

## A Study of Fertility Levels and Trends in Bihar

**Amit Kumar**

Research Scholar, International Institute for Population Science, Mumbai, India

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### Abstract

Several Indian states have achieved or on the way of achieving the replacement level fertility, but the performance of Bihar are far from this. Accordingly, this paper attempts to assess the level and trends of fertility in Bihar and. It also examines the socio-economic determinants of fertility. Results indicate that TFR is stagnated in Bihar and its districts over the years with substantial differences across the socio-economic groups. Trends and differentials in fertility examined shows that it has declined maximum in the urban area, Hindu, Schedule Tribe and Other Backward Casts and among high wealth indices DLHS-2 to DLHS-3. Moreover, contraceptive use has increased across the socio-economic groups over the periods with substantive differentials within the groups. Result of Gompertz Model indicates that rate of decline in TFR is stagnant after 1997, Low literacy. Low urbanization preceding poverty are the other important factors, which may be the cause for stagnant.

**KEYWORDS:** Fertility, Contraception, Socio-economic, Gompertz model, Trend, Total Fertility Rate

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### Introduction

Bihar is demographically one of the most-backward states in India with its large population base, and high fertility becomes more important to the study of fertility. Moreover, there is a dearth of demographic studies available on Bihar. The fertility transition in most of the states began in late 1960s. Bihar and Uttar Pradesh were the states where the fertility transition began even in late 1970s. But the pace and levels of fertility transition in Bihar are relatively underexplored and have received very little attention compared to other north India states such as Madhya Pradesh and Uttar Pradesh. At current fertility level, a woman in Bihar will have an average of four children in her whole reproductive life. The total fertility rate in Bihar has increased by 0.3 children from 1998-99 to 2005-06 (NFHS 1998-99, 2004-05).

According to Census 1981, 1991 and 2001 total fertility rate in the state is 5.20, 5.26 and 4.38 respectively. Sample Registration System (SRS) show recent total fertility rate as 3.9 (2007). Hence given this diversity, we propose to undertake a trends analysis and determinants of TFR in Bihar. We are also updating the work of Murthy, Guio and Dreze (1996) who undertook a trend analysis of fertility in Bihar. In this paper, we analyze the trends of fertility (Total Fertility Rate) in Bihar.

## Objective of the study

The broad objective of the present study is to understand the changes in fertility and its determinants in Bihar. However the specific objectives are:

1. To assess the level and trends of fertility in Bihar
2. To examine the socio-economic determinants of fertility change in Bihar.

## Data

The present paper is base on the secondary data obtained from Sample Registration System (SRS), Registrar General of India, during 1981 to 2007, to analyze the trends of total fertility rate by rural-urban, data from Registrar General of India (2009). The district level Schedule Castes & Schedule Tribes, Hindu, Muslim, level of urbanization, literacy rate, female literacy rate, woman work participation rate have taken from census of India 1981, 1991 & 2001 to socioeconomic determinants of fertility of Bihar.

All three rounds of District Level Household Survey-1998-99, 2002-04, and 2007-08 are used to calculate the total fertility rate at district level as were as examine the differentials. The birth order first and second data collected in DLHS-1 & 2 are used to calculate fertility rate. More specifically, these two data set (NFHS & DLHS) are used to examine the differentials in contraceptive prevalence rate in the state. Data on Couple protection rate are obtained from Family welfare statistics 2006 (Ministry of Family Welfare and Health, Government of India) during 1980 to 2005.

## Methodology

In this study both Arriaga's P/F ratio method and Ram & Chander Shekar method

$TFR = 12.2675 * EXP(-0.0221 * (PFSB))$ . The Gompertz Model used to trend analysis of total fertility rate during 1981 to 2007. Correlation matrix used to examine the socio-economic determinants of fertility change in Bihar.

## Results

### Trends and changes in Total Fertility Rate in India and Bihar

Table 1 shows the trends in Total Fertility Rate (TFR) during 1981 to 2007 in India and Bihar. It can clearly see from the table that there is variation among the increase and decrease in TFR in Bihar and India during different time periods. As the table shows that in 1984, there was an increase in TFR (5.9) than the past three years (in 1981, 1982 and 1983). Then again in 1992 and 1999, the TFR is slightly increased (4.6 and 4.5). Likewise in India, the TFR was increased (5.5) in 1986 and (5.3) in 1989. In 1990, there was a drastic reduction in TFR of India (4.6) in rural Bihar, there was a decrease in TFR accept in 1984(6). In rural India, we can see the instability for total fertility rate. The total fertility rate was highest in 1986 (5.7). The TFR was also high in 1989 and 1990 (5.4 for both the years). In 1984 (4.9) and 1993 (3.7), there was a slight increase in TFR for urban Bihar. In urban India, the TFR was highly increased in 1986 (4.9). It then came down to

3.2 in 1987. Then it again raised in 1989 (4.8) from 3.1 in 1988. There was little increase in TFR in 1992 but after 1992, there was a decrease in TFR up to 2007 (2).

Figure 1 shows the decadal percentage change in TFR by place of residence for India and Bihar. The decadal percentage change in TFR is clearly evident that the change is more in case of India than Bihar. The decrease in TFR from 1987-97 was 20 percent in India and 18 percent in Bihar. A similar situation is observed in the case of rural and urban areas. However, the difference between India and Bihar in case of decadal change in TFR was more in rural than urban areas. A noticeable fact is that the change in TFR from 1997-2007 was more or less same in urban India and urban Bihar. It could be because of low urbanization; Bihar is experiencing high fertility.

Figure 2 shows the rate of changes in TFR during 1981-2007. The basic question lies in the mind of the researcher is that when the most of the states were experiencing the rapid fertility decline, why the state of Bihar shows stagnation in fertility decline in the recent period? The reason could be that the period 1997 is a landmark in the history of family welfare programme in India. In this year, we adopted the Target Free approach for family planning programme and RCH programme also integrated with family welfare programme (Bhat, P. N. Mari; 1994). Figure 2 shows the Gompertz curve, plotted for Product of change in TFR and time on the level of TFR shows a curvilinear relationship. The fitted curve is based on 1.8 ( $\alpha$ ) and 5 (S) as lower and upper limits of TFR respectively, with the point of inflection at 4.7. The Gompertz curve is evident with the product change of TFR around 6 to 7 the fertility decline was more in pre-1997, which was stagnant with stagnation in product of changes around 5 in post-1997 and drastically dropped to 1.8 in 2007 Pathak K. B. and Murthy P. K. (1987) also found a similar result.

### **Differentials in Total Fertility Rate in Bihar**

Table 2 shows that differentials in TFR with selected background characteristics are examined using DLHS data and results are presented in table 4. Result shows that TFR has declined by most of the background characteristics like place of residence, Hindu, Schedule Tribe, Other Backward Classes, etc. in during DLHS-2 to DLHS-3. The Muslims show high TFR of 5.3 than the Hindu, who has TFR of 4.3, Mistry M (1995) also found a similar result. But the temporally the TFR remains static among them. TFR has declined higher (0.3) in the urban area than the rural area (0.1).

### **Differentials in Contraceptive Prevalence Rate in Bihar**

Table 3 reveals that contraceptive use has increased across the socio-economic groups over the periods but within the groups, differentials remained substantive over the periods. Rural-urban differences are apparent. For instance, use of contraceptive is low (31%) in rural areas compared to urban areas (50%) during 2005-06. Moreover, similar differences are observed over the period. Further, educational level is positively associated with contraceptive use, for example among the illiterate women contraceptive use is only 20 percent compared to 53 percent among highly educated during 2005-06. Differences among socio-cultural groups are also evident from the table, for example contraceptive use are highest among the Hindu (37%) than Muslim (19) in 2005-06. Similarly, it was higher among OBC caste compared to SC and ST. Wealth index also has a positive

impact on contraceptive use, as it has increased from 25 percent among low-wealth indices to 54 percent among high Wealth indices. The similar differentials among caste, religion and wealth index are observed across the periods.

Results of DLHS also reflect a similar picture in Bihar. For example contraceptive use in the state has increased from 25 percent in DLHS-1 to 33 percent in DLHS-3, again indicating that only one-third of women are using any family planning methods in the states in 2007-08. Contraceptive use among different socio-economic groups have shown increasing trends over the periods, but differentials in contraceptive use within the groups remained same over the periods and the results are similar as the findings of National Family Health Surveys.

Figure 3 shows the couple protection rate (CPR) in the state of Bihar in last 25 years. As it has observed, the CPR has increased very slowly in the states in last 25 years with very fluctuating trends. For instance, CPR has increased from 12 to 26 between 1980 and 1990, but again it has started continuous decline and between 1990 to 2000, CPR has declined from 26 to 21; again it has continuously decreased up to 16 percent in 2005.

### **Correlates of Total Fertility Rate in Bihar**

Table 4 shows the association of Total Fertility Rate (TFR) with backgrounds characteristics by using correlation analysis. Caste (SC/ST), religion (Hindu, Muslims), urbanization, educational status, work participation and contraceptive prevalence rate have considered as different characteristics. The result has given in terms of correlation matrices in table 10. Result indicates that TFR has associated with all selected variables; however correlation is not evenly significant across the variables. It has observed that TFR has positively correlated with Muslim religion and work participation, but it is only significant for Muslims religion. On the other hand TFR is negatively correlated with, Hindu religion, urbanization and educational status (Nakkeeran N; 2003). Interestingly, it is negatively correlated with contraceptive prevalence rate but the relationship is not significant.

### **Summary and Conclusion**

It has observed that pace of fertility decline is higher in India than Bihar during 1981-2007 indicating that Country will achieve the replacement level of fertility earlier than Bihar. The decadal decline in fertility in country and Bihar indicate the same picture. Percentage decadal decline in fertility is much higher in the country than Bihar in total as well as in the rural area. Interestingly in the urban area similar changes are observed in the country and the state. The Gompertz curve indicates that with the product change of TFR around 6 to 7 the fertility decline was more in pre-1997, which was stagnant with stagnation in product of change around 5 in post-1997 and drastically dropped to 1.8 in 2007.

Trends and differentials in fertility examined using DLHS data shows that it has declined maximum in the urban area, Hindu, Schedule Tribe and Other Backward Casts and among high wealth indices during DLHS-2 to DLHS-3. In the case of religion, TFR is highest among Muslims (5.3) followed by Hindu (4.3), and patterns are stagnant over the

periods. In the case of wealth indices TFR is 5.0 among those who belong to low-wealth indices. Trends in contraceptive use among currently married women by different socio-economic groups in the state of Bihar indicate that the contraceptive use has increased from 23 percent from 1992-93 to 34 percent in 2005-06. It has been seen that contraceptive use has increased across the socio-economic groups over the periods with substantive differentials within the groups. Contraceptive use is higher in the urban area than rural. It is higher in Hindu (37%) than Muslim (19%), illiterate (20%) than highly educated (53%) during 2005-06. The similar differentials among place of residence, caste, religion and wealth index have been found across the periods. The similar results have followed from DLHS data. The couple protection rate (CPR) has increased from 12 to 26 between 1980 and 1990, but again it has started continuous decline during 1990 to 2000 (26 to 21 respectively); again it has continuously decreased up to 16 percent in 2005. Result of correlation metrics indicates that the fertility in Bihar has correlated with all selected variables such as caste (SC/ST), religion (Hindu, Muslims), urbanization, educational status, work participation and contraceptive prevalence rate; however correlation is not evenly significant across the variables.

An important conclusion comes out of this paper is the fertility decline in Bihar is stagnant after 1997. The rate of decline is also decelerating since 1997. However, it raises doubts about the success of target free approach adapted into family planning programme. Moreover low literacy, low urbanization preceding poverty are the other important factors, which may be the cause for stagnant TFR in Bihar. There is needed to look at all those programs associated with population stabilization effort in the state.

#### References:

Arriaga, E.E. (1983) Estimating fertility from data on children everborn by age of mother. International Research Document, No. 11, US Bureau of the Census, Washington DC.

Bhat, P. N. Mari (1994). Level and Trends in Indian Fertility: a reassessment'. *Economic and Political Weekly*, December 17-24: 3273-3280.

International Institute of Population Science and Macro International (2007), *District Level Household Survey (Reproductive and Child Health), 2002-04: India: Mumbai: IIPS.*

International Institute of Population Science and Macro International (2007), *National Family Health Survey (MCH and Family Planning), 1998-99: India: , Mumbai: IIPS.*

International Institute of Population Science and Macro International (2007), *National Family Health Survey (NFHS-2), 2005-06: India: Volume I, Mumbai: IIPS.*

International Institute of Population Science and Macro International (2007), *National Family Health Survey (NFHS-3), 2007-08: India: Mumbai: IIPS.*

Murthy M, Guio Anne Catherine and Dreze J. (1996). Mortality, Fertility and Gender Bias in India: A District-Level Analysis, *Population and Development Review*, Vol. 21, No. 4, pp. 745 – 782.

Mistry M (1995) Role of religion in fertility and family planning among Muslims in India. *Indian Journal of Secularism* , **3**(2):1-33.

Nakkeeran N (2003). Women's Work, Status and Fertility Land, Caste and Gender in a South Indian Village, *Economic and Political Weekly* September 13, 2003 pp. 3931-39

Pathak K. B. and Murthy P. K. (1987) Rural-urban fertility differentials in India. *Janasamkhyā*. Jun;5(1):41-59.

Ram F., Chander shekhar and Mohanty S.K. (2005). Human Development: Strengthening District Level Vital Statistics in India, by UNDP, International Institute for Population Sciences, Mumbai.

Ramesh, B.M., S. C. Gulati and Robert D. Retherford (1996). 'Contraceptive Use in India, 1992-93'. *National Family Health Survey Subject Reports No.2*. Mumbai: International Institute for Population Sciences.

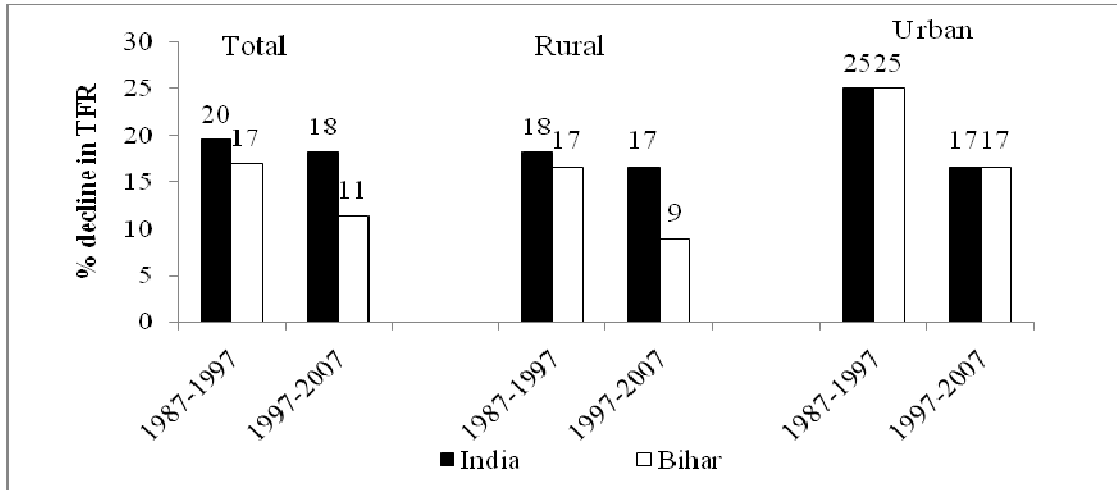
Registrar General of India. (2009), Compendium of India's Fertility and Mortality Indicators 1971-2009 Based on The Sample Registration System (SRS), India, New Delhi.

**Table: 1 Trends of Total Fertility Rate in India and Bihar, 1981 to 2007**

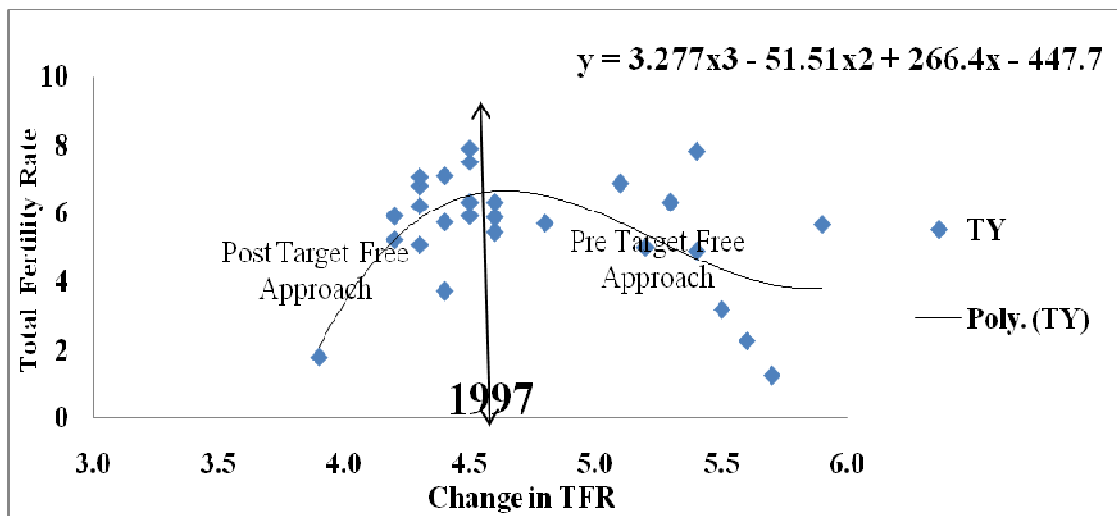
Year	India			Bihar		
	Total	Rural	Urban	Total	Rural	Urban
1981	5.2	5.4	4.1	5.7	5.8	4.8
1982	4.5	4.9	3.4	5.6	5.7	4.7
1983	4.5	4.9	3.4	5.5	5.6	4.5
1984	4.5	4.8	3.5	5.9	6.0	4.9
1985	4.3	4.6	3.3	5.4	5.6	4.4
1986	5.5	5.7	4.9	5.2	5.3	4.2
1987	4.1	4.4	3.2	5.3	5.4	4.2
1988	4.0	4.3	3.1	5.4	5.5	4.3
1989	5.3	5.4	4.8	5.1	5.2	3.9
1990	4.6	5.4	4.6	4.8	4.9	3.4
1991	3.6	3.9	2.7	4.4	4.5	3.5
1992	3.6	3.9	2.6	4.6	4.8	3.4
1993	3.5	3.8	2.8	4.6	4.7	3.7
1994	3.5	3.8	2.7	4.6	4.8	3.5
1995	3.5	3.9	2.6	4.5	4.7	3.3
1996	3.4	3.7	2.4	4.5	4.6	3.2
1997	3.3	3.6	2.4	4.4	4.5	3.1
1998	3.2	3.5	2.4	4.3	4.5	3.1
1999	3.2	3.5	2.3	4.5	4.7	3.4
2000	3.2	3.5	2.3	4.5	4.7	3.4
2001	3.1	3.4	2.3	4.4	4.6	3.1
2002	3.0	3.3	2.2	4.3	4.5	3.1
2003	3.0	3.2	2.2	4.2	4.4	3.1
2004	2.9	3.3	2.1	4.3	4.4	3.2
2005	2.9	3.2	2.1	4.3	4.4	3.2
2006	2.8	3.1	2.0	4.2	4.3	3.0
2007	2.7	3.0	2.0	3.9	4.1	2.9

Source: Sample Registration System (Registrar general of India)

**Figure: 1 Decadal percentage decline in Total Fertility Rate in Indi and Bihar according to place of residence, 1987-2007**



**Figure:2 Relationship between change in Total Fertility Rate to the level of TFR as indicated in Gompertz model (based on Sample Registration System), 1981-2007**



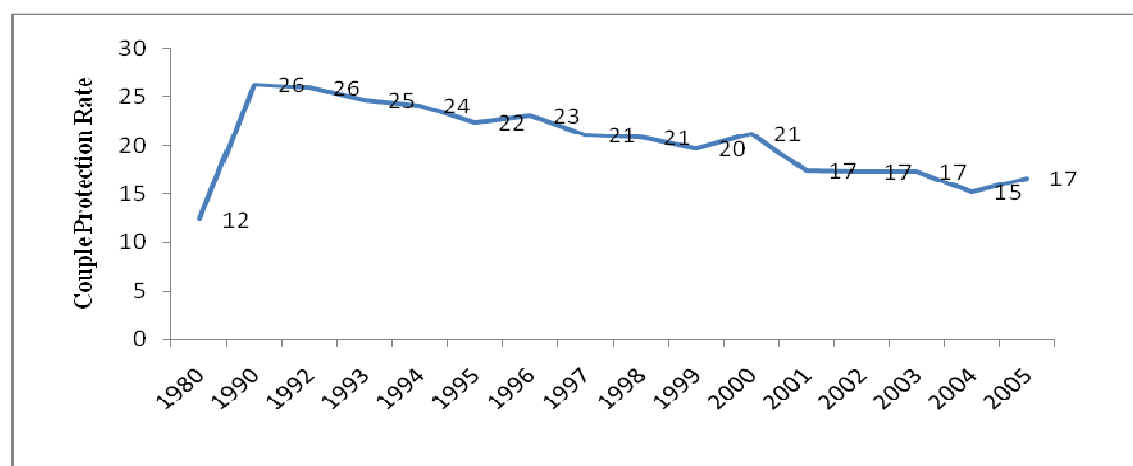


**Table: 2 Differentials in Total Fertility Rate in Bihar by selected socio-economic characteristics, based on District level Household Survey-2002-04 & 2007-08.**

Background characteristics	2002-04	2007-08
<b>Residence</b>		
Rural	4.6	4.5
Urban	4.0	3.7
<b>Education</b>		
Non literate	5.3	5.2
0-9 Year	3.5	3.7
10 above	2.7	2.5
<b>Religion</b>		
Hindu	4.3	4.3
Muslim	5.3	5.3
<b>Caste</b>		
SC	5.0	4.9
ST	4.9	4.4
OBC	4.5	4.4
Other	3.8	3.9
<b>Wealth index</b>		
Low	5.0	5.0
Medium	4.0	3.8
High	2.8	2.8

Total Fertility rate estimated by Ram & Chander Shekar method  $TFR = 12.2675 * EXP (-0.0221 * (PFSB))$

**Figure: 3 Trends in couple protection rate in Bihar, 1980-2005**



Source: Family welfare statistics, 2006

**Table: 3 Differentials in contraceptive prevalence rate in selected socio-economic characteristics in Bihar (estimates from DLHS 1998-2008 and NFHS 1992-06)**

Background characteristics	DLHSs			NFHSs		
	1998-99	2002-04	2007-08	1992-93	1998-99	2005-06
<b>Place of residence</b>						
Rural	20.7	25.9	31.9	19.8	22.9	31.4
Urban	37.7	44.7	47.5	42.5	38.9	50.6
<b>Educational status</b>						
Illiterate	18.5	24.2	29.1	17.6	20.5	29.0
0-9 Year	33.1	35.9	37.2	40.7	36.2	40.4
10Year&above	36.0	52.2	48.8	45.7	40.3	53.1
<b>Religion</b>						
Hindu	25.1	33.3	36.1	26.0	27.3	36.9
Muslim	7.9	15.8	14.8	7.5	9.1	19.0
<b>Caste</b>						
SC	17.2	20.6	25.5	14.5	19.5	23.2
ST	14.2	23.1	24.1	16.4	14.1	NA
OBC	22.0	30.5	34.1	24.7	34.3	38.3
Other	30.7	42.0	40.3	NA	24.6	35.9
<b>Standard of living index</b>						
Low	NA	22.7	27.3	NA	16.5	24.9
Medium	NA	38.9	37.7	NA	29.1	38.1
High	NA	57.0	53.1	NA	48.8	54.2
<b>Total</b>	<b>25.0</b>	<b>31.0</b>	<b>33.0</b>	<b>23.1</b>	<b>23.5</b>	<b>34.1</b>

NA- Not Available

**Table: 4 Correlation Matrix for Total Fertility Rate and socio-economic indicators 2001, Bihar**

	Total Fertility Rate	Percentage of Sc/ St Population	Percentage of Hindu Population	Percentage of Muslim Population	Urbanization Level	Literacy Rate	Women Literacy Rate	Women Work Participation Rate	Contraceptive Prevalence Rate
<b>Total Fertility Rate</b>	1								
<b>Percentage of Sc/ St Population</b>	-0.226	1							
<b>Percentage of Hindu Population</b>	-0.543**	0.415	1						
<b>Percentage of Muslim Population</b>	0.543**	-0.411	-0.997	1					
<b>Urbanization Level</b>	-0.313*	0.041	0.191	-0.193	1				
<b>Literacy Rate</b>	-0.401	0.337	0.674	-0.682	0.66	1			
<b>Women Literacy Rate</b>	-0.104	0.029	0.429	-0.436	0.393	0.607	1		
<b>Women Work Participation Rate</b>	0.047	0.339	-0.14	0.155	-0.195	-0.34	-0.244	1	
<b>Contraceptive Prevalence Rate (DLHS-2)</b>	-0.214	-0.094	0.197	-0.209	0.461	0.379	0.457	-0.076	1

\*\* P<0.01, \* P< 0.05.

Source: Census of India 2001.