.1329
Child Mortality	0.2282 (20.51)***	0.3918 (18.68)***	1.256 (20.51)***	0.1594 (14.77)***	0.3836 (14.64)***	1.1729 (14.77)***	0.1491 (7.96)***	0.5045 (7.96)***	1.1606 (7.96)***	0.12484 (7.43)***	0.2863 (7.25)***	1.1329 (7.43)***
Child Mortality Indicators of C	0.2282 (20.51)*** Child's Health	0.3918 (18.68)*** Inputs	1.256 (20.51)***	0.1594 (14.77)***	0.3836 (14.64)***	1.1729 (14.77)***	0.1491 (7.96)***	0.5045 (7.96)***	1.1606 (7.96)***	0.12484 (7.43)***	0.2863 (7.25)***	1.1329 (7.43)***
Child Mortality Indicators of C Child was	0.2282 (20.51)*** Child's Health 0.0043	0.3918 (18.68)*** Inputs 0.0074	1.256 (20.51)*** 1.0043	0.1594 (14.77)*** 0.0309	0.3836 (14.64)*** 0.0743	1.1729 (14.77)*** 1.0314	0.1491 (7.96)*** -0.0200	0.5045 (7.96)*** -0.0686	1.1606 (7.96)*** 0.9799	0.12484 (7.43)*** 0.01274	0.2863 (7.25)*** 0.0292	1.1329 (7.43)*** 1.0128
Child Mortality Indicators of C Child was ever breastfed	0.2282 (20.51)*** hild's Health 0.0043 (0.29)	0.3918 (18.68)*** Inputs 0.0074 (0.29)	1.256 (20.51)*** 1.0043 (0.29)	0.1594 (14.77)*** 0.0309 (2.26)**	0.3836 (14.64)*** 0.0743 (2.26)**	1.1729 (14.77)*** 1.0314 (2.26)**	0.1491 (7.96)*** -0.0200 (-1.23)	0.5045 (7.96)*** -0.0686 (-1.23)	1.1606 (7.96)*** 0.9799 (-1.23)	0.12484 (7.43)*** 0.01274 (1.25)	0.2863 (7.25)*** 0.0292 (1.25)	1.1329 (7.43)*** 1.0128 (1.25)
Child Mortality Indicators of C Child was ever breastfed Child ever	0.2282 (20.51)*** hild's Health 0.0043 (0.29) 0.01159	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199	1.256 (20.51)*** 1.0043 (0.29) 1.011	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149	1.1606 (7.96)*** 0.9799 (-1.23) 1.004	0.12484 (7.43)*** 0.01274 (1.25) 0.00264	0.2863 (7.25)*** 0.0292 (1.25) 0.0060	1.1329 (7.43)*** 1.0128 (1.25) 1.0026
Child Mortality Indicators of C Child was ever breastfed Child ever received	0.2282 (20.51)*** <b>Thild's Health</b> 0.0043 (0.29) 0.01159 (8.04)***	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)***	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)***	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)**	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)**	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)**	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)***	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)***	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)***	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33)	$\begin{array}{c} 0.2863 \\ (7.25)^{***} \\ \hline \\ 0.0292 \\ (1.25) \\ 0.0060 \\ (1.33) \\ \end{array}$	$ \begin{array}{c} 1.1329 \\ (7.43)^{***} \\ \hline 1.0128 \\ (1.25) \\ 1.0026 \\ (1.33) \end{array} $
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination	0.2282 (20.51)*** Child's Health 0.0043 (0.29) 0.01159 (8.04)***	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)***	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)***	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)**	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)**	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)**	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)***	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)***	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)***	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33)	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33)	1.1329         (7.43)***         1.0128         (1.25)         1.0026         (1.33)
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics	0.2282 (20.51)*** Child's Health 0.0043 (0.29) 0.01159 (8.04)*** 5 of Husband	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)***	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)***	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)**	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)**	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)**	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)***	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)***	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)***	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33)	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33)	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33)
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics	0.2282 (20.51)*** hild's Health 0.0043 (0.29) 0.01159 (8.04)*** s of Husband 0.03304	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** 0.0312	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age	0.2282 (20.51)*** hild's Health 0.0043 (0.29) 0.01159 (8.04)*** s of Husband 0.03304 (6.76)***	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)***	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)***	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)***	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)***	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)***	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** 0.0312 (4.97)***	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)***	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)***	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)***	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)***	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232 (5.56)***
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age	0.2282 (20.51)*** <b>hild's Health</b> 0.0043 (0.29) 0.01159 (8.04)*** <b>5 of Husband</b> 0.03304 (6.76)*** -0.0003	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** 0.0312 (4.97)*** -0.0003	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004	1.1329         (7.43)***         1.0128         (1.25)         1.0026         (1.33)         1.0232         (5.56)***         0.9998
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age Age square	0.2282 (20.51)*** <b>Thild's Health</b> 0.0043 (0.29) 0.01159 (8.04)*** <b>5 of Husband</b> 0.03304 (6.76)*** -0.0003 (-5.53)***	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005 (-5.50)***	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997 (-5.53)	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016 (-5.62)***	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004 (-5.63)***	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998 (-5.62)***	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** 0.0312 (4.97)*** -0.0003 (-3.84)***	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009 (-3.84)***	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997 (-3.84)***	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188 (-4.82)***	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004 (-4.77)***	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232 (5.56)*** 0.9998 (-4.82)***
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age Age square Education	0.2282 (20.51)*** <b>Thild's Health</b> 0.0043 (0.29) 0.01159 (8.04)*** <b>5 of Husband</b> 0.03304 (6.76)*** -0.0003 (-5.53)*** -0.01830	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005 (-5.50)*** -0.0314	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997 (-5.53) 0.9819	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016 (-5.62)*** -0.0080	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004 (-5.63)*** -0.0193	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998 (-5.62)*** 0.9919	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** 0.0312 (4.97)*** -0.0003 (-3.84)*** -0.0088	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009 (-3.84)*** -0.03101	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997 (-3.84)*** 0.9908	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188 (-4.82)*** 0.01203	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004 (-4.77)*** 0.02761	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232 (5.56)*** 0.9998 (-4.82)*** 1.0121
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age Age square Education	0.2282 (20.51)*** <b>Child's Health</b> 0.0043 (0.29) 0.01159 (8.04)*** <b>5 of Husband</b> 0.03304 (6.76)*** -0.0003 (-5.53)*** -0.01830 (-2.14)***	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005 (-5.50)*** -0.0314 (-2.14)***	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997 (-5.53) 0.9819 (-2.14)***	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016 (-5.62)*** -0.0080 (-2.61)***	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004 (-5.63)*** -0.0193 (-2.61)**	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998 (-5.62)*** 0.9919 (-2.61)***	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** -0.00312 (4.97)*** -0.0003 (-3.84)*** -0.0088 (-1.81)*	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009 (-3.84)*** -0.03101 (-1.81)*	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997 (-3.84)*** 0.9908 (-1.81)*	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188 (-4.82)*** 0.01203 -1.03	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004 (-4.77)*** 0.02761 (1.03)	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232 (5.56)*** 0.9998 (-4.82)*** 1.0121 (1.03)
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age Age square Education Education	0.2282 (20.51)*** hild's Health 0.0043 (0.29) 0.01159 (8.04)*** 5 of Husband 0.03304 (6.76)*** -0.0003 (-5.53)*** -0.01830 (-2.14)*** 0.0030	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005 (-5.50)*** -0.0314 (-2.14)*** 0.0052	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997 (-5.53) 0.9819 (-2.14)*** 1.003	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016 (-5.62)*** -0.0080 (-2.61)*** -0.0003	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004 (-5.63)*** -0.0193 (-2.61)** 0.0009	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998 (-5.62)*** 0.9919 (-2.61)*** 1.0004	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** -0.00312 (4.97)*** -0.0003 (-3.84)*** -0.0088 (-1.81)* Omitted	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009 (-3.84)*** -0.03101 (-1.81)*	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997 (-3.84)*** 0.9908 (-1.81)* 1.00	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188 (-4.82)*** 0.01203 -1.03 -0.00392	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004 (-4.77)*** 0.02761 (1.03) -0.0090	$\begin{array}{c} 1.1329 \\ (7.43)^{***} \\ \hline 1.0128 \\ (1.25) \\ \hline 1.0026 \\ (1.33) \\ \hline 1.0232 \\ (5.56)^{***} \\ \hline 0.9998 \\ (-4.82)^{***} \\ \hline 1.0121 \\ (1.03) \\ \hline 0.9960 \\ \hline \end{array}$
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age Age square Education Education square	0.2282 (20.51)*** hild's Health 0.0043 (0.29) 0.01159 (8.04)*** 5 of Husband 0.03304 (6.76)*** -0.0003 (-5.53)*** -0.01830 (-2.14)*** 0.0030 (1.94)**	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005 (-5.50)*** -0.0314 (-2.14)*** 0.0052 (1.94)**	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997 (-5.53) 0.9819 (-2.14)*** 1.003 (1.94)*	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016 (-5.62)*** -0.0080 (-2.61)*** -0.0003 (-1.60)*	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004 (-5.63)*** -0.0193 (-2.61)** 0.0009 (1.60)*	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998 (-5.62)*** 0.9919 (-2.61)*** 1.0004 (1.60)*	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** -0.00312 (4.97)*** -0.0003 (-3.84)*** -0.0088 (-1.81)* Omitted	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009 (-3.84)*** -0.03101 (-1.81)* 	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997 (-3.84)*** 0.9908 (-1.81)* 1.00	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188 (-4.82)*** 0.01203 -1.03 -0.00392 (-1.64)*	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004 (-4.77)*** 0.02761 (1.03) -0.0090 (-1.64)*	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232 (5.56)*** 0.9998 (-4.82)*** 1.0121 (1.03) 0.9960 (-1.64)*
Child Mortality Indicators of C Child was ever breastfed Child ever received vaccination Characteristics Age Age square Education Education Square Constant	0.2282 (20.51)*** hild's Health 0.0043 (0.29) 0.01159 (8.04)*** 5 of Husband 0.03304 (6.76)*** -0.0003 (-5.53)*** -0.01830 (-2.14)*** 0.0030 (1.94)** -1.377	0.3918 (18.68)*** Inputs 0.0074 (0.29) 0.0199 (7.95)*** 0.05671 (6.70)*** -0.0005 (-5.50)*** -0.0314 (-2.14)*** 0.0052 (1.94)**	1.256 (20.51)*** 1.0043 (0.29) 1.011 (8.04)*** 1.0335 (6.76)*** 0.9997 (-5.53) 0.9819 (-2.14)*** 1.003 (1.94)* 0.2523	0.1594 (14.77)*** 0.0309 (2.26)** 0.0035 (2.36)** 0.0225 (7.06)*** -0.00016 (-5.62)*** -0.0080 (-2.61)*** -0.0003 (-1.60)* -1.4366	0.3836 (14.64)*** 0.0743 (2.26)** 0.0084 (2.37)** 0.0541 (7.06)*** -0.0004 (-5.63)*** -0.0193 (-2.61)** 0.0009 (1.60)*	1.1729 (14.77)*** 1.0314 (2.26)** 1.0035 (2.36)** 1.0227 (7.06)*** 0.9998 (-5.62)*** 0.9919 (-2.61)*** 1.0004 (1.60)* 0.2377	0.1491 (7.96)*** -0.0200 (-1.23) 0.0044 (2.47)*** -0.00312 (4.97)*** -0.0003 (-3.84)*** -0.0088 (-1.81)* Omitted -1.3957	0.5045 (7.96)*** -0.0686 (-1.23) 0.0149 (2.47)*** 0.1060 (4.97)*** -0.0009 (-3.84)*** -0.03101 (-1.81)* 	1.1606 (7.96)*** 0.9799 (-1.23) 1.004 (2.47)*** 1.0318 (4.97)*** 0.9997 (-3.84)*** 0.9908 (-1.81)* 1.00 0.2445	0.12484 (7.43)*** 0.01274 (1.25) 0.00264 (1.33) 0.02293 (5.56)*** -0.000188 (-4.82)*** 0.01203 -1.03 -0.00392 (-1.64)* -1.294	0.2863 (7.25)*** 0.0292 (1.25) 0.0060 (1.33) 0.0526 (5.48)*** -0.0004 (-4.77)*** 0.02761 (1.03) -0.0090 (-1.64)*	1.1329 (7.43)*** 1.0128 (1.25) 1.0026 (1.33) 1.0232 (5.56)*** 0.9998 (-4.82)*** 1.0121 (1.03) 0.9960 (-1.64)* 0.2739



Pseudo R <sup>2</sup>	0.3602	 0.3602	0.3556	 0.3556	0.2522	 0.2522	0.3493	 0.3493
$\text{Prob.} > \text{chi}^2$	0.0000	 0.0000	0.0000	 0.0000	0.0000	 0.0000	0.0000	 0.000
Number of observations	12229		11523		5002		5641	

Note: Figures in parenthesis are z-values, \* significant at 10 percent, \*\* at 5 percent, and \*\*\* at 1 percent level.