

Women education level and TFR in Uttar Pradesh.

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Abstract - India is a developing country, overpopulation is one of the most basic causes of underdevelopment. This country is now facing with this acute problem, which tends to nullify most of the efforts of development. Government, along with non-government organizations and world bodies, are trying to solve this problem by declaring national population policy, establishment of national population commission and state population commissions, conducting research on the determinants of fertility. Fertility rates in all states are not uniform, it remains very high in some northern states like UP., Bihar, M.P., Rajasthan etc. But some southern states, like Kerala, Tamil Nadu, etc. Controlled it in a planned way and achieved replacement level.

In 1952, India was the first country in the world to launch family planning to the extent necessary for reducing birth rates to stabilize the population at a level consistent with the requirement of national economy. The National health policy 1983 fixed the goal of replacement level of total fertility rate (TFR, 2.1) by the year 2000. The new National population policy (NPP)-2000 declared and its documents clearly fixed the goal of replacement level before the 2010, deadline for the country. According to a recently-released health ministry report, only, 11 states and three union territories have attained the goal of replacement level (TFR 2.1) before the 2010 deadline. Mr Srinivasan, put it as "a saga of great expectations and poor performance". On May 2000 India was projected to have 1 billion (100 crore) people i.e. 16% of world's population on 2.4% of global land area. As per 2001 census, population of the India was enumerated 1027 million on 31st march 2001, and country was observed in the middle of demographic transition. A lag in decline in fertility in relation to mortality has resulted in the sizeable growth of India's population, which will continue in the coming several decades. *If current trend is continued, India may overtake China in 2045 to the most populous country of the world. India's current annual increase in population of 15.5 million is large enough to neutralize efforts to conserve the resource endowment and environment.*

The objective of this paper is to establish a relationship between education levels of women and their TFRs. In this paper, it has been established "How different education levels of women affect fertility differently, in rural and urban areas of Uttar Pradesh". In Uttar Pradesh, both Male as well as female literacy rates are very low as compared to national literacy rates. Female literacy rate of Uttar Pradesh in 2001 was 42.22% and gap in male and female literacy rate was 26.6 percent. In 2011 Census, female literacy improved to 59.26% and gap in male and female literacy rates also reduced to 19.98%. But this improvement is lower than improvement in national literacy rate. Data analysis of Uttar Pradesh shows a significant and inverse relationship between education level of women and their fertility.

The most populous state Uttar Pradesh is most concern to stabilize population. National Commission on Population estimated that by 2026, 22% of India's population will be contributed by Uttar Pradesh alone, while Bihar, Rajasthan and Madhya Pradesh together will account for 22%. The four southern states of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu will account for only 13%. In this context, should we reconsider our efforts in reaching for a higher level of female education in Uttar Pradesh, along with effective family planning-policies and successful implementation, efforts to educate women beyond the threshold level must be continued in order to reduce fertility rates at an even pace.

Index Terms—Age Specific fertility rates (ASFR), Children ever born (CEB), Children born last year (CBL), Average parity of women in a particular age group (P), Average parity equivalent F(i), Cumulative fertility $\phi(i)$, Total fertility rate (TFR), Empowered action group (EAG), Crude Birth Rate (CBR).

Introduction

India is a developing country, overpopulation is one of the most basic causes of underdevelopment. This country is now facing with this acute problem, which tends to nullify most of the efforts of development. Government, along with non-government organizations and world bodies, are trying to solve this problem by declaring national population policy, establishment of national population commission under chairmanship of the prime minister and state population commissions under chairmanship of the chief ministers of the respective states, conducting research on the determinants of fertility in the country and states. Fertility rates in all states are not uniform, it remains very high in some northern states like UP., Bihar, M.P., Rajasthan etc. But some southern states, like Kerala, Tamil Nadu, etc., controlled it in a planned way and achieved replacement level.

The objective of this paper is to establish a relationship between education levels of women and their TFRs. In this paper, it has been established "How different education levels of women affect fertility differently, in rural and urban areas of Uttar Pradesh". In Uttar Pradesh, both Male as well as female literacy rates are very low as compared to national literacy rates. Female literacy rate of Uttar Pradesh in 2001 was 42.22% and gap in male and female literacy rate was 26.6 percent. In 2011 Census, female literacy improved to 59.26% and gap in male and female literacy rates also reduced to 19.98%. But this improvement is lower than improvement in national literacy rate. In Uttar Pradesh, above results show a significant inverse relationship between education level and fertility of women. This analysis is based on the census of India-2001 F series data of Uttar Pradesh. The objective of this paper is to establish a relationship between education levels of women and their TFRs.

In 1972, the goal of reaching crude birth rate (CBR) of 25 per 1000 was set but this goal was not attained even by 2002. The National health policy 1983 fixed the goal of replacement level of total fertility rate (TFR) by the year 2000. The new National population policy (NPP)-2000 declared and its document clearly fixed the goal of replacement level (TFR 2.1) before the 2010 deadline for the country. Mr Srinivasan, put it as "a saga of great expectations and poor performance". According to a recently-released health ministry report, 11 states viz Andhra Pradesh, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Punjab, Sikkim, Tamil Nadu and West Bengal. And three union territories (Chandigarh, Pondicherry and Andaman and Nicobar Islands.) have attained the goal of replacement level (TFR 2.1) before the 2010 deadline. Spacing between children, age of marriage, behavioural changes, education, better healthcare, widespread acceptance of family planning measures like vasectomy and tubectomy and socio-economic conditions are some of the factors behind this progress". However, early marriages and negligence of birth control measures in other populous states keep India's fertility rate alarmingly high. States like Uttar Pradesh, Bihar and Madhya Pradesh will need at least 15-20 years to achieve this goal. On May 2000 India was projected to have 1 billion (100 crore) people i.e. 16% of world's population on 2.4% of global land area. As per 2001 census, population of India was enumerated 1027 million on 31st march 2001, and country was observed in the middle of demographic transition. A lag in decline in fertility in relation to mortality has resulted in the sizeable growth of India's population so for which will continue in the coming several decades. Decline in population growth process has been witnessed since 1980. The National population policy (NPP)-2000 documents clearly stated that population growth in India continues to be high on account of demographic momentum (estimated contribution 58%), higher unwanted fertility due to unmet need of contraception (estimated contribution 20%). *If current trend is continued, India may overtake China in 2045 to the most populous country of the world. While global population has increased three times during this century from 2 billion to 6 billion. The population of India has increased nearly five times from 238 million (23 crores) to 1 billion in the same period. India's current annual increase in population of 15.5 million is large enough to neutralize efforts to conserve the resource endowment and environment.*

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on Population estimated that by 2026, 22% of India's population will be contributed by Uttar Pradesh alone, while Bihar, Rajasthan and Madhya Pradesh together will account for 22%. The four southern states of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu will account for only 13%. In this context, should we reconsider our efforts in reaching for a higher level of female education in Uttar Pradesh, along with effective family planning-policies and successful implementation, efforts to educate women beyond the threshold level must continue in order to reduce fertility rates at an even pace. In comparison to the southern states, fertility has been significantly higher in the northern states. Fertility has also begun to fall in the large in northern states mainly after 1986, but it was still relatively high in this region. TFR in UP and MP were 4.8 and 4.0, respectively in 2000.

Determinants of Fertility in India and states

Education plays a very important role in population control, especially, women education is the prominent factor to control TFR and elimination of poverty. Education of girls at least up to the age of 14 can help stop early marriages, prevalent in rural areas. It has been shown that wherever girl's literacy has been taken care of, a significant improvement in population control observed. Women education affects social-economic and demographic indicators which are essential for population stabilisation. The Task Force of the National Commission on Population (NCP) has been already identified the following key social, economic and demographic indicators for population stabilisation in India.

1. Total Fertility Rate
2. Sex ratio.
3. Percentage of couples using family planning methods.
4. Child mortality up to the age of 2.
5. Maternal Mortality Rate.
6. Percentage of Women receiving skilled attention during deliveries.
7. Percentage of children (12-24 months) getting complete immunization.
8. Nutritional status of children below 6 years.
9. Percentage of girls marrying below 18 years of age.
10. Percentage of births, deaths and marriages registered.
11. Literacy rate-males and females.
12. Enrolment of children in schools up to the age of 14 and the rate of dropouts.
13. Percentage of households with safe drinking water.
14. Percentage of villages connected by pucca roads.

Among, above fourteen indicators, first thirteen indicators are directly or indirectly affected by women education level.

Education as a Determinant of Fertility

Education, especially female education is the most important determinant of fertility. Directly or indirectly it affects other determinants of fertility. The Task Force of the National Commission on Population (NCP) has been already identified the fourteen key social, economic and demographic indicators for population stabilisation in India. Among, above mentioned fourteen indicators, first thirteen indicators are directly or indirectly affected by women education level. Among various socioeconomic and demographic determinants of fertility, education, especially female education, is the most dominant factor to reduce TFR.

There are several arguments in the demographic literature, which explains the mechanism through which education has its impact on the other variables such as age at marriage, contraceptive behaviour, fertility and mortality. Higher levels of education lead to a greater awareness and also contributes to improve the economic conditions. Education acts as a catalyst for social upliftment enhancing the returns on investment made in almost every aspect of developmental efforts. Women education plays very important role for social upliftment and development of the societies and Mahatma Gandhi puts it as followed-

“Educate one man, you educate one person, but educate a woman and you educate a whole civilisation”.

-Mahatma Gandhi

Female Education and Supply of Children

Education affects the supply of children through three intervening variables. These are: (1) age at marriage; (2) breast feeding; and (3) child mortality [(8) P: 12].

Age at Marriage: Education tends to increase the age at first marriage, thereby decreasing the number of years that can be devoted to child bearing. This relationship between women's education and age at marriage has been found in almost all fertility studies. Cleland and Jejeebhoy (10) show that in almost every country in South Asia, women with education get married "roughly two to five years later than uneducated women" (p.87). A study of 26 developing countries sponsored by the United Nations (6) finds that age at marriage invariably increases with the level of education in all of the countries examined, despite the fact that "the age at marriage varies widely across countries" (p.50). According to Jejeebhoy [(8) Pp: 12-13], age at marriage is affected by education through decision-making autonomy, interaction with a wider world", emotional autonomy and self-reliance.

Besides delaying marriage, female education has been observed to be associated with greater numbers of women not marrying at all. Women with higher education levels are more likely to be able to organize their lives outside the realm of marriage and family. For example, in Thailand, only about 1.9 per cent of women without education do not marry, whereas 14.6 per cent of highly educated women do not marry [(6) P: 46].

Breast Feeding: Prolonged breast-feeding is one of the traditional practices that serves as a means of contraception. With increases in the levels of education of women, the period of breast-feeding tends to decrease [(6), (8), (10)]. Breast feeding practices are affected by education through knowledge autonomy, decision-making autonomy and emotional autonomy [(8) Pp: 13-14].

Child Mortality: High rates of child mortality reduce the supply of children, which in turn is likely to increase the demand for children. The existence of a linear relationship between mother's education and child mortality has been well established [for a review, see (11)]. With a high rate of child survival, parents can be certain that they need not have many babies in order to maintain their desired family size. Moreover, with the death of an infant, duration of breast feeding and post-partum abstinence is curtailed, which promotes fertility [(10) P: 93]. Thus with the survival of children, intervals between births are likely to be widened. Female education affects child survival through all the five forms of female autonomy described by Jejeebhoy [(8) P: 12-13].

Female Education and Demand for Children

Female education has an impact on the demand for children via these variables: (1) Desired family size; (2) Son preference; (3) Labour contributions of offspring during childhood; (4) Children as old age support; (5) Children as sources of prestige; and (6) Economic, time and opportunity costs of raising children [(8) P: 12].

Desired Family Size: With education, women become much less fatalistic regarding their family size. As Cochrane [(7) P: 104-5] notes in a study of fertility in Nigeria, only 10 per cent of the women with education beyond the primary stage believed fertility to be determined by God', whereas 50 per cent of the totally uneducated women held that belief. In most research studies it has been found that desired family size becomes smaller with the increase in women's educational levels [e.g., (6), (8), (10)]. However, the strength of relationship varies from culture to culture [(6), (8), (10)], depending mainly on the degree of gender stratification in the society under study. Education (lower level) has less impact in highly gender-stratified societies than in relatively egalitarian societies. Education affects desired family size through all the five forms of autonomy that it brings about [(8) P:12-13].

Son Preference: In gender-stratified societies, as in Northern India, especially in Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh, son preference is so strong that even education above primary level cannot counteract

it. In rural area, specially in northern Indian states like, U.P.,M.P., Rajasthan, Haryana and Panjab and Bihar, gender stratification is very strong . If a couple desires to have two living sons, they will end up having 3.9 children on an average. If parents want at least one daughter and one son, the average would turn out to be 3 (Sheps, as cited in Chowdhury's paper [(12) P: 257]. Thus son preference increases the family size and TFR significantly in the long run. Chowdhury (12) finds that in Bangladesh son preference is so strong that even education above primary level cannot counteract it. Cleland and Jejeebhoy [(10) P: 94] suggest that very high levels of education are required in order to counter the preference for sons in such societies. The higher education of women, through providing them self reliance, social and economic autonomy, probably has a negative impact on son preference [(8) P: 12-13].

The Labour Contributions of Offspring During Childhood: Highly educated women are more likely to educate their children and send them to school.They do not prefer their children to use as a labour while uneducated women, who believe that a function of children is to help their parents in economic activities. Jejeebhoy [(8) P:131] cites evidence from a study carried out in Maharashtra, India. The study reveals that expected and actual levels of support from sons diminished as women's educational levels increased. For girls the decline is relatively modest, as more emphasis is placed on sons' schooling. Overall, the children of women with secondary education only contribute about 60 per cent of the labour that is contributed by the children of uneducated women. Cleland and Jejeebhoy [(10) P: 96] also mention several other similar studies. Effects of female education on child labour are channelled through self-reliance, and social and economic autonomy [(8) P: 12-13].

Children as Old Age Support: One of the perceived benefits of children is as providing a means of support in old age. With increasing levels of education, women tend to rely less on their children for support in old age and for economic help and housing [(8) P: 129]. However, the effect of education varies with the intensity of gender stratification in the society. In highly gender-stratified societies, a higher level of education is required in order to have a significant impact. As the level of education of women increases, they are more likely to depend on other types of resources (such as personal savings) rather than relying solely on their children (especially their sons) [(10) P: 98]. Women's education affects the extent to which children are perceived as sources of support in old age through social and economic autonomy and self-reliance [(8) P :12-13].

Economic, Time and Opportunity Costs of Children: Education leads to aspirations for better qualified children. With "higher standards of child care" [(13) P: 570], other than feeding, housing and clothing children, educated parents perceive costs to be higher because they have to arrange for a better education for their children. Level of education of children tends to have a direct relationship with mother's schooling [(8) P: 133]. Thus raising equality children' is perceived by parents to be costly, hence reducing the number of desired children and fertility.

More highly educated women are more likely to be engaged in paid employment outside the home. An educated woman is likely to take into account the loss of income that will result from having more children and may therefore decide not to have large numbers of children. Besides this opportunity cost, better educated women also feel it necessary to spend more time with children and are less likely to leave young children in the care of older siblings. This time cost leads educated women to have fewer children than uneducated women. Education affects the perceptions of mothers in terms of economic, opportunity and time cost of children through knowledge autonomy, decision-making autonomy and self-reliance [(8) P: 12-13].

Children as Means of Enhancing Prestige: In some societies in Asia and Africa, a woman's sense of identity, legitimization, recognition, security, and prestige in the family is dependent on her having children. Although very few studies have been carried out in this area, the evidence suggests that the education of women serves as an alternative means of gaining respect. As an educated person, an educated woman is considered to be knowledgeable. If she earns money by working in an 'honourable' occupation, she is likely to be highly valued. Education brings in prestige for a woman, in spite of not having many children through social and economic autonomy and self-reliance [(8) P: 12-13].

Female education and unwanted pregnancy (Contraceptive Use)

Studies have overwhelmingly documented positive and significant relationships between female education and contraceptive use [(6-8), (10), (14)]. Female education affects the use of contraception through the acquisition of knowledge regarding contraception and through increased spousal communication.

The National population policy(NPP)-2000 documents clearly stated that population growth in India continues to be high on account of higher unwanted fertility due to unmet need of contraception (estimated contribution 20%) .

Knowledge of Contraception: There appears to be a positive relationship between the education of women and contraceptive knowledge [(6-7)].

The most obvious way in which schooling may influence the fertility of couples is by providing them with the means of acquiring and understanding correct information about prevention of pregnancy and childbirth. Literacy, in the narrow sense of ability to read and write, cannot be the only crucially important cognitive skill implicated. Even one to three years of maternal schooling is associated in some countries with an appreciable reduction in childbearing and this modest exposure to primary schooling is rarely sufficient to impart lasting reading and writing skills. The work of Levine and associates in Mexico, Nepal and Zambia has demonstrated that unschooled adult women are less capable of understanding radio messages on health in their native language than primary schooled women - a powerful demonstration that oral literacy skills acquired in school persist into later life in ways that might be relevant to health and contraception (Levine et al., 1991).

The work of Caldwell in West Africa and South India suggests that schooling transmits new western values of the child-centred nuclear family which results in a greater commitment to their survival and welfare (Caldwell, 1982; Caldwell, Reddy and Caldwell, 1985). Such a transformation in values leads, inevitably, to smaller family sizes but more investment in each child - a process often termed the quantity-quality trade-off. Though immensely plausible, this thesis founders upon the fact that schooling has only a relatively modest impact on indicators of desired family size, once appropriate statistical controls are introduced.

Cleland and Jejeebhoy [(10) P: 100] argue that "the role of schooling becomes more apparent in terms of detailed knowledge: the number of methods, especially non-terminal methods, known; the correct use of a particular method; and from where a particular method can be acquired." For example, they refer to a study showing that in India, 95 per cent of the women with secondary education knew about the IUD whereas only 39 per cent of the uneducated women had the knowledge of this method of birth control.

Understanding in Spouses: The education of women (even primary level education) also breaks another barrier to contraception: lack of spousal intimacy -- which restricts free discussion on sexual matters or on issues related to contraception [(7-8), (10)]. Education affects spousal communication through emotional autonomy and decision-making autonomy [(8) Pp: 12-13].

The number of unwanted pregnancies is lower among educated women than among uneducated women. Educated women are more likely to use contraception consistently as soon as their desired family size has been completed. The gap between desired family size and actual family size shows the unmet need for contraception among uneducated women [(6), (8)].

The National Population policy (NPP)-2000 documents of India, clearly stated that population growth in India continues to be high on account of demographic momentum (estimated contribution 58%), higher unwanted

fertility due to unmet need of contraception (estimated contribution 20%).

Thus female education, in addition to having many other benefits, also goes a long way in reducing fertility. But what level of education threshold is required for it to have a negative impact on fertility is an important issue, analysis will reflect on this issue. India and its empowered action group (EAG) states viz. U.P., Madhya Pradesh, Chhattisgarh, Uttarakhand, Bihar, Jharkhand, Rajasthan, and Orissa, with lower levels of development and modernization and highly gender-stratified cultural settings, are likely to find that a higher level of education is required. In general, it has been observed that a secondary level of education is likely to influence fertility very significantly.

Fertility trend and Demographic indicators.

In India, fertility declined in term of TFR from 5.2 per women in 1971 to 2.9 in 2001 with varying pace in rural and urban areas of India and in different states. ASFR for selected years during 1971-2001 for all India and Uttar Pradesh have fallen for women at all ages, both in rural & urban areas. The greatest fall however, has occurred at older ages within reproductive span, indicating that fertility is increasingly being controlled within marriage through adoption of family planning. At the younger age group 15-19 fertility decline reflects mainly a rise in the age at marriage of girls which increased from 17 years in 1971 to 22 years now. Furthermore, earlier fertility used to peak at 20-24 and 25-29 and it now peaks only at 20-24 implying that average span of child bearing has declined considerably. It is mainly due to improvement in women education level and improvement in socio economic condition of women. After six decades, formulating the national family welfare programme, India has:

- Reduced CBR from 40.8 (1951) to 26.4 (1998) and 21.8(2011, SRS bulletin)
- IMR from 146 per 1000 live births (1951) to 72 per 1000 live births (1998 SRS) and 44(2011, SRS bulletin).
- Added 25 years to life expectancy from 37 yrs to 62 yrs.

Literacy trend :

Literacy rates in India have improved over the years according to the estimates provided by successive Censuses. Table 1 depicts the rise in the literacy rates. Estimates from the recent Census 2001 indicate a significant rise in the literacy level. However large gaps in the male female literacy rate still exists and every effort must be made to decrease this gap

Table 1: Literacy Rate (1951 -- 2001) in India.				Difference in Male & Female Literacy Rates
Year	Literacy Rate (%)			
	Persons	Males	Females	
1951	18.33	27.16	8.86	18.3
1961	28.31	40.40	15.34	25.06
1971	34.45	45.95	21.97	23.98
1981	43.56	56.37	29.75	26.62
1991	52.21	64.13	39.29	24.84
2001	65.49	75.96	54.28	21.68

2011	73.0	80.9	64.6	16.3
Literacy rate in Uttar Pradesh.				
2001	56.27	68.82	42.22	26.6
2011	69.72	79.24	59.26	19.98

Note: Literacy Rates of 1951, 1961 and 1971 relate to population aged five years and above. The rates for the years 1981 and 1991, 2001 relate to the population aged seven years and above.

Broad-based efforts made during the last fifty years have resulted in a massive expansion of the education system in the country, raising the overall status of educational provisions in terms of accessibility and participation.

As per 2011 Census, in India male and female literacy rates are 80.9 and 64.6 percent, respectively and its gap is 16.3 percent..As compare with 2001 Census, male literacy rate improved from 75.96% to 80.9% in 2011 i.e.4.94% and female literacy rate also improved from 54.28 to 64.6 percent in 2011 i.e.10.32%.Thus percentage improvement in female literacy is more than double to that of male. But female literacy rate in India is also low. On the other hand, in Uttar Pradesh, both Male as well as female literacy rates are very low as compared to national literacy rate. Female literacy rate of Uttar Pradesh in 2001 was 42.22% and gap in male and female literacy rate was 26.6 percent. In 2011 Census, female literacy improved to 59.26% and gap in male and female literacy also reduced to 19.98%.But this improvement is lower than improvement in national literacy.

Small amounts of primary and middle level of education are not likely to have a significant impact. However, the threshold level varies from one social setting to another. In highly gender-stratified societies, the threshold level is likely to be higher than in relatively egalitarian societies. To achieve the goal of replacement level (TFR 2.1) , special attention must be given for women education not only for increase in literacy rate but also for increase in qualitative higher education.

Data Source and quality of data

In demographic usage, the term ‘fertility’ relates to the number of live births, to a woman in her life time fertility experience upto the moment at which data is collected. Traditionally, demographic estimation has been based on data collected by Censuses and by vital registration system. If data collected by these methods (sources) is perfect, demographic parameters could be calculated directly from the data reported and there would be no need for indirect estimation. But unfortunately, however, in many countries, due to different type of errors, the estimates obtained directly from the data are severely flawed, keeping in this view, demographers have developed a set of techniques that allow their indirect estimation. So the immediate need is to search for such question which can be answered with reasonable accuracy and that provide enough information about a certain demographic phenomenon to permit the indirect estimation. Quality of estimates also depends upon quality of data. In 2001 and 2011 Census of India, four questions relating to fertility were canvassed. These were:

- I. Age at marriage.

- II. Number of children surviving.
- III. Number of children ever born (CEB).
- IV. Whether any child was born during the last year (CBLY).

First, question was asked from all ever married persons male as well as female, the second and third, questions were asked for all ever married women, while the last one (IVth) question was canvassed in case of currently married women. Currently married women means, those women, whose husband is alive. The number of children ever born to a particular ever married woman is an aggregate measure of her life time fertility Experience up to the moment at which the data is collected. When women are grouped according to some variable such as age or duration of marriage, the average number of children ever born by the group, also known as their average parity can be computed by dividing the total number of children born to the total number of women in the age-group. The result is a measure of the average life time fertility experience of the survivors of a birth or marriage cohort.

Average parities for groups of women calculated from data on children ever born can be distorted either by errors in the number of children reported or by errors in the classification of women in particular age-groups.

In general, following are the types of errors in CEB data:-

1. Misunderstanding the questions.

- I. The mortality errors: It arises when the respondents report only the number of children who are still alive rather than those ever born.
- II. Non-resident error: This is caused by overlooking the alive children who are not residing with the mother.
- III. The marriage error: This occurs when the question is pertinent to all marriages and the women who have been married more than once do not include their children to previous marriages in their report.

2. Respondents' lapse of memory

- I. The memory error, which is caused by tendency on the part of some mothers, elderly forget to include some of their children who had died. The symptoms of such omission are average parities that fail to increase rapidly enough as age increases.
- II. The baby error is caused by the common tendency to overlook reporting of the alive young children of particular sex.

Type of errors in the current fertility data

The current fertility data suffers mostly from reference period error. The CEB data on the other hand

does not involve time element in it and hence is free from such type of error. The reference period (say one year) may be either under reported or over reported. It means, instead of reporting the births of an average 12 months, they may be related to either more than 12 months or less than 12 months.

But few limitations with regard to these indices may be mentioned. These are:

I. The question on birth during last one year was canvassed only for currently married women for operational reasons. Sensitive questions as to whether there was any birth during the last one year could not be canvassed in the case of the single, widowed or divorced women. Some births might have taken place to women, who might have become widowed or divorced subsequently, but before or during the Census enumeration period. Such births have not been netted, although their proportion may not be significant.

- I. Another class of births that would have been left out would relate to babies born during the last one year to mothers who may have died before the Census date.
- II. The limitation of collecting the retrospective data should also be considered. These are omission of events, inaccuracies in dating of birth and distortion in age reporting.

The effect of these limitations would be partly to under estimate the relevant fertility indicators. The above mentioned limitations would imply that the estimates of current fertility should be considered as indicative of broad trends, rather than actual levels. Thus, we see that Census data has different type of errors and estimates obtained directly from the data are severely flawed. Keeping in this view demographers have developed a set of techniques to indirect estimation of TFR. P/F ratio method for estimation of TFR given by William Brass is pioneer and mostly used method for TFR. But this method assumes no decline in fertility in recent past. But as evident shows that fertility decline in India due to improvement in educational level and awareness in women, change in socio-economic condition of women and use of contraceptives, etc..

Thus, P/F ratio technique, over estimates the TFR. In P/F ratio technique, average parity equivalent $F(i)$ are estimated by interpolation. Several procedures have been proposed for this interpolation. William Brass used simple polynomial model of fertility. While Coale and Trussel used second degree polynomial to estimate average parity equivalent $F(i)$. But it seems to appear not appropriate in present situation. So Brass model & Coale –Trussel fertility models require slight modification in estimating average parity equivalents $F(i)$ by interpolation. Thus, fertility trend follows, logistic curve (growth curve). So, fitted logistic curve is used for estimating $F(i)$ by interpolation, in modified MMP P/F' ratio technique. Thus TFRs are calculated by modified P/F' ratio technique. In this technique we use following data :

1. Total number of children ever born classified by five year age group of mother.
2. Total number of children born in last one year to the date of census or survey classified.
3. Total number of women in five year age group (irrespective of marital status).

Methodology

Computational Procedure:

Step1. Calculation of reported average parities: Reported Average parity of women in age group (i) is denoted by

$$P(i) = \frac{\text{Total no. of children everborn (CEB) to women in age group (i)}}{\text{Total no. of women in that age group (TW)}} = \frac{CEB}{TW}$$

Where, TW= Total No. of women in that age group, whether married or single, fertile or not.

Step2. Calculation of preliminary fertility schedule from information on births in the last year or from registered birth:

ASFR for age group (i) is denoted by f(i).

$$f(i) = \frac{\text{Total birth to women in last one year in age group (i)}}{\text{Total women}} = \frac{CBL}{TW}$$

(Here TW .means total women whether childless or not ever married or not in that age group).

Step3. Calculation of cumulated fertility schedule for a period: We denote it , Φ (i)

Cumulated fertility Φ (i) = 5 (f(0) + f(1) + + f(i)).

Step4. We use this fitted logistic curve, for estimating average parity equivalents F'(i) from the given data of age-group. To fit the logistic curve given in equation (5),

$$U_t = \frac{K}{1 + \exp(a + bt)}, \quad b < 0 \quad \dots\dots\dots (5)$$

where a, b and K are constants and U_t is the value of the time series at time t. We, use following formula for estimating parameters K, a, and b

Since $K \neq 0$ we get,
 $K = [(U_2^2 (U_1 U_3) - 2U_1 U_2 U_3)] / (U_2^2 - U_1 U_3) \quad \dots\dots\dots(10)$

$b = (1/t_2 - t_1) \log [(K - U_2) U_1 / (K - U_1) U_2] \quad \dots\dots\dots(11)$

$a = \log [(K - U_1) / U_1] - bt_1 \quad \dots\dots\dots(12)$

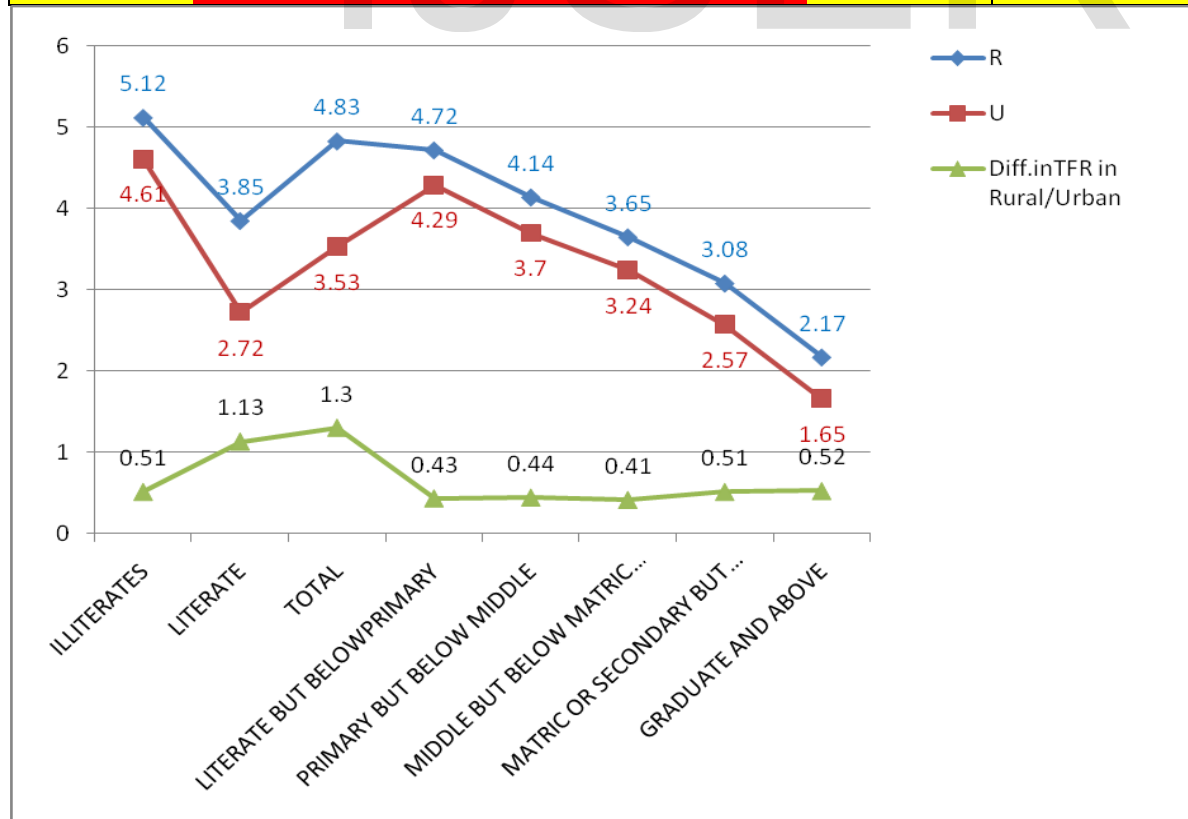
In this respect, estimates of average parity equivalent F'(i) is used by fitted logistic curve in place of average parity equivalent F(i). We used the method of three selected points for fitting the logistic curve: The given time series data is first plotted on a graph paper and a trend line is first drawn by the freehand smoothing curve method. Thus, use of trend line, makes equivalent cumulated fertility that women experiencing those rates would achieve by the end of each five-year age group. MMP used Population analysis spread sheet(PAS), which was developed by U.S. Bureau of census International programs Centre with some modifications, to estimate TFR. In modified software F'(i), average parity equiva-

lent by fitted logistic curve is used in place of $F(i)$. Thus in modified software P/F' is used in place of P/F ratio. In modified Population analysis spread sheet (PAS), estimates of the parameters, k , a and b are used to fit the logistic curve. $F'(i)$, is estimated by fitted logistic curve. Thus modified technique does not use estimates of the parameters, $a(i)$, $b(i)$ and $c(i)$, which were tabulated by trussell. In modified technique other procedures follow same as in trussell P/F ratio method.

Data Analysis

TFR OF WOMEN WITH DIFFERENT EDUCATIONAL LEVELS IN UTTAR PRADESH					
S.N.	Education level of women	Total	Rural	Urban	Diff. In TFR of R/U
1	2	3	4	5	6
1	ILLITERATES	5.05	5.12	4.61	0.51
2	LITERATE	3.39	3.85	2.72	1.13
3	TOTAL	4.54	4.83	3.53	1.3
4	LITERATE BUT BELOW PRIMARY	4.6	4.72	4.29	0.43
5	PRIMARY BUT BELOW MIDDLE	4.02	4.14	3.7	0.44
6	MIDDLE BUT BELOW MATRIC OR SECONDARY	3.5	3.65	3.24	0.41
7	MATRIC OR SECONDARY BUT BELOW GRADUATE	2.79	3.08	2.57	0.51
8	GRADUATE AND ABOVE	1.75	2.17	1.65	0.52

Data Source: F-series data of Census 2001 of Uttar Pradesh.



From above table it is very clear that TFR of Illiterate women in rural and urban area of Uttar Pradesh are 5.12 and 4.61, respectively and its difference is 0.51, this difference in TFR may be due to difference in socio economic condition, life style of women in urban areas, income levels of households, educational levels of husbands, awareness and availability of contraceptives in urban areas, etc..

The Graph of TFR of women with educational level, literate but below primary to matric or secondary but below graduate levels in rural areas and literate but below primary to middle but below matric in urban areas, are almost straight lines. These TFR lines are parallel to each other with a constant slopes from educational level, literate but below primary to middle but below matric . Thus, it is clear that in rural areas TFRs decline with a constant rate up to educational level matric or secondary but below graduate and in urban areas it declines with a constant rate up to educational level middle but below matric. The Graph of difference in TFR of women with educational levels, literate but below primary to middle but below matric levels in rural as well as in urban areas, is a straight line parallel to x-axis(educational levels). Thus, it is clear that TFRs decline with a constant rate at these educational levels, in rural as well as in urban areas of Uttar Pradesh. The difference in TFR of women in rural and urban areas for these educational levels are 0.43 and 0.44, and 0.41, respectively, which are almost same and its graph is almost straight line. Thus, we may conclude that difference in socio economic condition, life style of women, income levels of households, educational levels of husbands, autonomy of women, awareness and availability of contraceptives have same effect to reduce TFR of women up to educational level middle but below matric, in rural as well as in urban areas of Uttar Pradesh. But in urban areas TFRs sharply declined in women whose educational level are above matric or secondary and in rural areas, Graduate & above .

Summary and Conclusion

From our discussion thus far, we have observed that education does have a major impact on fertility. Even after controlling for other relevant factors, the education of women stands out as a significant factor in determining fertility. It was shown that the greatest impact of education on fertility occurs when levels of education are at secondary level. Small amounts of primary and middle level of education are not likely to have a significant impact. However, the threshold level varies from one social setting to another. In highly gender-stratified societies, the threshold level is likely to be higher than in relatively egalitarian societies. Education has been found to increase women's levels of autonomy in decision-making, in acquiring knowledge, in gaining access to economic resources, and in interacting with a wider social circle. It is through this autonomy that education exerts an impact on fertility.

In Uttar Pradesh ,above results show a significant and inverse relationship between education level and fertility of women. In this context, should we reconsider our efforts in reaching for a higher level of female education in some northern states like UP., Bihar , M.P., Rajasthan etc. , along with effective family planning-policies and successful implementation , efforts to educate women beyond the threshold level must continue in order to reduce fertility rates at an even pace. A reduction in the fertility rate is only one of the numerous positive effects of education. It affects the survival rates of children. Above all, education helps men and women to become efficient and conscious citizens. The autonomy acquired through education helps individuals (both men and women) to

understand what their rights are and the range of options they have to solve or mitigate their problems and sufferings in order to live a better life. It is for this reason that education is a basic human right, and it is the duty of world leadership to ensure education for all.

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