

Changing Role of Female Education on Fertility in India

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1. Introduction

It is widely accepted that education plays a key role in individual's, wellbeing and society's economic, cultural and social progress. It is found as one of the important factors affecting all the three main demographic indicators- fertility, mortality and migration. So far, in most of the social science researches how educational attainment can influence the demographic factors especially fertility has been the foremost focus, as high fertility is still a major concern in most of the developing countries including India. During last three or four decades the relationship of female education and fertility has been a subject of great interest for demographers and policy makers. Many studies have conducted at the national and international level to understand and interpret the relationship between female education and fertility and effect of education on fertility decline (Graff, 1979, Caldwell, 1980, Jain 1981, Dreze and Murthi 2001, Bhat 2002, Kravdal, 2002). Many researchers argued that wife's education has a strong effect than husband's education on determining couple's number of children (Cochrane 1983, Cleland and Rodriguez 1988). Thus exiting studies proved that though overall education has an impact in reduction of fertility, female education performs more crucial role.

Education is not only a main predictor of fertility reduction, but also one of the important indicators of socio-economic development, in general. Thus universal education has been the focus in the policy and programme to increase the literacy level in many developing countries where level of education is noticeably low. In a similar way, many high fertility countries including India emphasise on the fertility reduction through its policy and fertility control programmes, since a considerable decline in fertility measured as an indicator of social progress. As a consequence, different survey results of many countries show that during last thirty or forty years there has been a considerable decrease in TFR and increase in educational level. In India, according to the data provided by the Census, the literacy rate has increased near about 30 percent from 1971 to 2001, while from SRS data it can be observed that TFR has fallen from 5.2 to 3.1 during the same period. Keeping in mind this dynamic nature of two simultaneous changes in education and fertility level, one can raise question that whether there is any change in the relationship or not. This study is an effort to observe the role of education on fertility over the time in Indian scenario.

2. Review of previous studies

At national level, maximum demographers and sociologists choose female education in their research because level of female education is far behind than the level of male education. According to the researchers with an increase in female or wife's education husband's education also increase may be because of educated women usually marry those men who are more educated than them but the reverse however is not true (Jain and Nag 1987). Thus, female education has become a subject of great interest to the researchers.

During last three or four decades many researchers have been trying to discover the link between women's education and fertility at the national and international level (Graff 1979, Caldwell, 1980 Jain, 1981 Bhat, 2002, Dreze, Murthi 2001 Kravdal, 2002). Though increase in parent's education causes decrease in marital fertility, but among parent's education mothers or wife's education plays a key role not only in fertility decline but also in social development approach. So, emphasise was more on the importance of wife's education than husband's

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education (Cochrane, 1983, Cleland and Rodriguez 1988). Former studies relating to education and fertility show that there is a negative relationship between education and fertility.

Some researchers have argued about the pathway of education-fertility relationships, that is whether education affects fertility directly or it affects fertility indirectly by affecting other socio-economic and demographic indicators (Graff 1979, Radha Devi 1988, Jejeebhoy 1992, Dreze & Murthi 2001). Cleland and Rodriguez (1988) and Kasardl (2000) observed a considerable decline in marital fertility with an increase in parent's education, so they emphasise more on parent's education. Some researchers said that educated women gain new opportunities for status attainment to a certain extent than childbearing thus education increases the opportunity cost of childbearing for women which related to reduction in fertility (Easterlin & Crimmins 1985, Coleman 1990, Diamond et al.1999).

In some demographic literature it has been found that, among other socio-economic variables, like place of residence, caste, religion, women's age and work participation it is her education which controls her fertility behaviour. Some major determinants of fertility like marriage pattern, age of the respondents at first birth and last birth, child surviving, child ever born including contraceptive use are mainly affected by women's education (Parasuraman, Roy, Radha Devi, Arokiasamy, Unisa 1999). Axinn and Barber (2001) in their study found that a women's proximity to school during childhood significantly increase permanent contraceptive use in adulthood which leads to low fertility.

In spite of generous number of studies on education-fertility research, studies which emphasises more on changing role of education with the course of fertility decline over the year (Jejeebhoy 1992; Bhat 2002) are very few. According to Bhat P.N. Mari (2002) from the initial stage of demographic transition female education exerts significant negative effect on fertility, but with the progress of demographic transition this effects tend to be weaken as better educated people took the leading role to adopt the small family norms followed by the lower strata (Bhat 2002). On the other hand (Jejeebhoy 1992) tries to establish a theoretical link that the effect of a small amount of education (no education and primary education) is insignificant but beyond the threshold level of education (middle, higher education) the effect of maternal education on fertility becomes universally inverse.

3. Need for the study

Earlier studies proved that education changes fertility level, but unfortunately very little research has carried out to understand the changing nature of female education on fertility. Only Jejeebhoy 1992; Bhat, 2002 gave their argument about the changing role of female education on fertility in Indian scenario , but to explain the changing role of female education on fertility in the present scenario it is useful if somebody take longer period (near about 15 years) to get the clear picture. The main aim of this paper is to study whether there is any change in the role of female education on fertility in the present situation during 1992 to 2006. The three rounds of NFHS provides us with ample opportunity to look into the trends of fertility and educational level and also gives us the chance to do some in-depth analysis on the relationship on education and fertility.

Education reduces fertility by reducing reproductive span and increasing age at marriage, contraceptive use and work participation. It is known that there is a positive relationship between education and age at marriage. With an increase in educational level not only age at marriage but also proportion of never married women substantially increase which denoted a considerable decline in fertility. Female education also amplifies the use of contraception by providing correct knowledge to the users and non users about contraception. Mainly this paper tries to compare different measures of fertility differentials with altered educational level to examine the influence of education on fertility behaviour.

4. Objectives of the study

The broader objective of this paper is to find out the changing role of female education on fertility in India. The specific objectives of this study are delineated as—

1. To study the level and trends in TFR and female education in India and its major states from three rounds of NFHS.
2. To understand the trends of fertility differentials by educational level of female.
3. To examine the impact of female education on fertility and whether it changes from NFHS I to NFHS III.
4. To identify the contribution of female educational level on change in fertility.

5. Data and method

a. Data

The present paper based on the secondary data obtained from the three rounds of National Family Health Survey NFHS I (1992-93), NFHS II (1998-99) and NFHS III (2005-06). NFHS surveys are mainly designed to provide estimates of important indicators on family welfare, maternal and child health and nutrition. NFHS I (1992-93), NFHS II (1998-99) and NFHS III (2005-06) collected information from nationally representative sample of 89777, 90303 and 124385 women respectively.

To study the changing role of female education on fertility this paper analyse data of all ever married women of 15-49 age group from NFHS I (1992-93), NFHS II (1998-99) and NFHS III (2005-06) survey. Sample size of the total ever married women aged 15-49 years considered for this study are 89777 for NFHS I, 90303 for NFHS II and 98923 for NFHS III.

b. Methodology

In this study both bi-variate and multivariate analyses have been used. To find out the relationship between fertility differentials and female education bi-variate analysis has been performed. In this paper fertility has been expressed by the components like TFR, children ever born (CEB), child surviving (CS). Multivariate regression analysis has been done for each round of NFHS, to observe the impact of female education on fertility taking mean CEB as the dependent variable. The dependent variable has been dichotomised taking mean number of child ever born of women aged 40-49 years assuming that they almost completed their fertility, as the cut off point. The mean children ever born to those women in NFHS I, II and III are 4.76, 4.40 and 3.81 respectively.

This paper also tries to examine whether there is any change in contribution of female education on fertility decline over the years by decomposition analysis. To fulfil the objective of this paper a method adopted by Bhat (2002) in his study to decompose the overall change in TFR by women's educational level in India at two point of time. Mathematically the formula of decomposition is written as—

$$\begin{aligned} F_b - F_a &= \sum_{i=1}^k F_{b,i} \times C_{b,i} - \sum_{i=1}^k F_{a,i} \times C_{a,i} \\ &= (F_{b,1} - F_{a,1})(C_{b,1} + C_{a,1})/2 + \sum_{i=2}^k (F_{b,i} - F_{a,i})(C_{b,1} + C_{a,i})/2 \\ &\quad + \sum_{i=1}^k (C_{b,i} - C_{a,i})(F_{b,i} + F_{a,i})/2 \end{aligned}$$

Where: $F_{a,i}$ = to the total fertility rate of educational class i at time a .

$F_{b,i}$ = to the total fertility rate of educational class i at time b .

$C_{a,i}$ = to proportion of women of the educational class i at time a .

$C_{b,i}$ = to proportion change in women of the educational class i at time b .

The three additive terms in the right hand side of the equation gives us information about the contribution of change in educational composition of women, contribution of fertility change in among educated women and contribution of fertility change in among illiterate women respectively. To get reliable result from the decomposition analysis this study has to adjust the formula. It is known that TFR is calculated from Age Specific Fertility Rate (ASFR) it is affected

by the educational composition of each age group. Therefore the value got from the left hand side of the decomposition formula is not matched with the right hand side formula because in the right hand side of decomposition formula is not affected by the educational composition of each age group as it is calculated for 15-49 years of age group. Lastly by adding the three component of right hand side the difference between two TFR at two point of time is calculated. After then the calculated value is used to calculate percentage.

6. Results and Discussion

a. Profile of women sample from three rounds of NFHS

Some socio economic and demographic factors have been considered here in this study to evaluate the educational level as well as fertility levels. The socio economic factors are religion, caste, place of residence, work status and women's age etc. The table give us an idea about the distribution of percentage of ever married women aged 15-49 among the selected socio economic and demographic variables. The table shows that among religion 81 percent ever married women aged 15-49 are belonging to Hindu, where near about 13 percent and 6 percent ever married women aged 15-49 are belonging to Muslim and other religion respectively. Among caste percentage of scheduled caste women is increasing from 12.10 percent during NFHS I to 19.41 percent during NFHS III, where the percentage of scheduled tribe women are more or less same during that same period. The table also shows that maximum percentage of ever married women aged 15-49 are found in rural areas. There is a big gap exists between rural and urban areas in terms of the distribution of percent of ever married women in the age group 15-49. The table also demonstrates that percent of not working women are more as compared to working women though there is a slightly increase has been measured among working ever married women aged 15-49 throughout the three NFHS survey. As per the table percentage of ever married women aged 15-24 has increased considerably where the percentage women with age group 25-49 has decreased from NFHS I to NFHS III.

b. Level and trends in TFR and female education in India and its major states from three rounds of NFHS and their relationship

Table 1 reveals the proportional change in educated women in India and its major states during NFHS I to NFHS III. The table clearly demonstrates that educational level of India has progressed from 38.3 percent during NFHS I to about 52.2 percent during NFHS III. Although a considerable increase in female educational level is measured but there exists significant state variation in educational level among women in India. According to NFHS III out of 18 major states there are 11 states namely Kerala, Tamil Nadu, Maharashtra, Himachal Pradesh, Punjab, West Bengal, Karnataka, Gujarat, Haryana, Uttaranchal, Orissa which have higher educational level than the national level. According to NFHS III Kerala has highest (95%) proportion of educated women, where on the other hand Rajasthan has lowest (31.3%) proportion of educated women. The table exhibits that the southern states of India like Kerala, Tamil Nadu and Karnataka have much higher educational level among women compared to rest of India. According to NFHS I Rajasthan have the lowest percentage of educated women where in NFHS II and NFHS III lowest proportion of educated women has been measured in Bihar. The last three columns of the table illustrate the percent relative change in educational level from NFHS I to NFHS II, NFHS II to NFHS III and NFHS I to NFHS III respectively. Around 21 percent increase in educational level among women has been measured during NFHS I to NFHS II where the rate has slightly fallen down to 12 percent during NFHS II to NFHS III. The rate of increase in women's educational level is much faster during NFHS I to NFHS II as compared to NFHS II to NFHS III. More than 25 percent increase in women's educational level has been measured in Andhra Pradesh, Himachal Pradesh, Karnataka, Madhya Pradesh, Orissa, Tamil Nadu and Uttar Pradesh during NFHS I to NFHS II. Approximately 50 percent increase in educational level of female has been measured in Rajasthan during NFHS I to NFHS II. During NFHS II to NFHS III the level of increase in women's education is more or less same among all the states varying within a narrow range of 15.8 percent in Himachal Pradesh to 19.6 percent in Haryana. Only Bihar

has experienced more than 30 percent increase in women's educational level during the last two NFHS.

Table 2 demonstrates the level and trend of Total Fertility rate (TFR) in India and its major states during NFHS I to NFHS III. The table shows that TFR in India has fallen from 3.4 during NFHS I to about 2.7 during NFHS III. According to NFHS III out of 18 major states there are 6 states namely Bihar, Uttar Pradesh, Jharkhand, Rajasthan, Madhya Pradesh, Haryana have TFR level higher than the national level. On the other hand as per NFHS III there are five states viz. Kerala, Andhra Pradesh, Punjab, Tamil Nadu and Himachal Pradesh have TFR less than 2. Though the national TFR is declining but there are some states like Bihar and Rajasthan which have experienced increase in TFR during NFHS II to NFHS III and NFHS I to NFHS II respectively. The three states of south India namely Kerala, Tamil Nadu and Andhra Pradesh have much lower fertility compared to rest of India. According to NFHS III Bihar has the highest TFR of 4.0 followed by Uttar Pradesh, Jharkhand, Rajasthan. According to NFHS I and NFHS II lowest TFR has been observed in Kerala with 2 and 1.96 respectively, but in NFHS III lowest TFR has been observed in Andhra Pradesh with 1.79. The last three columns of the table 2 explain the relative change of TFR in percent in India and some selected states during NFHS I to NFHS II, NFHS II to NFHS III and NFHS I to NFHS III respectively. Around 16% decline in TFR is found during NFHS I to NFHS II at the national level but the percentage decline in TFR during NFHS II to NFHS III is only 6 percent. There are four states namely Andhra Pradesh, Tamil Nadu, Maharashtra and Gujarat have experienced more decline in TFR during NFHS II to NFHS III with respect to NFHS I to NFHS II. Some states like West Bengal, Punjab, Karnataka, Himachal Pradesh and Haryana have experienced more than 20 percent decline in TFR during NFHS I to NFHS II but the decline rate turned out to be slow for these states during NFHS II to NFHS III.

c. Trends of fertility differentials by educational level for some selected background characteristics of India

Table 3 represents the percent change in number of educated women and mean number of children ever born (MCEB) of ever married women aged 15-49 by some selected socio-economic and demographic factors during NFHS I to NFHS III. The first three column of table 4 gives us an idea about the percentages of number of uneducated and educated women among some selected socio-economic and demographic factors and the last three columns of the table shows the MCEB among different socio economic and demographic factors during NFHS I to NFHS III. As per the data Muslims have higher percentage of uneducated women though for both the religious community the educational level has increased. More than half the Muslims are still in the uneducated category whereas for Hindus it is vice versa. Muslims ever married women have higher fertility may be because of some restriction made by their religious community related to family planning methods. The last three columns shows that mean CEB among Hindu ever married women aged 15-49 has declined during NFHS I to NFHS II and as well as NFHS II to NFHS III, but MCEB of Muslim ever married women aged 15-49 increases from 2.75 to about 3.51 during NFHS I to NFHS II and then declines to 3.51 to 3.34 during NFHS II to NFHS III. Table shows that Muslim women preferred more children than Hindu women may be because of strong son preference among them, low educated level, early age at marriage. Table demonstrates that Mean number of children ever born is high among uneducated ever married women compared to educated ever married women among of all religion. NFHS I showed that the non-literate Hindu's and the Muslim's are at the same level of fertility but decline was observed among the Hindus whereas the Muslim fertility increased during NFHS I to NFHS II.

From table 3 it may also be noted that the women's educational level among Scheduled Castes is much higher than Scheduled Tribes women during NFHS I to NFHS III, but schedule castes women have higher fertility than women from scheduled tribes and other castes. Though MCEB of schedule castes women has decreased but still it is higher than the women belonging to scheduled tribes and other castes. Only in NFHS III the MCEB of scheduled caste women is lower than schedule tribe women. Rural and urban differentials in terms of percent change in number of educated women and MCEB of ever married women has also been shown in the third

row of the table 3. The data demonstrate that women living in the rural areas have much lower percentage of educated women and higher fertility compared to those women who live in the urban areas. Though percent of educated women in rural areas has increased from 29.0 percent in NFHS I to about 43 percent in NFHS III, but still there exists a big gap between percent of educated women in urban and rural area. It is known that education and fertility are inversely related to each other, on the other hand a more developed place of residence have better educational levels. MCEB of educated women in urban areas decrease from 2.84 in NFHS I to about 2.51 in NFHS III, which may be because of late entry in the marital union reducing effective reproductive period. On the other hand due to early age at marriage, maximum uneducated women have longer reproductive period which leads to high fertility. Data also shows that uneducated women in urban area have fewer children as compared to uneducated women in rural area may be because of exposure of urban women to various family planning messages or may be because of more contraceptive use. Mean CEB of women living in rural areas also decreases from 3.17 in NFHS I to 2.99 in NFHS III.

Table 3 also explains the working status and its effect on MCEB among uneducated and educated ever married women. It is widely accepted that education sets off important changes in women's life which directly affect fertility. Generally it is argued that education opens economic opportunity among women and increases their work participation in wage field. Table 3 reveals that among total working women during NFHS I around 26 percent women are from educated group and 74 percent women are from uneducated group but the proportion has gradually declined among uneducated women from 74 percent during NFHS I to 60.1 during NFHS III due to increase in educational level and exposure to secondary and tertiary sectors. Higher percentages of uneducated women are found to be working may be because of easy availability of unskilled jobs in primary sector. In India a major proportion of the total population are engaged in agricultural activity. In India maximum uneducated women are engaged in agricultural activities where educated women have a tendency to restrict themselves in secondary and tertiary sector. Among total working women uneducated women have higher fertility compared to educated women because of increasing labour demand in primary sector. Among not working women uneducated women have higher fertility than educated women may be because of small decision making power and a lesser amount of use of contraceptive use. Table shows that uneducated working women have higher fertility than uneducated not working women because of labour demand in primary sector. The percentage of uneducated women in working category has also been decreased from 74.3 percent in NFHS I to 60.1 percent in NFHS III due to increase in educational level and exposure to secondary and tertiary sectors.

While look into the age pattern fertility by children ever born at national level, Table 3 shows that as age of women increases MCEB also increases. MCEB is much higher among 35-49 years age group as compared to other groups. According to the table uneducated women tend to have higher number of MCEB as compared to educated women. The level of education is negatively related with fertility i.e. as the level of education increase level of MCEB decrease, but fertility and is positively related to women's age. Only in 15-24 age groups the fertility level is more or less same among educated and uneducated women varying within a narrow range. Uneducated women in the age group 40-49 yrs tend to have higher fertility level compared to educated women.

Table 4 illustrates the trend in fertility differentials by women's education. The table shows that how fertility indicators are affected by two categories of education. To clearly understand the relationship between fertility and women's education some selected fertility indicators have been chosen. The selected fertility indicators are CEB, CS and Age at first marriage, Age at first Birth, Age at last Birth, Mean Birth interval in months, Contraceptive Use and reproductive span of ever married women aged 40 -49 years. It is found that MCEB is high among uneducated women as compared to educated women, may be due to uneducated women started child bearing much earlier than educated women. At national level fertility level are lower among educated women compared to uneducated women because maximum uneducated women have experienced of child loss. Thus by having a tendency to replace the dead child they produce more children. As children survival is high among educated women fertility level is become low among them which can be observed by the similar level of number children ever born and number of children surviving As

per the data 96 percent educated women have 1-4 numbers of surviving children where only 80 percent uneducated women have same number of surviving children. Only educated and uneducated differential in terms of having more than 10 surviving children was not so prominent. It is varying within a narrow range from 0.1 percent among educated women to about 0.2 percent among uneducated women.

Table 5 shows the differential of education on some selected determinants of fertility like age at marriage, age of the respondent at first birth and last birth, reproductive span, birth interval and Contraceptive use. In this study age of the respondent at first marriage has been chosen as one of the important determinant of fertility because the late entry into the marital union reduces the effective reproductive span. From the table it is easily understood that educated women have an intention to marry late compared to uneducated women. According to table 5 about 85 percent uneducated women marry before completing legal age at marriage, this percentage fell down to almost 50 percent among educated women. On the other hand more than 10 percent educated women marry after 25 years of age but the percentage of uneducated women marrying after 25 years of age has declined to less than one percent.

The average age at first birth is lower among uneducated women compared to educated women. Near about 60 percent uneducated women gave birth before they completed 18 years on the other hand only 30 percent educated women gave birth before 18 years of age. Though till today uneducated women have lower average age at first birth but the percentage declined from 60.9 percent in NFHS I to about 58.5 percent in NFHS III. The average age at first birth after completing 25 years of age is high among educated women than uneducated women.

It is found that average age at last birth is also higher among uneducated women than educated women. Generally demand for children decline consistently with increase in education, but due to exposure to various media even uneducated women may desire to have less number of children like educated women. Educated and uneducated differential is very much prominent in terms of age at last birth before 19 yrs completed may be because of difference in average timing of entry into the marital union, age at first birth and desired family size. Similarly the difference in age at last birth after 35 years of age is also higher among uneducated women compared to educated women. Age at last birth after completing 35 years among educated women has declined from 3.8 percent to 3.4 percent from NFHS I to NFHS III.

Table 5 also tells us about the noticeable decrease in mean reproductive span among women with respect to their education from 11.21 in NFHS I to 9.12 in NFHS III. One expects that the educated women will end her reproductive span shorter than uneducated women. Educated uneducated differential was also extremely prominent in terms of reproductive span. Due to late entry in to the marital union educated women have short reproductive span than uneducated women. On the other hand more than 60 percent uneducated women marry before completing 18 years of age so they have longer reproductive period. Table 5 also illustrates that mean reproductive span reduces among educated women from 9.07 in NFHS I to about 6.73 in NFHS III, where on the other hand though uneducated women have longer reproductive period, but the mean reproductive period among uneducated women also declined from 12.92 in NFHS I to 10.98 in NFHS III.

It can be observed that, contraceptive practice is much higher among educated women compared to uneducated women. Educated women are likely to have better opportunity to interact with the out side the world and obtain information about different family planning methods through exposure to various media. Thus percentages of ever married educated women currently using contraceptive methods are much higher than uneducated women. The percentage of educated ever married women currently using contraceptive methods has increased from 49.3 in NFHS I to about 59 percent in NFHS III. Percentage of uneducated ever married women currently using contraceptive methods has also increased from 31.5 percent in NFHS I to 50.8 percent in NFHS III.

d. Impact of female education on fertility from NFHS I to NFHS III

To fulfil the third objective of this paper binary logistic regression has been done by controlling various socio economic and demographic characteristics of respondent which may influence the

fertility behaviour of respondent. Table 6 shows the influence of different socio economic and demographic variable on mean child ever born by binary logistic regression analysis. In this table some socio economic and demographic variables like-women's education, religion, caste, place of residence, husbands education, use of contraception, work participation, child death, mass media and age at first birth have been considered, which affect fertility level over time along with the increase in educational level.

As the main aim of this paper is to know the changing impact of female education on fertility, the study emphasise more on how educational level affects fertility level? It is a considerable truth that women's education plays a significant role on fertility decline over the time. As educational level increases, demand for children decreases among women. The table shows that women with primary, secondary and higher level of education have less chance of having more than the mean numbers of children ever born as compared to women with no education during last three NFHS. Only during NFHS I the effect of primary education on mean CEB is insignificant. This table clearly tells us about the negative and significant impact of women's education on mean children ever born during NFHS I to NFHS III. On the other hand as per the table husband's education does not play any significant role on mean children ever born over the time.

From this table it is clearly understood that women belonging to Muslim and other religion have higher number of children ever born compared to Hindu women. The table shows that during NFHS I demand for children was less among Muslim women. There was 62 percent less chance that a Muslim women would have crossed the mean level of children ever born, than a Hindu women. During NFHS II and NFHS III women belonging to Muslim and other religion have significantly higher demand for children than Hindu women. During NFHS II women from Muslim and other religion are 2.69 and 1.215 times more likely to have total children ever born more than the average CEB as compared to Hindu women. During NFHS III Muslim women are 3.381 times more likely to have children ever born greater than the average children ever born as compared to Hindu women. Among caste scheduled caste and scheduled tribe women are more expected to have total children ever born more than mean children ever born as compared to women belonging from OBC and General caste during NFHS I, NFHS II and NFHS III respectively.

The result of binary regression shows that the women of urban areas do not play any significant role on mean number of children ever born. Contraception use has a positive and significant relationship with MCEB. If the women have ever used any contraceptive methods during their reproductive period then their demand for children is also significantly higher with women with never used any contraceptive methods during their reproductive period. The result demonstrates that those women who are working do not have any significant effect on mean children ever born compared to not working women. Women's exposure to mass media has a negative and significant effect on mean children ever born. Now a day's exposure to media has become an important factor which affects demand of children among women. Women who have ever expose to any mass media likely to have lower demand for children compared to those women who do not have any exposure to mass media. Table also shows that during NFHS I to NFHS III Current age of women and child death occurring to women have a positive and significant effect on MCEB where age at first birth has a negative and significant effect on MCEB. The result shows a considerable increase in odds ratio of child death from 2.379 in NFHS I to about 3.637 in NFHS III. It is accepted that child loss has a strong influence on mean number of children ever born. Earlier uneducated women used to have higher number of children may be because of higher number of child loss as compared to educated women. At present with an increase in mass education and exposure to media even uneducated woman have also practiced small family norms, but still they have a tendency to replace dead child. As a result of theses one unit change in proportion child loss may affect children ever born in large proportion

e. The contribution of change in female educational level on fertility decline

Decomposition analysis has been done to identify how women's educational attainment contributes on change in TFR at two point of time. Table 7a, 7b and 7c show the decomposition

of change in female educational level which affect in fertility decline during NFHS I to NFHS II, NFHS II to NFHS III and NFHS I to NFHS III respectively. The tables show that TFR of India has fallen from 3.39 in NFHS I to 2.85 in NFHS II to 2.68 in NFHS III but the rate of decrease in TFR is low during NFHS II to NFHS III as compared to NFHS I to NFHS II. Like TFR illiteracy among ever married women aged 15-49 has also decreased from 63 percent in NFHS I to 58 percent in NFHS II to 45 percent in NFHS III, where the percentage of educated groups has increased from more or less 37 percent in NFHS I to 41 percent in NFHS II to 55 percent in NFHS III. Decomposition analysis shows that change in fertility behaviour among illiterate women might only account for 53 percent decline in TFR during NFHS I to NFHS III among which 65 percent and 44 percent fall has been measured during NFHS I to NFHS II and NFHS II to NFHS III respectively. From this result it is clear that the decline rate is comparatively high during NFHS II to NFHS III than NFHS I to NFHS II. As per the result 17.7 percent decline in TFR have been observed due to the change in fertility behaviour of educated women during NFHS I to NFHS III, out of which more or less 21 percent change in TFR have been measured during NFHS I to NFHS II and about 11 percent decrease has been measured during NFHS II to NFHS III. The results of decomposition analysis also explains that about 29.5 percent decline in TFR has been measured due to change in educational composition of women during NFHS I to NFHS III, but the change in educational composition of women has raised up to 14.1 percent to 45.6 percent during NFHS I to NFHS II and NFHS II to NFHS III respectively. Thus from the result it is clearly understood that education and fertility relationship is changing in India.

7. Conclusion

The trend shows that at national and also at state level literacy and enrolment rates are increasing over the years, which, means the percentage of uneducated women are decreasing day by day. The study clearly illustrates the significant relationship between women's education and fertility. The findings of the study demonstrate that a considerable decrease in TFR has been measured in India and its major states during NFHS I to NFHS III due to change in female educational level.

The results presented in this paper shows that women with no and low education have higher fertility as compared to women with higher level of education. It was also found that there is a negative relationship between women's education and fertility. The study reveals that education plays an important role in fertility decline by increasing age at marriage which reduces effective reproductive span, increase work participation and contraceptive use among women.

The decomposition analysis showed that the contribution of the illiterate population in TFR has gone down similarly as that of the educated. The diffusion of the ideas and benefits of the smaller family may have decreased the educational categorical contribution in the TFR. The other part of the decomposed TFR formula suggested that as the educational categories are contributing less in the TFR the overall education is becoming a major factor in change of TFR.

Note: As per the suggestions given by the discussion floor, table of background characteristics of women considered for this study and results of linear regression considering CEB as dependent variable and explanation has been given in Appendix.

References

- Axinn William G. and Barber Jennifer S., Aug 2001, Mass Education and Fertility Transition, *American Sociological Review*, Vol 66 No 4, Page 481- 505.
- Bhat, P.N.M, 2002. "Returning a Favor: Reciprocity between Female Education and Fertility in India", *World Development* Vol. 30, No 10, Page 1791-1803.
- Caldwell, John, 1980, "Mass Education as a Determinant of the Timing of Fertility Decline", *Population and Development Review* Vol 6, No 2, Page 225-255.
- Cleland John and Rodriguez German, 1988, The Effect of Parental Education on Marital Fertility in Developing Countries, *Population Studies* 42, page 419-442 .
- Cochrane, Susan H. 1979, 'Fertility and Education: What Do We Really Know?', Baltimore, Maryland: John Hopkins University Press.
- Dreze Jean and Murthi Mamta, March 2001, Fertility, Education and Development: Evidence from India", *Population and Development Review* Vol 27, No 1, Page 33-63.
- Graff, Harvey J, March 1979, "Literacy, Education and Fertility, Past and Present: A Critical Review", *Population and Development Review* Vol 5, No 1, Page 105-140.
- IIPS & ORC Macro. 1994, National Family Health Survey (NFHS I)1992-1993, International Institute For Population Sciences, Mumbai.
- IIPS & ORC Macro.2000National Family Health Survey (NFHS I)1998-1999, International Institute For Population Sciences, Mumbai
- IIPS & ORC Macro. 2007, National Family Health Survey (NFHS I)2005-2006,International Institute For Population Sciences, Mumbai.
- Jain, Anrudh K, Nov 1981, "The Effect of Female Education on Fertility: A Simple Explanation", *Demography*, Vol 18, No 4, Page 577-595.
- Jain, Anrudh K. and Nag Moni, 1985, 'Female Primary Education and Fertility Reproduction in India'. Center for Policy Studies Working Paper No. 114. New York: The Population Council.
- Jejeebhoy, Shireen J. June 1992, 'Women's education, fertility and the proximate determinants of fertility', *Population and Women*, Gaborone, Botswana.
- Kirtz, Mary and Doglous T. Gurak September 1989, ' Women's Status, Education and Family Formation in Sub Saharan Africa' , *International Family Planning Perspectives* (New York) vol. 15, no 3, Page 100-105.
- Kravdal, Oystein, May 2002, "Education and Fertility in Sub Saharan Africa: Individual and Community Effects", *Demography*, Vol 39, No 2, Page 233-250.
- MacNay, Kirsty, Arokiasamy, Perinayagam, Cassen, Robert H, March 2003, "Why are Uneducated Women in India using Contraception? A Multilevel Analysis", *Population Studies*, Vol 57 No 1, Page 21-40.
- Palivos, Theodore and Scotese Carol A., Nov 1996, "Growth and Financing of Public Education and health", *Journal of Population Economics* Vol 9 No 4 Page 415-428.
- Parasuramn Sulbha, Roy T.K, Radha Devi,Paswan Balaram, Arokiasamy P, Unisa Sayeed, june 1999, 'Role of Women's Education in Shaping Fertility in India: Evidences From NFHS surveys'.
- Radha Devi 1997, 'Education and Fertility : Is There Any Link? in Kerala's demographic Transition: Deeterminants and consequences', Sage Publication, New Delhi, page 168-192
- United Nation's , 1993, 'Women's Education and Fertility Behaviour , Population Division, United Nations, Population News Letter, No 56.
- Weinberger, Mary Beth, Jun 1987, "The Relationship between Women's Education and Fertility: Selected Findings from World Fertility Surveys.", *International Family Planning perspective*, Vol 13 No 2 Page 35-46.

Table 1: Change in proportion educated women NFHS-I to NFHS-III

<i>India/States</i>	<i>Educated</i>			<i>Proportion change in Education</i>		
	NFHS I	NFHS II	NFHS III	NFHS-I to NFHS-II	NFHS-II to NFHS-III	NFHS-I to NFHS-III
Andhra Pradesh	32.6	41.1	47.4	26.0	15.4	45.5
Bihar	21.3	24.4	32.1	14.7	31.4	50.6
Chhattisgarh	0.0	0.0	40.8	--	--	--
Gujarat	46.0	54.6	61.2	18.7	12.1	33.1
Haryana	37.8	45.8	54.8	21.2	19.6	45.0
Himachal Pradesh	51.1	65.3	75.6	27.7	15.8	47.9
Jharkhand	0.0	0.0	34.9	--	--	--
Karnataka	40.1	50.4	59.3	25.7	17.5	47.8
Kerala	89.4	92.7	95.2	3.7	2.7	6.5
Madhya Pradesh	26.8	37.2	42.0	38.9	12.7	56.5
Maharashtra	53.0	62.2	70.9	17.3	14.0	33.7
Orissa	33.9	44.1	52.5	30.1	19.0	54.8
Punjab	48.8	62.1	64.3	27.1	3.5	31.6
Rajasthan	17.8	26.7	31.3	49.8	17.1	75.4
Tamil Nadu	56.7	64.8	73.1	14.4	12.7	28.9
Uttaranchal	0.0	0.0	58.0	--	--	--
Uttar Pradesh	24.5	32.9	37.0	34.6	12.3	51.2
West Bengal	48.7	55.4	58.6	13.7	5.7	20.2
India	38.3	46.6	52.2	21.6	12.1	36.3

Table 2: Change in total fertility rate (TFR) from NFHS-I to NFHS-III

<i>India/States</i>	<i>TFR</i>			<i>% change in TFR</i>		
	NFHS I	NFHS II	NFHS III	NFHS-I to NFHS-II	NFHS-II to NFHS-III	NFHS-I to NFHS-III
Andhra Pradesh	2.59	2.25	1.79	-13.1	-20.4	-30.9
Bihar	3.25	3.7	4	NA	8.1	NA
Chhattisgarh	NA	2.79	2.62	NA	-6.1	NA
Gujarat	2.99	2.72	2.42	-9	-11	-19.1
Haryana	3.99	2.88	2.69	-27.8	-6.6	-32.6
Himachal Pradesh	2.97	2.14	1.94	-27.9	-9.3	-34.7
Jharkhand	NA	2.76	3.31	NA	19.9	NA
Karnataka	2.85	2.13	2.07	-25.3	-2.8	-27.4
Kerala	2	1.96	1.93	-2	-1.5	-3.5
Madhya Pradesh	3.27	3.43	3.12	NA	-9	NA
Maharashtra	2.86	2.52	2.11	-11.9	-16.3	-26.2
Orissa	2.92	2.46	2.37	-15.8	-3.7	-18.8
Punjab	2.92	2.21	1.99	-24.3	-10	-31.8
Rajasthan	3.63	3.78	3.21	4.1	-15.1	-11.6
Tamil Nadu	2.48	2.19	1.8	-11.7	-17.8	-27.4
Uttaranchal	NA	2.61	2.55	NA	-2.3	NA
Uttar Pradesh	3.58	4.06	3.82	NA	-5.9	NA
West Bengal	2.92	2.29	2.27	-21.6	-0.9	-22.3
India	3.39	2.85	2.68	-15.9	-6.0	-20.9

Table 3: Change in education and Mean CEB by some selected socio-economic factors

Socio-economic factors	Categories	% Educated			Mean CEB		
		NFHS I	NFHS II	NFHS III	NFHS I	NFHS II	NFHS III
<i>Religion</i>	Hindu				3.57	2.93	2.78
	No education	62.6	54.3	47.7	3.9	3.4	3.5
	Educated	37.4	45.7	52.3	2.9	2.3	2.1
	Muslim				2.75	3.51	3.34
	No education	65.8	56.6	55.3	3.9	4.1	4
	Educated	34.2	43.4	44.7	2.9	2.8	2.5
	Others				2.32	2.69	2.55
	No education	41.9	33.4	30.8	3.4	3.4	3.3
Educated	58.1	66.6	69.2	2.3	2.3	2.2	
<i>Caste</i>	Scheduled Caste				3.32	3.19	3.04
	No education	80.1	67.9	59.6	3.5	3.6	3.6
	Educated	19.9	32.1	40.4	2.5	2.4	2.2
	Scheduled Tribe				3.12	3.13	3.11
	No education	83.7	75.3	69.8	3.2	3.3	3.5
	Educated	16.3	24.7	30.2	2.5	2.5	2.2
	Others				3.05	2.92	2.75
	No education	56.4	46.8	42.2	3.5	3.5	3.5
Educated	43.6	53.2	57.8	2.5	2.4	2.2	
<i>Place of Residence</i>	Urban				2.84	2.71	2.51
	No education	35.5	29	27.6	3.6	3.6	3.6
	Educated	64.5	71	72.4	2.4	2.3	2.1
	Rural				3.17	3.09	2.99
No education	71	62.1	56.8	3.4	3.5	3.6	
Educated	29	37.9	43.2	2.5	2.4	2.2	
<i>Work status</i>	Not working				2.99	2.85	2.67
	No education	55.5	49.4	40.4	3.43	3.48	3.49
	Educated	44.5	50.6	59.6	2.43	2.33	2.11
	Working				3.29	3.23	3.12
No education	74.3	67.1	60.1	3.5	3.6	3.6	
Educated	25.7	32.9	39.9	2.6	2.5	2.3	
<i>Women's age</i>	15-24				1.30	1.30	1.25
	No education	60.6	49.4	40	1.40	1.48	1.49
	Educated	39.4	50.6	60	1.12	1.13	1.08
	25-34				3.20	3.04	2.81
	No education	59.1	51.9	45.3	3.61	3.57	3.48
	Educated	40.9	48.1	54.7	2.59	2.47	2.26
	35-49				4.61	4.24	3.86
	No education	65.4	58.2	55.1	5.08	4.82	4.56
Educated	34.6	41.8	44.9	3.71	3.44	3.00	

Table 4: Change in percentage distribution of women by fertility indicator among educational groups level from NFHS I, NFHS II & NFHS III

<i>Fertility indicators</i>	<i>Educational level</i>	<i>NFHS I</i>	<i>NFHS II</i>	<i>NFHS III</i>
<i>Child Ever Born (CEB)</i>	No education Mean CEB	3.47	3.52	3.56
	CEB 1-4	69.1	69.8	70.4
	CEB 5-9	29.3	28.7	28.3
	CEB >10	1.6	1.5	1.3
	Educated Mean CEB	2.47	2.38	2.18
	CEB 1-4	90.1	90.9	89.3
	CEB 5-9	9.7	8.8	10.4
	CEB >10	0.2	0.2	0.3
	Mean CEB	3.09	2.99	2.84

Table 4 continued...

<i>Fertility indicators</i>	<i>Educational level</i>	<i>NFHS I</i>	<i>NFHS II</i>	<i>NFHS III</i>
<i>Children surviving (CS)</i>	No education Mean CS	2.86	2.96	3.04
	CS 1-4	80.4	80.2	80.5
	CS 5-9	19.4	19.6	19.3
	CS >10	0.2	0.2	0.2
	Educated Mean CS	2.25	2.17	2.02
	CS 1-4	93.2	94.0	96.1
	CS 5-9	6.7	5.9	3.9
	CS >10	0.1	0.1	0.0
	Mean CS	2.62	2.60	2.51

Table 5: Change in percentage distribution of women by demographic determinants of fertility among educational groups level from NFHS I, NFHS II & NFHS III

<i>Demographic determinants</i>	<i>Educational level</i>	<i>NFHS I</i>	<i>NFHS II</i>	<i>NFHS III</i>
<i>Age at first marriage</i>	No education Mean Age at Marriage	15.77	15.75	15.93
	<18 yrs of age	86.9	87.9	85.1
	19-24 yrs of age	12.1	11.6	14
	>25yrs of age	1.0	0.5	0.8
	Educated Mean Age at Marriage	18.06	18.12	18.22
	<18 yrs of age	49	54.5	49.8
	19-24 yrs of age	42.2	38.7	39.9
	>25yrs of age	8.7	6.9	10.2
	Mean Age at Marriage	16.65	16.85	17.12
	<i>Age at first birth</i>	No education Mean Age at First Birth	18.09	17.92
<18 yrs of age		60.9	63.4	58.5
19-24 yrs of age		35.6	33.3	37.7
>25yrs of age		3.5	3.3	3.8
Educated Mean Age at First Birth		19.76	19.74	20.10
<18 yrs of age		30.3	34.4	29.5
19-24 yrs of age		53.4	52.6	52.4
>25yrs of age		16.3	13	18.1
Mean Age at First Birth		18.71	18.75	19.18
<i>Age at last birth</i>		No education Mean Age at Last Birth	26.26	25.80
	15-19	13.4	13.4	10.6
	20-24	29.4	31.7	32.7
	25-29	28.1	29.7	30.3
	30-34	18.3	16.8	17.2
	>35	10.8	8.4	9.2
	Educated Mean Age at Last Birth	25.16	24.79	24.66
	15-19	8	9.7	8.9
	20-24	34.7	39	37.2
	25-29	37.1	34.7	36.6
	30-34	16.3	13.1	13.9
	>35	3.8	3.4	3.4
	Mean Age at Last Birth	25.85	25.34	25.4
	<i>Reproductive Span</i>	No education	12.92	11.71
Educated		9.07	7.96	6.73
Mean		11.71	10.2	9.12
<i>Mean Birth Interval (BI) in Month</i>	No education	32.1	31.0	31.5
	Educated	33.7	33.1	35.4
	Mean BI	32.3	31.3	32.8
<i>Contraceptive Use</i>	No education	31.5	39.0	50.8
	Educated	49.3	52.4	59.0
	Mean	0.4	0.5	0.6

Figure 1a: Relationship of education and fertility in state level, NFHS-I

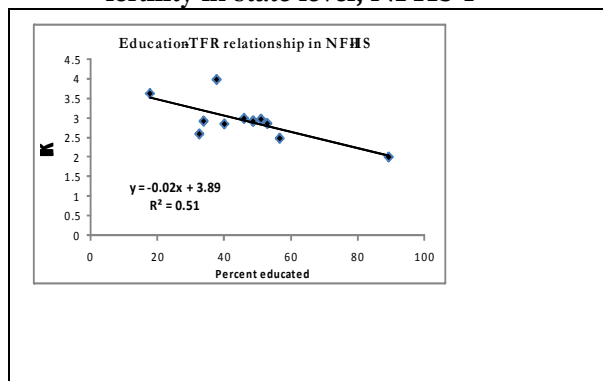


Figure 1b: Relationship of education and fertility in state level, NFHS-II

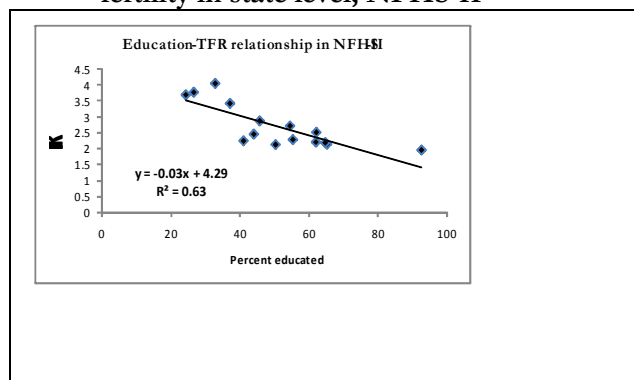


Figure 1c: Relationship of education and fertility in state level, NFHS-III

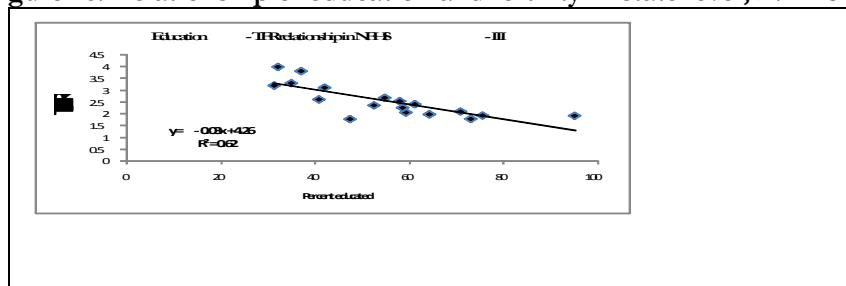


Table 6: Multiplicative effect of predictor variables on fertility

Predictor variables		NFHS I	NFHS II	NFHS III
Current age of respondent		1.037*	1.063**	1.057**
Number of dead children		2.379**	2.916**	3.637**
Age at first birth		0.889**	0.886**	0.888**
Women's Education	®No education =0			
	Primary	0.860	0.760**	0.627**
	Secondary	0.435**	0.442**	0.372**
	Higher	0.08**	0.249**	0.134**
Religion	®Hindu =0			
	Muslim	0.388**	2.69**	3.381**
	Other	0.416**	1.215*	1.591**
Caste	®OBC and General=0			
	Scheduled castes	1.893**	1.239**	1.379**
	Scheduled tribes	2.492**	1.806**	2.116**
Place of residence	®Rural=0			
	Urban	0.927	0.805**	0.943
Husband's education	®No education=0			
	Primary	0.982	1.051	1.100
	Secondary	0.872	1.036	1.040
	Higher	0.725	0.981	0.926
Contraception	®Not using =0			
	Using	1.314**	1.015	1.28**
Work participation	Not working = 0®			
	Working	0.788*	0.877	0.943
Mass media	®Not exposed =0			
	Any exposure	0.877	0.774**	0.805**
Constant		2.779	0.392*	0.862
R square		0.274	0.308	0.319
N		4132	18784	20924

Note: **p<0.01, *p< 0.05, ® equals to reference period.

Dependent variable: <= mean CEB, >mean CEB.

Mean CEB for NFHS I 4.76, NFHS II 4.40 and NFHS III 3.81

Table 7a: Decomposition of change in TFR between NFHS I and NFHS II by educational level of India

<i>Educational level of women</i>	<i>NFHS I</i>		<i>NFHS II</i>		<i>Within Class Decline In TFR</i>	
	TFR	% Women	TFR	% Women	Amount	% of Total
Illiterate	4.03	63.1	3.47	58.2	-0.34	65.2
Literate<middle complete	3.01	18.4	2.64	19.3	-0.07	13.4
Middle complete	2.49	7.2	2.26	8.2	-0.02	3.4
High School and Above	2.15	11.3	1.99	14.2	-0.02	3.9
All women	3.39	100.0	2.85	100	-0.448	85.9

Contribution of fertility change among illiterate women = 65.2%

Contribution of fertility change among literate women = (13.4+3.4+3.9) = 20.7%

Contribution of change in educational composition of women = 14.1%

Table 7b: Decomposition of change in TFR between NFHS II and NFHS III by educational level of India

<i>Educational level of women</i>	<i>NFHS II</i>		<i>NFHS III</i>		<i>Within Class Decline In TFR</i>	
	TFR	% Women	TFR	% Women	Amount	% of Total
Illiterate	3.47	58.2	3.15	44.5	-.016	43.7
Literate<middle complete	2.64	19.3	2.52	19.1	-0.02	6.0
Middle complete	2.26	8.2	2.24	14	0.00	0.7
High School and Above	1.99	14.2	1.91	22.3	-0.01	4.0
All women	2.85	100	2.68	100	-0.20	54.4

Contribution of fertility change among illiterate women = 43.7%

Contribution of fertility change among literate women = (6.0+0.7+4.0) = 10.7%

Contribution of change in educational composition of women = 45.6%

Table 7c: Decomposition of change in TFR between NFHS I and NFHS III by educational level of India

<i>Educational level of women</i>	<i>NFHS I</i>		<i>NFHS III</i>		<i>Within Class Decline In TFR</i>	
	TFR	% Women	TFR	% Women	Amount	% of Total
Illiterate	4.03	63.1	3.15	44.5	-0.47	52.8
Literate<middle complete	3.01	18.4	2.52	19.1	-0.09	10.2
Middle complete	2.49	7.2	2.24	14	-0.03	3.0
High School and Above	2.15	11.3	1.91	22.3	-0.04	4.5
All women	3.39	100.0	2.68	100	-0.63	70.52

Contribution of fertility change among illiterate women = 52.8%

Contribution of fertility change among literate women = (10.2+3.0+4.5) = 17.7%

Contribution of change in educational composition of women = 29.5%

APPENDIX

Table A: Percentage of ever married women by some background characteristics

<i>Background Characteristics</i>	<i>NFHS I</i>	<i>NFHS II</i>	<i>NFHS III</i>
Religion			
Hindu	81.97	81.82	81.49
Muslim	12.02	12.55	13.16
Others	6.01	5.63	5.35
Caste			
Scheduled Caste	12.10	18.47	19.41
Scheduled Tribe	8.82	8.79	8.49
Others	79.07	72.74	72.10
Place of residence			
urban	26.13	26.18	30.82
rural	73.87	73.82	69.18
Work Participation			
not working	66.86	62.63	62.40
working	33.14	37.37	37.60
Women's Age			
15-19	10.17	9.17	6.92
20-24	20.10	18.37	17.35
25-29	19.49	19.89	19.43
30-34	16.40	16.93	17.52
35-39	13.94	14.68	15.86
40-44	10.91	11.80	13.08
45-49	9.00	9.17	9.85
N	89777	90303	98923

Table B: Multiplicative effect of predictor variable

<i>Predictor variables</i>	<i>Standardized Coefficients Beta</i>	<i>Sig.</i>
Current age of respondent	0.089	0.000
child death	0.437	0.000
Age at first birth	-0.228	0.000
Women's Education	-0.159	0.000
Religion	0.094	0.000
Caste	-0.015	0.000
Place of residence	-0.015	0.000
Husband's education	-0.017	0.000
contraception	-0.012	0.000
work participation	-0.042	0.000
Mass media	-0.070	0.000
Time	-0.079	0.000
Constant		0.000
R square		0.459
N		74422

The above table shows the effect of different predictor variables on CEB of women aged 35-49. It has been assumed that the selected women have almost completed their fertility. Linear regression has been carried out keeping the dependent variable (CEB) as continuous. The three rounds of NFHS have been pooled to perform the analysis and a time variable has been kept as predictor.

The results from the table are in the same direction as of the logistic analysis. The time variable is showing a significant negative effect on CEB. R square is showing a higher value as that of the logistic, implying a better explanation of the variability of the model through linear regression.