

**Working Paper 245**

**Is Young Maternal Age A Risk  
Factor for Sexually  
Transmitted Diseases and  
Anemia in India? An  
Examination in Urban and  
Rural Areas**

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# IS YOUNG MATERNAL AGE A RISK FACTOR FOR SEXUALLY TRANSMITTED DISEASES AND ANEMIA IN INDIA? AN EXAMINATION IN URBAN AND RURAL AREAS

N Kavitha<sup>1</sup>

## Abstract

*The present research work aims to study the effect of young maternal age on the prevalence of sexually transmitted diseases (STD) and anemia using NFHS-3 data. The bi-variate analysis showed that women who had their first birth during adolescence reported higher prevalence of STDs and anemia than women who had their first birth at later ages in both settings. The multivariate findings revealed that the likelihood of prevalence STDs and anemia (urban areas) was higher among adolescent women than among adult women.*

## Introduction

### Importance of the Study and Earlier Research

In low and middle income countries, almost 10 per cent of girls become mothers by the age of 16 years. In sub-Saharan Africa and South-central and South-east Asia the percentages are higher (WHO website). Of the world's population, 27 per cent is in the age group 10-24 years (PRB, 2006). The high incidence of early childbearing and the large population of adolescents demands in-depth study. In many societies the mistaken assumption prevails that the onset of menarche signals reproductive maturity. Medical research too suggests that 12-18 per cent pelvic growth takes place after menarche. In western societies, teenage pregnancy is considered a major social problem, mainly due to premarital sexual relationships. In eastern societies marriages take place during adolescence and hence sexual relationships commence at a younger age.

In South Asia, marriage is a social norm and childbirth is expected soon thereafter. The percentage of women giving birth by the age of 20 is as high as 22 in less developed countries. It is 28 per cent in India (PRB, 2006). It is evident from this data that despite the consequences of early motherhood, adolescent pregnancy occurs worldwide, including India.

The age at marriage and age at first birth are important factors that influence the reproductive health of women because of the various biological factors involved in the reproductive cycle of women. Sexually transmitted infections (STIs) primarily spread through person-to-person sexual contact (WHO, 2007). The prevalence of sexually transmitted infections is a vital dimension in the field of reproductive and sexual health. STIs are not only widely prevalent but also frequently go undetected and untreated. It can result in serious reproductive morbidity and mortality.

Women who marry and are sexually active at an early age are more prone to suffer sexually transmitted infections due to their physiological susceptibility to infections, incomplete growth and lack of awareness than those who are older when they start having sexual relations and bearing children. Young women are particularly susceptible to sexually transmitted infections because they have fewer

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antibodies to fight pathogens and greater cervical ectopy (WHO, 1997). Biologically young women are vulnerable to the risk of STIs because their genital tract is not fully developed. In addition to their physiological vulnerability there are social and economic factors that increase the risk of STIs among young women.

Women who start childbearing at an early age are more likely to suffer from anemia due to lack of adequate nutrition. Pregnant teenage girls require nutrition over and above the nutritional demand for their adolescent growth. These factors together cause poor nutritional status to pregnant adolescent (Jejeebhoy, 1998; Ramachandran, 1989). Further, women who start childbearing at an early ages have no control over fertility due to lack of negotiating skills with their partner or within the family about using contraception. This results in high fertility at shorter intervals. Repeated childbearing at shorter intervals make women more vulnerable to anemia.

It is known from earlier studies that lack of knowledge and use of contraception and health care services are common among adolescent women (Rashid, 2006; Narzary, 2009). In addition to physiological susceptibility, low levels of awareness make adolescent women vulnerable to anemia and STIs.

Earlier studies have brought out that the prevalence of anemia is higher among women who started childbearing at adolescence than among women who started childbearing at later ages (Jolly et al., 2000; Igwegbe and Udigwe, 2001; AlRamahi and Saleh, 2006; Trivedi and Pasrija, 2007). However, some studies have also shown that anemia is common among both teenage and adult mothers (Mahfouz et al., 1995; Kumar et al., 2007). Similarly, in the case of prevalence of STIs, a review of existing literature reveals that adolescent women are at higher risk than adult women (Lao and Ho, 1997; Sharma et al., 2001). It is also evident that socio-economic and other demographic factors have close association with the prevalence of anemia and STIs (IIPS., 2000; Prasad et al., 2005). An insight into earlier literature necessitates focus on these aspects in an environment where early marriage and childbearing are common. Therefore, this study aims to concentrate on these factors and study the situation in India.

An overview of earlier literature showed that most of the research was conducted in developed and African countries, whereas the problem of adolescent pregnancy and its consequences are acute in South Asian countries, particularly India. Moreover, most of these studies are based on either hospital records or small samples, from which it would be difficult to arrive at any reasonable conclusion. Therefore, there is a need to study the effect of adolescent pregnancy on the prevalence of anemia and STIs at the community level using a nationally representative sample. For this purpose, this study aims to use data from the National Family Health Survey-3, India.

## **Data and Methodology**

### **Data Source**

As mentioned earlier, this study uses data from the National Family Health Survey-3 (NFHS-3), India that was carried out in 2005-06. The NFHS-3 is a nationally representative sample that covered 29 states. In NFHS-3 information was collected on sexually transmitted diseases (STDs) from women who had sex whether they had an STD, a genital sore or ulcer or experienced any abnormal (for men) or

bad smelling discharge (for women) in the last 12 months. Abnormal genital discharge and genital sore/ulcer have been shown to be useful in identifying STDs. In the case of anemia, NFHS-3 undertook direct measurement of hemoglobin levels of married women in the age group 15-49. Anemia levels were recorded for women who stayed in the household the night before the interview not for Nagaland. Based on the test, three levels of severity of anemia were distinguished: mild anemia (10.0-10.9g/dl for pregnant women, 10.0-11.9g/dl for non-pregnant women), moderate anemia (7.0-9.9g/dl) and severe anemia (less than 7.0g/dl). Appropriate adjustments were made for women living in altitudes above 1000 meters and respondents who smoke, since both these groups require more hemoglobin in their blood (Center for Disease Control and Prevention, 1998). However in the present study, information collected from ever married women who had at least one birth is used to see the influence of age of the women at first birth on the prevalence of STDs and anemia.

### **Dependent Variables**

In NFHS-3, STDs and symptoms of STDs are measured as per cent of women experiencing a specific illness during a 12-month period preceding the survey. The prevalence of STDs and symptoms of STDs are pooled together to form one variable i.e., whether or not the respondents experienced any STD/symptoms of STD, since the percent age of women suffering from STDs and those who reported genital sore/ulcer was very small. In the case of anemia, the variable is categorised as whether or not they had any anemia and is used for the multivariate analyses.

### **Independent variables**

Several co-variables were examined because they may mediate maternal age and prevalence of STDs and anemia. The mother's age at the time of childbirth is categorised into two i.e., women who had their first child at 19 years or below (adolescent mothers) and women who had their first birth at 20 years and above (adult mothers). It is important to control for number of children because it is highly correlated with maternal age. First pregnancies carry risk independent irrespective of maternal age (Mishra and Ramanathan, 2002) and adolescents rather than older women are more likely to face risk in their first pregnancy. This variable is categorised between having had one child, two children, three children ever born and having had four or more children. Education is associated with the prevalence of STDs and anemia (IPS, 2000; Prasad et al., 2005) and teenage pregnancy is concentrated among adolescents with low levels of education. This variable is dichotomised into none and some education. Work status of women was included in the analysis because of its close association with higher prevalence of morbidity and anemia due to dual burden as homemakers and work outside home. Further adolescent mothers have limited employment opportunities associated with low levels of education. Wealth status of the households is included due to the fact that women who marry at early ages are generally from low income families. Moreover, prevalence of infection and anemia are common among poor women. Cultural factors such as caste and religion tend to influence the age at marriage for girls and is included in the multivariate analyses.

Exposure to mass media may have an influence on the prevalence of STDs and anemia because it provides knowledge and awareness of availability and use of contraceptives as well as

nutrition. Apart from these, the use of contraception and awareness of STDs were included in the analysis of STDs due to its close association with prevalence of STIs. Anemia may increase the risk of STIs; hence prevalence of anemia is controlled in the analysis on STDs. The Body Mass Index (BMI) of women is controlled in the analysis due to the fact that early pregnancy plays a vital role in determining BMI of women. Termination of pregnancy may make women more susceptible to anemia due to blood loss during fetal loss and is controlled in the multivariate analyses. It is often reported that domestic violence is common among adolescent women. Spousal violence is strongly associated with prevalence of anemia and STDs, particularly among younger women (Silverman et al., 2007; Weiss et al., 2008; Dude, 2009; Ackerson and Subramaniam, 2009; Pandey et al., 2009). Hence the effect of spousal violence is also controlled in order to see the net effect of maternal age on the prevalence of anemia and STDs.

### **Statistical Analysis**

Initially, cross tabulations were used to examine the bivariable relationships between dependent variables and place of residence. In the second stage, cross-tabulations were prepared to understand the association of young maternal age and prevalence of anemia and STDs by place of residence. No test of significance was conducted on these statistics.

For multivariate analyses, logistic regression models were used. Analyses were conducted for urban and rural areas separately. In the multivariate analysis of prevalence of STDs/symptoms of STDs, three models were used. The first model included all the explanatory variables described above except prevalence of anemia and spousal violence, the second model included the prevalence of anemia. While introducing anemia variable in the model, the sample size reduced significantly since information on anemia was not collected for Nagaland. Similarly, in the third model spousal violence was included as an explanatory variable. Here too, number of women in the analysis was reduced because information on violence was collected from only one woman in the household if there was more than one eligible woman. Due to these large differences in the sample size, it was decided to use three models in the analysis. In the case of anemia, two models were used for the same reason. The first model excluded spousal violence variable and the second model controlled for spousal violence.

## **Results**

### **Prevalence of Anemia and Sexually Transmitted Diseases**

The percent age distribution of level of anemia among urban and rural women clearly exhibit s that level of anemia, irrespective of its severity levels, is higher among rural women as compared to urban women (Table 1). It is also evident from the results that per cent of women who suffered any STD is higher among rural women than urban women. The same trend is observed in the case of symptoms of STDs i.e., genital sore/ulcer and genital discharge in the last 12 months.

**Table 1: Per cent Distribution of women by the Prevalence of Anemia and Sexually Transmitted Diseases across their Place of Residence**

Disorders	Urban	Rural
<b>Level of Anemia</b>		
Mild	36.2	38.9
Moderate	12.3	15.2
Severe	1.3	1.8
Any Anemia	49.8	55.9
<b>Total Women</b>	<b>32723</b>	<b>44641</b>
<b>STDs/ Symptoms of STDs</b>		
Any STD in last 12 months	1.2	1.7
Genital sore/ulcer in last 12 months	1.7	2.5
Genital discharge in last 12 months	7.2	11.3
Any STD	10.1	15.5
<b>Total Women</b>	<b>27513</b>	<b>61145</b>

**Note:** STD denotes Sexually Transmitted Disease

Table 2 presents the relationship between maternal age and prevalence of anemia and STDs separately for urban and rural areas. It is seen that the prevalence of anemia is higher among adolescent mothers than among adult mothers. The percentage of women experiencing STDs or symptoms of STDs is also higher among young mothers compared to adult mothers. The same trend is observed in both urban and rural areas.

**Table 2: Per cent Distribution of Adolescent and Adult Women by the Prevalence of Anemia and Sexually Transmitted Diseases across their Place of Residence**

Disorders	Urban		Rural	
	Adolescent	Adult	Adolescent	Adult
<b>Level of Anemia</b>				
Mild	37.0	35.5	39.7	37.7
Moderate	13.7	11.0	16.1	13.8
Severe	1.7	1.0	1.8	1.8
Any Anemia	52.4	47.5	57.6	53.3
<b>Total Women</b>	<b>14852</b>	<b>17871</b>	<b>26072</b>	<b>18569</b>
<b>STDs/ Symptoms of STDs</b>				
Any STD in last 12 months	1.5	1.0	1.8	1.6
Genital sore/ulcer in last 12 months	1.9	1.5	2.7	2.2
Genital discharge in last 12 months	8.2	6.2	11.9	10.3
Any STD	11.6	8.7	16.4	14.1
<b>Total Women</b>	<b>13327</b>	<b>14187</b>	<b>39436</b>	<b>21710</b>

**Note :** STD denotes Sexually Transmitted Disease

## Results based on Multivariate Analyses

**Role of Maternal Age on Anemia in Urban Areas:** In urban areas, though adolescents aged 19 years or younger are significantly more likely than women aged 20 years and above to suffer from anemia, the effect is statistically significant at a less significant level ( $P < 0.10$ ). However, with the introduction of spousal violence variable in the model, the statistical significance of maternal age vanished (Table 3).

The effect of control variables show that women who have four or more children ever born and women living in the southern and eastern regions have higher odds for anemia prevalence as compared to women who have one child ever born and live in the northern region. Women from wealthier households, non-Hindus, women with higher BMI and working women face lower risk of anemia than women in the respective reference categories. Experience of different forms of spousal violence does not have any significant influence in the model. The results do not vary much among models.

**Role of Maternal Age on Anemia in Rural Areas:** Maternal age has not had any significant influence on the prevalence of anemia in rural areas in both the models. Educated women, working women, women from wealthier households, non-Hindu women, women of OBC and other caste groups, women who have exposure to mass media and women with higher BMI are less likely to be anemic than illiterate, non-working, poor, Hindu, SC/ST women, women who had no exposure to mass media and women with low BMI. Women who consume fruits daily are less likely to have anemia than women who do not consume fruits at all. The region in which women live appears to be a strong significant predictor for prevalence of anemia.

**Table 3: Logistic Regression Results for Prevalence of Anemia by Place of Residence**

Explanatory Variables	Urban				Rural			
	Model 1		Model 2		Model 1		Model 2	
	Coeff.	OR	Coeff.	OR	Coeff.	OR	Coeff.	OR
<b>Age at First Birth of Women</b>								
Young ( $\leq 19$ ) (Ref.)								
Adult (20 and above)	0.0456	1.0466 <sup>+</sup>	0.0225	1.0228	0.0383	1.0391	0.0295	1.0299
<b>Women' Literacy</b>								
Illiterates (Ref.)								
Literates	0.0227	1.0230	0.0296	1.0301	-0.0699	0.9325 <sup>**</sup>	-0.0557	0.9458 <sup>+</sup>
<b>Children Ever Born</b>								
1 (Ref.)								
2	0.0362	1.0368	0.0403	1.0411	-0.0604	0.9414	-0.0641	0.9380
3	0.0611	1.0630	0.0706	1.0731	-0.0594	0.9423	-0.0835	0.9199 <sup>+</sup>
4 and above	0.1452	1.1563 <sup>***</sup>	0.1753	1.1916 <sup>***</sup>	-0.0774	0.9255 <sup>+</sup>	-0.0768	0.9260 <sup>+</sup>
<b>Work Participation of Women</b>								
Non-working (Ref.)								
Working	-0.0850	0.9185 <sup>***</sup>	-0.0918	0.9123 <sup>**</sup>	-0.1266	0.8811 <sup>***</sup>	-0.1160	0.8905 <sup>***</sup>
<b>Wealth Index</b>								
Very Low (Ref.)								
Low	-0.2961	0.7437 <sup>**</sup>	-0.3366	0.7142 <sup>**</sup>	-0.1638	0.8489 <sup>***</sup>	-0.1743	0.8401 <sup>***</sup>
Medium	-0.4006	0.6699 <sup>***</sup>	-0.4003	0.6701 <sup>***</sup>	-0.2854	0.7517 <sup>***</sup>	-0.3028	0.7387 <sup>***</sup>
High	-0.4894	0.6130 <sup>***</sup>	-0.4970	0.6083 <sup>***</sup>	-0.3284	0.7201 <sup>***</sup>	-0.3409	0.7112 <sup>***</sup>
Very High	-0.6211	0.5373 <sup>***</sup>	-0.6089	0.5440 <sup>***</sup>	-0.3573	0.6996 <sup>***</sup>	-0.3736	0.6883 <sup>***</sup>
<b>Religion</b>								
Hindu (Ref.)								
Others	-0.1908	0.8263 <sup>***</sup>	-0.2117	0.8092 <sup>***</sup>	-0.2478	0.7805 <sup>***</sup>	-0.2713	0.7624 <sup>***</sup>

Contd...



<b>Caste</b>								
SC/ST (Ref.)								
OBC	0.0399	1.0408	0.0434	1.0444	-0.0732	0.9294**	-0.0682	0.9341*
Others	-0.0428	1.0438	0.0449	1.0459	-0.1306	0.8776***	-0.1057	0.8997***
<b>Exposure to Mass Media</b>								
No (Ref.)								
Yes	-0.0658	0.9363	-0.0958	0.9086	-0.1252	0.8823***	-0.0796	0.9234**
<b>Region</b>								
North (Ref.)								
East	0.3022	1.3528***	0.3043	1.3557***	0.3776	1.4588***	0.3525	1.4226***
West	0.0431	1.0440	0.0664	1.0686	0.0343	1.0349	0.0311	1.0316
South	0.2015	1.2232***	0.1912	1.2108***	0.0774	1.0805**	0.0443	1.0453
<b>Body Mass Index</b>								
Low (Ref.)								
Medium	-0.3162	0.7289***	-0.3189	0.7270***	-0.2191	0.8033***	-0.2337	0.7916***
High	-0.5371	0.5845***	-0.5218	0.5934***	-0.5606	0.5709***	-0.5868	0.5561***
<b>Consumption of Green Leafy Vegetables</b>								
Never (Ref.)								
Daily	0.3916	1.4794	0.3666	1.4428	0.1663	1.1809	0.2784	1.3210
Weekly	0.3993	1.4908	0.3768	1.4576	0.2015	1.2233	0.3136	1.3684
Occasionally	0.1639	1.1781	0.1753	1.1916	0.0373	1.0380	0.1990	1.2202
<b>Consumption of Fruits</b>								
Never (Ref.)								
Daily	-0.1268	0.8809	-0.1293	0.8787	-0.2537	0.7759***	-0.2785	0.7569***
Weekly	-0.0254	0.9749	-0.0362	0.9645	-0.0992	0.9056	-0.1079	0.8977
Occasionally	0.0473	1.0485	0.0437	1.0447	-0.0607	0.9411	-0.0634	0.9385
<b>Less Severe Violence</b>								
No Violence (Ref.)								
Yes			0.0039	1.0040			0.0157	1.0158
<b>Severe Violence</b>								
No Violence (Ref.)								
Yes			0.0609	1.0627			0.0182	1.0184
<b>Sexual Violence</b>								
No Violence (Ref.)								
Yes			0.0385	1.0392			0.0281	1.0285
<b>-2 log likelihood</b>	44277.401		33185.197		59259.655		44145.258	
<b>Chi-Square Value</b>	874.874		648.171		1554.961		1141.328	
<b>Level of Significance</b>	0.000		0.000		0.000		0.000	
<b>Number of Women</b>	32571		24406		44294		33019	

**Note:** Coeff. denotes coefficient, OR denotes odds ratio, \*\*\* denotes  $p < 0.001$ , \*\* denotes  $p < 0.01$ , \* denotes  $p < 0.05$ , +denotes  $p < 0.10$

**Role of Maternal Age on STDs in Urban Areas:** In urban areas, the multivariate findings of the prevalence of STDs show significant differences between adolescent and adult mothers. Odds of prevalence of STDs are lower for adult mothers than for adolescent mothers. The introduction of the spousal violence variable in the model does not alter the statistical significance and the effect of different forms of violence on the prevalence of STDs attains greater significance (Table 4). Being a non-Hindu, belonging to OBC, using contraception, experiencing termination of pregnancy and awareness of STDs increases the odds of reporting STDs. Higher wealth status decreases the risk of STDs. Women in southern, western and eastern regions have lower odds of reporting STDs/symptoms of STDs compared to women in the northern region. Experience of less severe physical violence ( $P < 0.000$ ) and sexual violence ( $p < 0.000$ ) have shown strong influence on the prevalence of STDs.

**Role of Maternal Age on STDs in Rural Areas:** As seen in urban areas, in rural areas too, maternal age has a significant relationship with the reporting of STDs. Adolescent mothers are almost 1.1 times more likely to report STDs than adult mothers in model 1 and model 2. However when spousal violence is introduced in the model, the statistical significance of maternal age gets eliminated. A trend similar to the effect of other independent variables in urban areas is noticed. Experience of any form of violence increases the risk of reporting of sexually transmitted diseases and the effect is highly significant for all forms of spousal violence ( $p < 0.000$ ).

## **Discussion and Implications**

The results show that there is a relationship between maternal age and the prevalence of anemia in both urban and rural areas. The reason behind this negative relationship could be that adolescence is the period when important physiological and psychological growth takes place. Childbearing at such an early age may expose women to the risk of anemia due to the competition for nutrients between their growth and pregnancy. Studies have shown that women who start childbearing at early ages tend to go for repeated childbearing at short intervals. This rapid childbearing during a short span makes women more vulnerable to anemia. Maternal age has a greater influence on the prevalence of STDs in both urban and rural areas. A plausible explanation for the higher prevalence of STDs among adolescent mothers could be that adolescence is the stage when most of the growth of the reproductive tract takes place. Starting a sexual relationship and childbearing before reaching biological maturity could adversely affect the reproductive and sexual health of adolescents. Further, adolescents in general have fewer antibodies to fight against infections (Prasad et al., 2005). Hence, physiological susceptibility to infections makes younger women more vulnerable to infections. Studies have found that women who marry and give birth at early ages often experience spousal violence (Hamid et al., 2009) due to lack of autonomy within the family which makes women more vulnerable to STIs and anemia.

**Table 4: Logistic Regression Results for Prevalence of Sexually Transmitted Diseases by Place of Residence**

Explanatory Variables	Urban						Rural					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Coeff.	OR	Coeff.	OR	Coeff.	OR	Coeff.	OR	Coeff.	OR	Coeff.	OR
<b>Age at First Birth of Women</b>												
Young (<=19) (Ref.)												
Adult (20 and above)	0.1995	1.2207***	0.1869	1.2055***	0.1486	1.1602**	0.1044	1.1100**	0.0919	1.0963**	0.0353	1.0359
<b>Women' Literacy</b>												
Illiterates (Ref.)												
Literates	-0.0063	0.9937	0.0098	1.0098	0.0614	1.0634	-0.0684	0.9339	-0.0349	0.9657	-0.0236	0.9767
<b>Children Ever Born</b>												
1 (Ref.)												
2	0.1069	1.1129	0.1053	1.1110	0.1430	1.1537*	-0.0499	0.9513	-0.0279	0.9725	-0.1314	0.8769*
3	0.0541	1.0556	0.0672	1.0696	0.0509	1.0522	-0.0101	0.9899	0.0254	1.0257	-0.0836	0.9198
4 and above	0.0524	1.0538	0.0509	1.0522	0.0051	1.0051	-0.0021	0.9979	0.0466	1.0477	-0.0495	0.9517
<b>Work Participation of Women</b>												
Non-working (Ref.)												
Working	0.0344	1.0350	0.0305	1.0310	-0.0229	0.9774	-0.0187	0.9814	0.0184	1.0186	-0.0558	0.9457
<b>Wealth Index</b>												
Very Low (Ref.)												
Low	-0.1410	0.8685	-0.0679	0.9343	-0.1087	0.8970	-0.1573	0.8545***	-0.1315	0.8768**	-0.1627	0.8498***
Medium	-0.3820	0.6825**	-0.3138	0.7307*	-0.3499	0.7048*	-0.4010	0.6696***	-0.3624	0.6960***	-0.2952	0.7444***
High	-0.4462	0.6401***	-0.3630	0.6956**	-0.2743	0.7601*	-0.5824	0.5585***	-0.5549	0.5741***	-0.4562	0.6337***
Very High	-0.6768	0.5082***	-0.6006	0.5485***	-0.4513	0.6368**	-0.7205	0.4865***	-0.6737	0.5098***	-0.5295	0.5889***
<b>Religion</b>												
Hindu (Ref.)												
Others	0.1151	1.1220**	0.1680	1.1830***	0.0531	1.0545	0.2345	1.2643***	0.3045	1.1.3559***	0.2375	1.2680***
<b>Caste</b>												
SC/ST (Ref.)												
OBC	0.2523	1.2870***	0.2141	1.2387***	0.2259	1.2535***	0.2383	1.2691***	0.2161	1.2412***	0.2380	1.2687***
Others	-0.0494	0.9518	-0.0708	0.9316	-0.0412	0.9596	0.1798	1.1969***	0.1162	1.1232**	0.1970	1.2178***

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<b>Exposure to Mass Media</b>												
No (Ref.)												
Yes	-0.1525	0.8586	-0.2198	0.8027**	-0.1667	0.8464	-0.0696	0.9328	-0.0646	0.9375	-0.0885	0.9153*
<b>Region</b>												
North (Ref.)												
East	-0.1576	0.8542***	-0.1304	0.8777**	-0.1309	0.8773*	-0.1610	0.8513***	-0.1285	0.8794***	-0.1890	0.8278***
West	-0.6304	0.5324***	-0.6002	0.5487***	-0.5158	0.5970***	-0.6202	0.5378***	-0.6068	0.5451***	-0.5896	0.5546***
South	-1.0595	0.3466***	-1.0538	0.3486***	-1.0728	0.3420***	-1.0670	0.3440***	-1.0576	0.3473***	-1.0612	0.3460***
<b>Use of Contraception</b>												
No (Ref.)												
Yes	0.3056	1.3575***	0.2911	1.3379***	0.2552	1.2908***	0.3109	1.3646***	0.2725	1.3132***	0.2809	1.3244***
<b>Ever had a Terminated Pregnancy</b>												
No (Ref.)												
Yes	0.4427	1.5569***	0.4227	1.5260***	0.3132	1.3678***	0.4590	1.5825***	0.4404	1.5533***	0.3391	1.4037***
<b>Awareness of STI</b>												
No (Ref.)												
Yes	0.3114	1.3653***	0.3512	1.4207***	0.2710	1.3113***	0.2682	1.3076***	0.2806	1.3239***	0.2323	1.2615***
<b>Anemia</b>												
No (Ref.)												
Yes			0.0596	1.0614					0.0611	1.0630*		
<b>Less Severe Violence</b>												
No Violence (Ref.)												
Yes					0.6515	1.9184***					0.5550	1.7420***
<b>Severe Violence</b>												
No Violence (Ref.)												
Yes					0.1001	1.1053					0.2532	1.2881***
<b>Sexual Violence</b>												
No Violence (Ref.)												
Yes					0.4715	1.6025***					0.4476	1.5646***
<b>-2 log likelihood</b>	19428.948		17767.536		14423.223		31897.914		30605.850		23317.702	
<b>Chi-Square Value</b>	661.714		604.764		802.131		1119.255		1070.019		1400.902	
<b>Level of Significance</b>	0.000		0.000		0.000		0.000		0.000		0.000	
<b>Number of Women</b>	36837		32525		27624		47121		44252		35198	

**Note:** Coeff. denotes coefficient, OR denotes odds ratio, \*\*\* denotes p<0.001, \*\* denotes p<0.01, \* denotes p<0.05

The results clearly show that there is a need to raise the age at marriage and thereby the age at first birth for women. The status of women within the family needs to be strengthened to increase the decision making power which would help women negotiate on their marriage and within the marriage, about contraception and health care. It is also important to educate parents about the need for female education, consequences of early marriage and childbearing and advantages of delayed childbearing. The emphasis should be laid on educating the family members, particularly men and mothers-in-law who are the decision makers for newly married women especially young women. Female education is an important dimension to concentrate on in order to raise the age at marriage as well as the status of women. Further, adolescent women's health needs are different from those of adult women. Therefore attention should be paid to strengthen adolescent reproductive sexual health programmes.

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## Appendix

For better understanding of some of the explanatory variables used in the analyses, they are described in appendix as how these variables are measured.

### Wealth Index

Wealth status of the family indicates the overall level of their own economic status and their family. In NFHS-3, wealth index was calculated using a set of variables. The NFHS-3 wealth index is based on the following 33 factors: assets and housing characteristics: household electrification, type of windows, drinking water source, type of toilet facility, type of flooring, material of exterior walls, type of roofing, cooking fuel, house ownership, number of household members per sleeping room, ownership of a bank or post office account, ownership of a mattress, a pressure cooker, a chair, a cot/ bed, a table, an

electric fan, a radio/transistor, a black and white television, a colour television, a sewing machine, a mobile phone, any other telephone, a computer, a refrigerator, a watch or clock, a bicycle, a motor cycle or scooter, an animal-drawn cart, a car, a water pump, a thresher and a tractor.

Each household asset was assigned a weight generated through principal component analysis, and the resulting asset scores were standardized in relation to a normal distribution with a mean zero and standard deviation one (Gwatkin et al., 2000). Each household was then assigned a score for each asset, and the scores were summed for each household; individuals were ranked according to the score of the household in which they reside. The sample was then divided into quintiles i.e., five groups with an equal number of individuals in each. In NFHS-3, one wealth index was developed for the whole sample. Thus, at the national level, 20 per cent of the household population was in each wealth quintile although this was not necessarily true at the state level.

### **Body Mass Index**

NFHS-3 collected information on the height and weight of women in the age group of 15-49 and men aged 15-54. The height and weight measurements were used to calculate the BMI. The BMI is defined as weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). This index excludes women who were pregnant at the time of survey and women who gave birth during the two months preceding the survey. A cut-off point of 18.5 is used to define thinness or acute under-nutrition and a BMI of 25 or above indicates overweight and obesity.

### **Exposure to Mass Media**

In NFHS-3, respondent's media exposure was measured by asking men and women about the frequency (almost every day; at least once in a week; less than once in a week; or not at all) with which they read a newspaper or magazine, watch television or listen to radio. In addition, all respondents were asked whether 'usually go to a cinema hall or theatre to see a movie at least once in a month. In the present research work, exposure to newspaper, radio and television were considered. If the respondent was exposed to at least one of these, then they were considered to have had some exposure to mass media and if the respondent was not at all exposed to any of the exposure indicators concerned, then they were considered as not exposed to mass media at all.

### **Region**

The different states in India were divided into four categories based on geographical location. Northern region consists of following states: Jammu and Kashmir, Himachal Pradesh, Punjab, Uttaranchal, Haryana, Delhi, Rajasthan, Chattisgarh, Madhya Pradesh, and Uttar Pradesh. West Bengal, Jharkhand, Orissa, Bihar, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya and Assam were categorized as the eastern region. The western region comprised Gujarat, Maharashtra and Goa. The southern region included Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

### **Spousal Violence**

NFHS-3 collected detailed information on domestic violence as well as spousal violence. In the present analysis three forms of spousal violence was used i.e., whether experienced less severe violence or not (ever pushed, shook or threw something, ever slapped, ever punched with fist or did something harmful and ever kicked or dragged), whether experienced severe violence or not (ever tried to strangle or burn and ever threatened or attacked with knife or gun) and whether experienced any sexual violence or not (ever physically forced sex when not desired and ever forced other sexual acts when not wanted).

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