Spatial Pattern of Poverty Reduction and Fertility Transition in India

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Abstract

Using data from the National Family and Health Survey, 1992-93 and 2005-06, this paper examines the linkages of poverty reduction and fertility change in Indian states. The official cutoff point of poverty is applied to the composite wealth index (based on economic proxies) in defining the poor. Fertility changes are measured with respect to changes in total fertility rate (TFR) and fertility preferences indicators. Results indicate that the level of fertility has declined both among the poor and non-poor in most of the states but in varying degrees. While the contribution of the poor to the decline in fertility was about 10 percent in the country, it was maximum in the states like Chhattisgarh (44 percent) followed by Madhya Pradesh (29 percent). The states of Bihar and Jharkhand showed little decline in the fertility level, though poverty had reduced substantially in these states. The decline in fertility level and preferences are largely reflected in contraceptive use and less in increase in age at marriage. The poor and non-poor differential in contraceptive use has narrowed down in many of the states. The study concludes that the association of decline in poverty and fertility is weak and the effect of space (region) is large in relation to the change in contraceptive use.

I. Introduction

Though poverty and fertility relationship is a priority research of developing countries, little attention has been made in Indian context. Moreover, Indian states are heterogeneous with respect to their socio-economic development and many states in India have two common features, decline in fertility and reduction in poverty levels since the 1990s. While researchers attribute the fertility transition in the 1970s and 1980s to women's education, improvement in household economic condition, reduction in child mortality and child marriage, rising cost of child bearing and rearing (Caldwell *et al* 1982, Dreze and Murthi 2001), fertility transition since the 1990s has been attributed largely to the diffusion of contraception (Bhat 2002; Arokiasamy 2009). The diffusionists explain how fertility transition takes place, but they do not explain why it happens. We hypothesize that the poor are increasingly adopting contraception and the poor-non poor differentials in fertility preferences and contraceptive use have narrowed down over the years. The economic hardship, not necessarily absolute but relative, induces poor and uneducated women to limit their family size and increase in contraceptive use.

Since the 1990s, poverty reduction and fertility transition are concomitant in Indian states. The official estimates of poverty in the country has declined from 36 percent in 1993-94 to 22 percent by 2004-05 (based on mixed recall period estimates) and the total fertility rate (TFR) has declined from 3.5 to 2.9 per woman during the same period (Planning Commission 2007, Office of the Registrar General and Census Commissioner 2010). By 2007, nine states in India had reached the replacement level of fertility and four states are close to the replacement level of fertility (IIPS and Macro International 2007). Similarly, the reduction of poverty was more than the national average in the states of Haryana, Punjab, Kerala, Andhra Pradesh, Tamil Nadu, Gujarat, Karnataka, West Bengal and Bihar and it was slow in the states of Orissa, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. While economists primarily attribute the reduction in poverty to economic growth, demographers have theorized the influence of economic development, increased child survival, culture and marriage in shaping the fertility changes. Recently, the role of diffusion, that is, change of attitude and behavior about methods of birth control spreading from one individual to other, among social groups, often independent of social and economic circumstances was advocated as an important mechanisim of fertility change (Van de Walle and Knodel 1980; Cleland, John and Chris Wilson 1987; Bongaarts and Watkins 1996; Casterline 2001). At the global level, the diffusion propositions, that is, limited utility of socio-economic theories in explaining fertility change, weaker relationship of fertility and development indicators and diffusion of new ideas leading to fertility change were advocated despite its many limitations (Bryant 2007).

There is a considerable body of literature on poverty and fertility linkages, which is mainly drawn from cross-sectional data that highlight the bi-directional and complex relationship of poverty and fertility at the macro and micro levels. These writings are grouped into three "categories", namely, i) macro level (household) effects of fertility change on poverty, ii) micro level effects of poverty on fertility, and iii) micro level effects of fertility on poverty (Amin et al 2007). While macro level studies generally conclude that increases in absolute poverty are due to higher levels of fertility (Eastwood and Lipton 1999), micro level studies establish that poor households tend to have larger families and that their children have lower schooling and poor health (Lipton 1994; Desai 1995). Micro level studies also deal with the reverse causality, that is, the effect of fertility on economic well being. Studies have also explored contextual factors such as family planning programmes, health services, social structure, institutional characteristics and the level of development in understanding the relationship between poverty and fertility (Diamond *et al* 1999). It is commonly argued that fertility and contraception are important factors for poverty reduction at the national and household levels (Merrick 2002).

Though a number of studies examine the inverse relationship of fertility and poverty and the adverse effect of high fertility on the poor health of mother and children, little attention has been paid to

increasing contraceptive use and lower fertility preferences among the poor. This probably emanates from the common notion that poor people tend to have more children due to perceived economic benefit and therefore, poverty is the key explanatory variable explaining high fertility. But, fertility decline in many developing countries like Thailand, Bangladesh, Nepal, parts of sub-Saharan Africa and Latin America, amid economic crises has added to the debate of population and poverty within the framework of rational thinking (National Research Council 1993; Kabeer 2001; Cosio- Zavala 2003; Gurmu and Mace 2008). These findings call for reconsidering the relationship between poverty and fertility decline in the framework of rational thinking that promotes behavioral change in response to the prevailing ecology and economic stress. In India, fertility transition in some states has added to this debate (Mohanty 2009). Accordingly, the main objective of this paper is to understand the linkages of poverty reduction and fertility change in India. Specifically, it aims to address a simple research question: What is the nature of relationship between poverty and fertility in states of India over time?

This research has bearing on four recent writings. First, Dreze and Murti (2001) found a negative but insignificant relationship between poverty and fertility in the districts of India. We believe that the relationship has been strong over the last two decades and that it can be best tested using household level data. Second, it has been found from a study of 25 Sub-Saharan Africa countries that there is a weak association between fertility changes and economic status (Schoumaker 2004). Third, the findings from Albania, Ethiopia, Indonesia and Vietnam (longitudinal study) highlight that poor households do not necessarily have a higher rate of fertility, but those with higher fertility (measured with respect to number of children), tend to have a higher rate of entering into poverty and a lower rate of exiting poverty (Aassve *et al* 2006). Fourth, only recently has space been incorporated to studies of fertility decline as an object of investigation rather than as neutral variable (Guilmoto and Rajan 2001; Weeks *et al* 2004; Schmertmann *et al* 2008).

II. Data and Methods

Data

Since 1973-74, the official estimates of poverty in India are derived by the Planning Commission, Government of India based on the consumption expenditure data collected by the National Sample Survey Organization (NSSO) in its quinquinneal rounds. The official definition of poverty deems a person poor if the per capita consumption expenditure of the household is below the poverty line. However, these surveys do not collect data on vital events or birth histories to understand the fertility differentials of the population. On the other hand, all the three rounds of National Family and Health Surveys (NFHS), along similar lines as other Demographic and Health Surveys (DHS), collected information on a wide range of topics: fertility, mortality, family planning, maternal and child health, nutrition, living condition of households (housing quality, household amenities and asset of the households), and other variables. The NFHSs are nationally representative surveys. It cover all the states of India, based on probability based sampling. The NFHS 1 interviewed 89777 women from 88562 households while the NFHS 3 interviewed 124385 women from 109041 households. The details of the sampling procedure, sample size and the findings are available in national and state reports (IIPS and Macro International 2007). These surveys do not collect data on direct economic measures such as income or consumption expenditure, but use a composite wealth index based on economic proxies (housing quality, household amenities and consumer durables) to understand the economic differential of the population. A number of studies have demonstrated that the wealth index is a good proxy of long term economic status (Filmer and Pritchett 2001; Rutstein and Johnson 2004). In this paper, we have used the first and third rounds of NFHS, conducted in 1992-93 and 2005-06 respectively so as to have a sufficient time interval to understand the change in demographic behavior. It may be mentioned that NFHS 1 provided the data for undivided Uttar Pradesh, Madhya Pradesh and Bihar, but we have provided separate estimates for the states of Uttaranchal, Chhattisgarh and Jharkhand (Uttaranchal, Chhattisgarh and Jharkhand were created from the states of Uttar Pradesh, Madhya Pradesh and Bihar respectively). We have used the household file for

estimating the wealth index and classifying the poor, and the women file to estimate the proximate determinants. The state weight is used for state level analyses and the national weight is used for national level analyses. STATA and SPSS were used for the analyses.
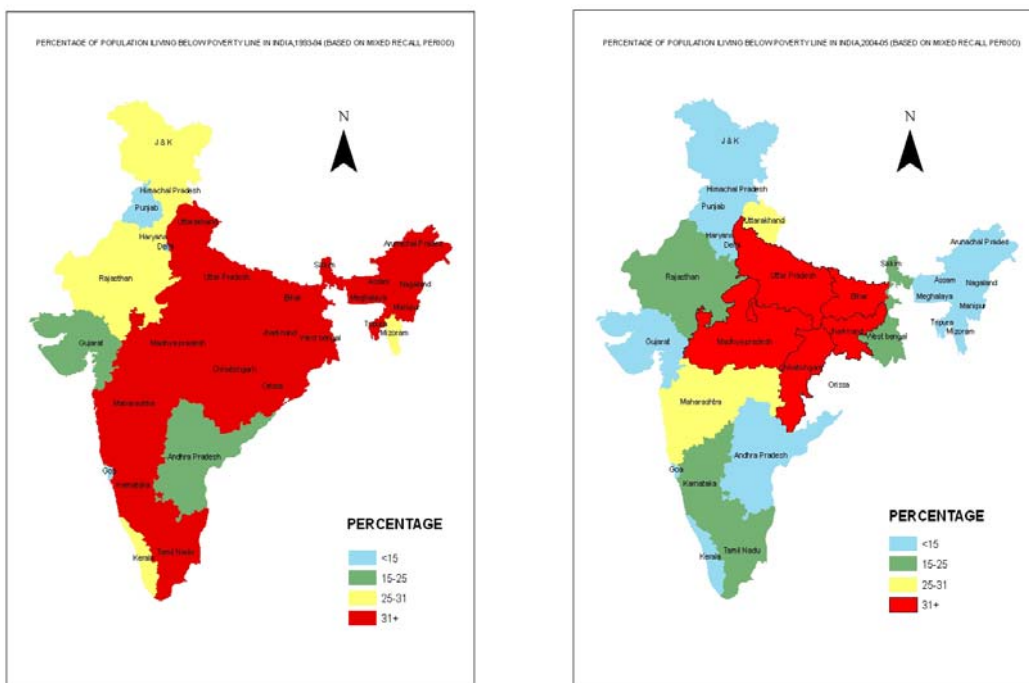
Methods

The methodology involved four steps:
i)   computation of composite wealth indices and identification of the poor and non-poor
ii)   estimation of TFR among the poor and non-poor
iii)   segregation of fertility change among the poor and non-poor by using the proportional decomposition method
iv)   regression decomposition (logistic) in the use of contraception over time

Wealth indices were computed from a set of variables on ownership of consumer durables, housing condition and size of land holding of the household and by using the principal component analyses (PCA). Our wealth index differs from the one provided in the data set. We have constructed a separate wealth index for rural and urban areas as the health estimates differ significantly when separate wealth indices are used for rural and urban areas instead of a combined one (Mohanty 2009). From the composite wealth index (ascending), a percentile distribution is obtained for rural and urban areas separately. We have defined the poor based on the cutoff point of consumption poverty for the year 1993-94 which is close to NFHS 1 (1992-93), and poverty estimates of 2004-2005 which is close to NFHS 3 (2005-06). For example, 22 percent each of the rural and urban population (based on mixed recall period consumption) in the country were below the poverty line in 2004-2005 (Planning Commission 2007) and so the cutoff point of the poor for the year 2005-06 has been kept at 22 percent each for rural and urban areas. Similarly, in 1992-93, 37 percent of the rural population and 32 percent of the urban population in the country were classified as poor. Here, the implicit assumption is that the relative ranking of consumption poor and wealth poor in the country is similar. However, we have used the words 'consumption poor' while referring to the official estimates of poverty, and 'asset poor' for those derived from economic proxies. The TFR is estimated from the births during the three years preceding the survey for the poor and

non-poor separately. The weighted average of estimated TFR of the poor and non-poor is close to the estimated TFR of the combined TFR of the state.

The proportional decomposition method developed by Kitagawa (1955) and modified by Bhat (2002) is used for understanding the changes in fertility level among the poor and non-poor (Kitagawa 1955). We have decomposed the overall change in TFR between two points of time: change in fertility among women belonging to poor households, change in fertility among women belonging to non-poor households, and change in fertility due to change in distribution of women by poverty. The decomposition techniques are useful to understand the extent to which the change in rates (TFR) are attributable to different factors influencing the population. For simplicity, we have introduced only poverty (poor and non-poor) in the simple decomposition model and controlled other confounding factors in multivariate framework.

Mathematically, the decomposition formula is written

$$\sum_{i=1}^{k} Fb,iCb,i - \sum_{i=1}^{k} Fa,iCa,i$$
$$= \frac{(Fb,1 - Fa,1)(Cb,1 + Ca,1)}{2} + \frac{\sum_{i=2}^{k}(Fb,i - Fa,i)(Cb,i + Ca,i)}{2}$$
$$+ \sum_{i=1}^{k}(Cb,i - Ca,i)(Fb,i + Fa,i)/2$$

where $C_{a,i}$ and $C_{b,i}$ refer to the proportion of women of poverty class i (i=poor and non-poor) at time a (1992-93) and time b (2005-06) respectively. F_a refers to the TFR in 1992-93 and F_b refers to the TFR in 2005-06.

The regression based decomposition (logistic) is used to understand the contribution of covariates to contraceptive use. The dependent variable is current use of contraception and the covariates are age, education, sex composition of living children, child loss, caste, religion, place of residence, region and poverty.

Fig 1: Trends in Percentage of Population living below the Poverty Line in India based on Mixed Recall Period, 1993-2005

66
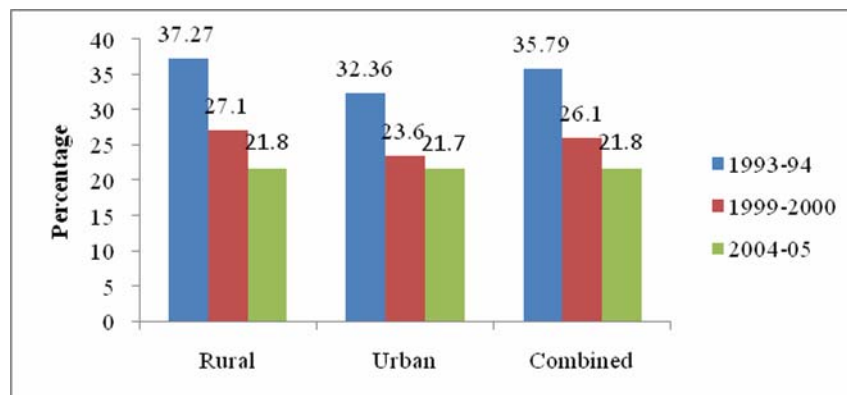
III. Results

The results are presented in three sections. Section I presents the changes in fertility levels and preferences among the poor and non-poor, Section II presents the change in proximate determinants among the poor and non-poor. Section III presents the decomposition of contraceptive increase by covariates.

Section I: Changes in Fertility Levels and Preferences

The percentage of population living below the poverty line, the percentage of asset poor and the estimated total fertility rate (TFR) for the states of India is given in Table 1.The estimates of consumption poverty are taken from the Planning Commission, Government of India. The poverty estimates of 2004-05 are provided based on Mixed Recall Period (MRP) and Uniform Recall Period (URP) while that of 1993-94 is provided based on MRP only. The MRP refers to the reference period of 30 days for food and related items and 365 days for selected items. The URP refers to the uniform reference period of 30 days.

Table 1: Percentage of Consumption Poor, Asset Poor and Total Fertility Rate in the states of India, 1992-2006

Sr No	States / India	Percentage of Consumption Poor (MRP) during		Percentage of Asset Poor during		Total Fertility Rate		Percentage Change in		
	States / India	1993-94	2004-05	1992-93	2005-06	1992-93	2005-06	Consumption Poor	Asset Poor	Total Fertility Rate
1	Andhra Pradesh	22.2	11.1	34.6	19.2	2.6	1.8	50	45	31
2	Assam	40.9	15	41.8	17.7	3.5	2.4	63	58	31
3	Bihar	55	32.5	54.9	45.1	4.1	4.0	41	18	2
4	Chhattisgarh	42.5	32	41.7	30.3	3.3	2.6	25	27	22
5	Gujarat	24.2	12.5	28.0	10.0	3.0	2.5	48	64	17
6	Haryana	25.1	9.9	7.7	6.0	4.0	2.7	61	22	33
	India	**36**	**21.8**	**36**	**21.8**	**3.4**	**2.7**	**39**	**39**	**21**
7	Jharkhand	40.9	34.8	56.0	43.8	3.4	3.3	15	22	4
8	Karnataka	33.2	17.4	28.5	17.0	2.9	2.1	48	40	28
9	Kerala	25.4	11.4	16.2	3.3	2.0	1.9	55	80	4
10	Madhya Pradesh	42.5	32.4	40.2	35.0	4.1	3.2	24	13	22
11	Maharashtra	36.9	25.2	31.2	16.3	2.9	2.1	32	48	28
12	Orissa	48.6	39.9	45.3	38.0	2.9	2.4	18	16	17
13	Punjab	11.8	5.2	6.3	5.0	2.9	2.0	56	21	32
14	Rajasthan	27.4	17.5	31.4	25.2	3.6	3.2	36	20	12
15	Tamil Nadu	35	17.8	35.1	24.0	2.5	1.8	49	32	27
16	Uttarakhand	40.9	31.8	18.7	8.7	3.4	2.5	22	53	26
17	Uttar Pradesh	40.9	25.5	39.7	26.0	4.9	3.3	38	35	33
18	West Bengal	35.7	20.6	44.2	23.0	2.9	2.3	42	48	21

Note: 1. Consumption poverty are based on estimates of Mixed Recall Period, Planning Commission, Government of India.
2. Consumption poverty of 1993-94 is taken from Economic Survey (1999) and 2004-05 is accessed from planningcommission.nic.in/news/prmar07.pdf
3. Consumption poverty of Jharkhand, Chhattisgarh and Uttarakhand for the period of 1993-94 are kept same as that of Bihar, Madhya Pradesh and Uttar Pradesh respectively 4. TFR is taken from NFHS national report

We have used the mixed recall period (MRP) estimates of poverty as it is comparable over the period. Since no estimates of consumption poverty were available for 1993-94 for the states of Chhattisgarh, Jharkhand and Uttarakhand, the same of the undivided Madhya Pradesh, Bihar and Uttar Pradesh

respectively are used. The asset poor at the national level are the same as the cut-off point of consumption poverty of the respective period.

The TFRs are derived from the births in the preceding three years. Reduction in consumption poverty was maximum in Assam followed by Haryana, Punjab and Kerala. It was below the national average in the economically weaker states of Jharkhand and Bihar. On the other hand, the relative rankings of consumption poverty and asset poor among the states are similar. However, the reduction in asset poor was maximum in the state of Kerala followed by Gujarat, Assam and Uttarakhand but slower in the states of Madhya Pradesh, Orissa and Bihar. The reduction in TFR was 21 percent for the country with maximum decline in Haryana and Uttar Pradesh (33 percent each) followed by Punjab, Andhra Pradesh and Assam. The reduction in TFR was just 2 percent in Bihar though consumption poverty had reduced substantially. Reduction in consumption poverty and asset poor is faster than reduction of fertility in all the states, but in varying degrees. The correlation coefficient of change in TFR and change in consumption poverty was 0.34, and the correlation coefficient of change in asset poor and change in TFR was 0.005. These findings suggest a weak association between change in fertility and poverty in the states of India. We further provided the estimated TFR among the poor and non-poor and the contribution to change in TFR among the poor and non-poor for 17 major states of India (Table 2, p.69).

We have not attempted the exercise for the smaller states due to the small sample size. During 1992-2006, the estimated TFR among the poor had declined from 3.9 to 3.6, while it had declined from 3.2 to 2.5 among the non-poor. Though the fertility level among the poor is higher than that among the non-poor cutting across the states, most of the states have experienced decline in fertility levels among the poor during the last fourteen years. The TFR among the poor is close to replacement level in the states of Kerala, Tamil Nadu, Andhra Pradesh and Maharashtra. On the other-hand, TFR among the non-poor is as high as 3.8 in Bihar followed by Jharkhand and Rajasthan. We further decomposed the change in TFR to three factors; change in fertility level among the poor, change in fertility level among the non-poor and change in fertility due to reduction in poverty level. The maximum decline in TFR among the non-poor was observed in Uttar Pradesh (1.9) followed by Punjab and the minimum decline in TFR was observed in Kerala. The state of Kerala had attained below replacement level of fertility in 1992-93, therefore, such a small change in TFR was in the expected direction. Among the high fertility states, the reduction in fertility among the non-poor was minimum in the states of Bihar and Jharkhand (less than 0.2).

The pattern of decline in fertility level varies largely by poverty status. The TFR among the poor women had declined in 11 of the 17 states and increased in six of the states, namely, Bihar, Jharkhand, Gujarat, Rajasthan, Punjab and Kerala. It is interesting to note that the extent of decline in TFR among the poor and non-poor are of similar magnitude in the states of Andhra Pradesh, Karnataka and Maharashtra. On the other hand, the increase in TFR by 0.5 per woman was noticed in Bihar, Jharkhand and Rajasthan. The decomposition of change in TFR over the last fourteen years revealed that the contribution to fertility change among the poor was maximum in the economically weak states of Chhattisgarh (44 percent) and Madhya Pradesh (29 percent) and revealing in the southern states of Andhra Pradesh and Karnataka (about 20 percent). This suggests that the poor are contributing increasingly to fertility transition and that poverty is not necessarily a barrier in fertility reduction. Hence, poverty reduction and fertility transition have not gone hand in hand in many parts of India. We have not computed the overall decline in TFR in the states of Bihar, Jharkhand and Kerala due to small changes in the overall TFR in these states (from 4.1 to 4.0 in Bihar and 3.4 to 3.3 in Jharkhand and 2.0 to 1.9 in Kerala during 1992-93 and 2005-06).

Table 2: Trends in TFR among the Poor and non-poor and Decomposition of Change in TFR by Poverty Level in the states of India, 1992-2006

Sr No	States / India	Total Fertility Rate among the Poor		Total Fertility Rate among the non-poor		Percentage contribution to change in TFR		
						Among Poor	Among Non-poor	Due to decline in poverty
		1992-93	2005-06	1992-93	2005-06			
1	Gujarat	3.6	4.0	2.8	2.3	-18	73	46
2	Rajasthan	3.9	4.4	3.5	2.9	-34	104	30
3	West Bengal	3.4	3.0	2.6	2.1	22	49	29
4	Assam	4.1	3.5	3.2	2.2	16	59	25
5	Uttaranchal	4.1	3.5	3.3	2.5	9	73	18
	India	**3.9**	**3.6**	**3.2**	**2.5**	**10**	**72**	**18**
6	Chhattisgarh	3.9	3.0	3.0	2.5	44	43	13
7	Uttar Pradesh	5.4	4.9	4.6	2.7	10	78	12
8	Maharashtra	3.2	2.5	2.7	2.0	21	70	9
9	Andhra Pradesh	2.9	2.2	2.5	1.7	25	67	8
10	Orissa	3.1	2.9	2.8	2.1	13	79	8
11	Tamil Nadu	2.6	2.2	2.4	1.7	19	74	7
12	Karnataka	3.1	2.4	2.8	2.0	20	75	5
13	Punjab	3.5	3.7	2.9	1.9	-1	96	5
14	Madhya Pradesh	4.7	4.0	3.7	2.8	29	68	3
15	Haryana	4.9	4.3	3.9	2.6	3	96	1
16	Bihar	4.4	4.9	3.8	3.7	NC	NC	NC
17	Jharkhand	3.7	4.2	3.1	2.9	NC	NC	NC
18	Kerala	2.1	2.2	2.0	1.9	NC	NC	NC

NC: Not computed due to small change in TFR in these states

The decline in TFR due to decline in poverty varies from 3 percent in Madhya Pradesh to 29 percent in West Bengal, 30 percent in Rajasthan and a maximum of 46 percent in Gujarat. The decline in poverty was also large in the state of Gujarat. From this discussion, it may be said that the reduction of poverty and the reduction of fertility were not uniform across the states of India and that the fertility level among the poor had declined significantly.

Fertility Preferences among the Poor and the Non-poor

The ideal family size (IFS) and the desire for an additional child (DAC) are two of the fertility preferences indicators collected in Demographic and Health Surveys (DHS) and largely used in explaining the fertility preferences of the population (Roy *et al* 2008). The decline in mean IFS is found for both the poor and the non-poor in all the states (Table 3, p.70). In many of the states, the decline in mean IFS was higher or of equal magnitude among the poor compared to the non-poor. The differentials in the mean IFS among the poor and the non-poor had narrowed down over the years.

TFR AMONG POOR AND NON-POOR IN THE STATES OF INDIA, 2005-06.

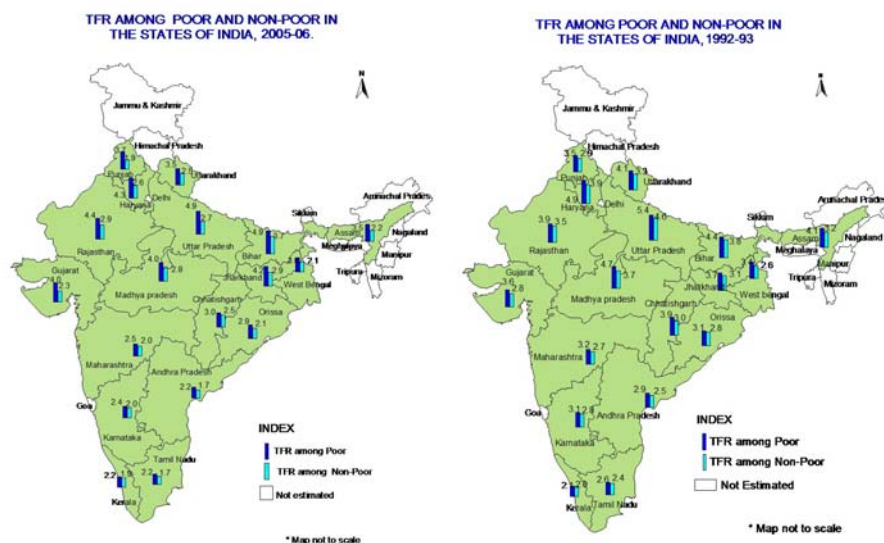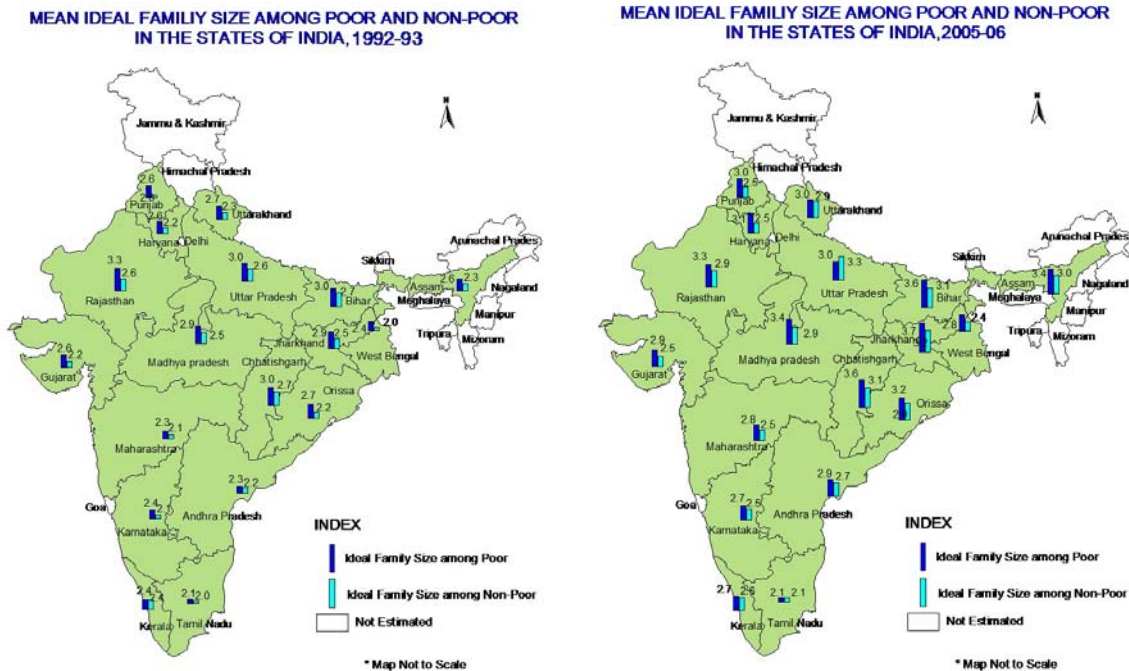TFR AMONG POOR AND NON-POOR IN THE STATES OF INDIA, 1992-93

Table 3: Percentage of Currently Married Women with two surviving children (including current pregnancy) not desiring an additional Child and Mean ideal Family Size 1992-2006 by States and Poverty

Sr No	States / India	Ideal Family Size (IFS)				Desire for additional child among non-sterilised fecund women with 2 surviving (including current pregnancy) children			
		Poor		Non-poor		Poor			Non-poor
	States / India	1992-93	2005-06	1992-93	2005-06	1992-93	2005-06	1992-93	2005-06
1	Andhra Pradesh	2.9	2.3	2.7	2.2	42.0	32.4	40.1	30.1
2	Assam	3.4	2.6	3.0	2.3	27.5	11.9	20.2	9.7
3	Bihar	3.6	3.0	3.1	2.7	41.5	25.9	38.8	20.2
4	Chhattisgarh	3.6	3.0	3.1	2.7	62.0	30.7	44.8	24.9
5	Gujarat	2.9	2.6	2.5	2.2	48.4	35.3	26.4	16.8
6	Haryana	3.1	2.6	2.5	2.2	45.0	26.8	24.0	11.2
7	Jharkhand	3.7	2.9	3.2	2.5	41.0	25.6	34.6	20.3
8	Karnataka	2.7	2.4	2.5	2.1	39.1	26.6	31.7	20.7
9	Kerala	2.7	2.4	2.6	2.4	24.6	-	28.5	26.4
10	Madhya Pradesh	3.4	2.9	2.9	2.5	43.3	25.7	36.3	17.7
11	Maharashtra	2.8	2.3	2.5	2.1	47.7	31.5	28.4	17.8
12	Orissa	3.2	2.7	2.9	2.2	35.2	22.6	27.8	12.4
13	Punjab	3.0	2.6	2.5	2.0	29.7	15.8	16.7	6.9
14	Rajasthan	3.3	3.3	2.9	2.6	34.7	28.4	34.2	20.5
15	Tamil Nadu	2.1	2.1	2.1	2.0	21.8	8.4	17.7	7.8
16	Uttarakhand	3.0	2.7	2.9	2.3	28.9	13	25.4	10.1
17	Uttar Pradesh	3.0	3.0	3.3	2.6	37.9	20.2	33.9	16.0
18	West Bengal	2.8	2.4	2.4	2.0	26.7	17.2	18.9	10.1
	India	3.2	2.7	2.7	2.3	37.6	23.1	27.5	16.1

\- Not computed due to low cell size

For example, in Chhattisgarh the mean IFS among the poor had declined from 3.6 to 3.0, while it declined from 3.1 to 2.7 among the non-poor. Similarly, we have computed the desire for an additional child among women who had two living children (including current pregnancy) or more. The response to the question on 'desire for additional child' includes a small proportion of the non-numeric responses such as "Up to God" and "Not Decided". However, we have tabulated the percentage of women with two or more surviving children (including current pregnancy), who stated that they do not want any more children by poverty level.

MEAN IDEAL FAMILIY SIZE AMONG POOR AND NON-POOR IN THE STATES OF INDIA, 1992-93

MEAN IDEAL FAMILIY SIZE AMONG POOR AND NON-POOR IN THE STATES OF INDIA, 2005-06

Section II: Proximate Determinants of Fertility

The four proximate determinants that largely explain the fertility change are age at marriage, contraception, induced abortion and post partum amenorrhea (Bongaarts 1982). We have attempted to understand the change in three proximate determinants of fertility, namely mean age at marriage (females), contraceptive use and the post partum amenorrhea (PPA) among the poor and non-poor in the states of India. As the data on the question of induced abortion was not collected uniformly during the survey, we have not used it in the analyses. The increased age at first marriage reduces the child bearing period and hence directly affects fertility. To understand the role of marriage over time, three marriage cohorts are computed, namely, 1964-89, 1990-99 and 2000-06. The mean age at first marriage for the country has increased by 1.4 years for the poor and 2 years for the non-poor during the last 14 years (Table 4, p.72).

The increase in age at marriage among the poor and non-poor has been noticed in all the states. The variations in mean age at marriage among the poor and non-poor across the states are relatively small. Among the poor, the mean age at marriage was maximum in the state of Tamil Nadu (20 years) followed by Kerala (19.7 years) and minimum in the state of Bihar (16.1 years). The mean age at marriage among the non-poor is higher than that of the poor in all the states of India. However, the lower age at marriage continued to be a concern in many of the states even where the fertility had reached below the replacement level (Andhra Pradesh, Punjab and Maharashtra).

71

Table 4: Mean age at First Marriage and the Percentage of Girls marrying below legal age by Poverty and Marriage Cohort in India and the states

State /India	Mean Age at first marriage among Poor			Mean Age at first marriage among Non-poor			Percentage marrying below age 18 among Poor			Percentage marrying below age 18 among Non-poor		
	1964-89	1989-99	2000-06	1964-89	1989-99	2000-06	1964-89	1989-99	2000-06	1964-89	1989-99	2000-06
Andhra Pradesh	15.0	15.9	16.5	15.1	16.4	18.0	79.6	73.0	67.9	81.0	70.0	47.8
Assam	15.9	17.0	18.3	17.0	18.7	19.5	69.2	60.3	46.4	63.1	44.4	37.3
Bihar	15.2	15.4	16.1	15.5	16.2	16.9	84.7	84.9	73.0	82.7	74.0	63.3
Chhattisgarh	15.5	16.2	16.7	15.9	17.2	18.0	84.4	77.6	67.4	79.7	58.4	49.1
Gujarat	15.5	16.2	18.2	17.3	18.2	19.0	85.9	74.1	60.0	55.7	44.4	30.5
Haryana	16.1	15.9	16.6	16.7	17.5	18.8	72.5	74.5	76.9	64.1	54.6	33.9
Karnataka	15.7	16.1	17.6	16.6	18.0	19.5	73.7	71.1	55.9	65.8	50.8	35.5
Kerala	18.2	20.6	19.7	18.6	21.1	21.8	62.5	30.0	33.3	40.2	18.8	12.6
Jharkhand	15.7	15.9	16.2	15.9	16.8	17.5	77.5	74.7	76.1	76.2	66.6	60.4
Madhya Pradesh	15.5	15.8	17.3	15.7	16.9	18.3	79.8	78.0	57.1	77.1	62.9	43.9
Maharashtra	15.4	16.4	17.2	16.5	18.1	19.0	80.4	69.2	59.3	67.1	48.8	36.7
Orissa	16.1	16.8	17.2	16.7	18.2	19.5	75.4	65.2	61.5	66.2	47.2	33.9
Punjab	16.4	17.1	17.7	17.9	19.1	20.3	61.8	61.9	50.0	47.8	33.1	14.0
Rajasthan	15.6	15.9	17.0	15.8	16.4	17.8	77.6	73.1	68.0	77.7	72.2	52.3
Tamil Nadu	17.0	18.3	20.1	17.5	19.5	20.4	62.0	44.2	24.6	52.3	32.6	19.1
Uttaranchal	14.8	16.6	17.2	16.6	18.4	20.0	82.1	65.5	54.5	65.2	42.2	20.6
West Bengal	15.4	16.0	16.5	16.2	17.5	18.3	82.8	77.2	66.7	71.7	58.6	50.0
Uttar Pradesh	15.5	16.0	16.5	16.1	17.0	17.9	79.4	76.2	67.4	73.2	60.8	51.9
India	15.6	16.2	17.0	16.4	17.7	18.4	78.4	72.6	62.8	68.5	53.8	41.5

The pattern is similar but differences are large with respect to legal age at marriage, that is, marriage before age 18. Among the poor, the proportion of girls marrying below age 18 had declined from 78 percent for those married before 1990 to 63 percent for those married during 2000-06, but the differences among the poor and non-poor are large. However, all the states have experienced a decline in the proportion of girls marrying below age 18, irrespective of their poverty levels. Among the poor, while one-fourth of girls of the marriage cohort 2000-06 married below age 18, it was two-thirds in the states of Andhra Pradesh, Chhattisgarh, Rajasthan and West Bengal. Even among the non-poor, about half of the recent marriages (marriage cohort 2005-06) in the states of Jharkhand, Rajasthan, Tamil Nadu, West Bengal and Uttar Pradesh were below legal age at marriage. Though fertility among the poor and non-poor has reduced substantially over the years, there has not been much change in the marriage practices in these states. We have also computed the contraceptive use, unmet need for contraception and the mean duration of post partum amenorrhea (PPA) among the poor and non-poor for the different states in India (Table 5, p.73).

Among the poor, the use of any method of contraception among ever-married women has increased by 49 percent (from 30 percent to 44 percent) compared to 30 percent (43 percent to 55 percent) among the non-poor. All the states had experienced substantial increase in contraceptive use among the poor and non-poor. Among the poor, the highest use of contraception was observed in the state of Kerala (72 percent) followed by West Bengal (62 percent), Andhra Pradesh and Maharashtra. Also, the gap in contraceptive use, measured as the ratio of contraceptive use among the poor and non-poor had declined in most of the states. The closer the ratio to one, the smaller is the difference in contraceptive use between poor and non-poor women.

Table 5: Contraceptive use among Ever Married Women, Unmet need and Mean duration of post partum infecundability among Married Women in India, 1992-2006

States / India	Contraceptive use				Unmet need for Contraception				Mean Duration of PPA in months			
	Poor		Non-poor		Poor		Non-poor		Poor		Non-poor	
	1992-93	2005-06	1992-93	2005-06	1992-93	2005-06	1992-93	2005-06	1992-93	2005-06	1992-93	2005-06
Andhra Pradesh	38.1	61.3	46.3	67.8	12.1	6.5	9.9	4.3	8.3	7.6	7.5	6.5
Assam	29.0	39.1	45.8	56.1	21.0	13.5	18.4	10.1	8.8	8.6	7.9	7.4
Bihar	14.5	23.6	28.6	36.7	25.0	27.1	21.4	21.0	7.9	8.3	6.4	6.9
Chhattisgarh	27.8	46.1	39.6	52.7	27.2	10.8	19.2	9.9	9.0	8.4	7.2	7.6
Gujarat	38.5	58.8	49.6	65.6	11.2	10.8	12.6	7.9	7.2	7.7	6.1	6.0
Haryana	33.5	47.6	49.1	63.1	17.6	12.9	14.3	8.0	6.4	5.0	5.7	5.0
Karnataka	37.5	56.5	48.2	63.8	16.8	9.5	13.3	9.5	8.2	7.9	7.0	6.7
Kerala	55.3	72.0	58.6	67.4	8.0	9.3	11.8	8.8	5.9	6.3	4.9	5.0
Jharkhand	19.8	24.0	32.7	41.8	20.0	28.1	12.2	20.1	8.4	9.1	7.7	7.5
Madhya Pradesh	28.9	47.7	38.2	58.3	20.7	13.2	19.0	10.5	8.8	7.8	6.8	6.7
Maharashtra	42.7	60.4	52.9	66.3	14.4	11.7	12.4	9.0	8.5	7.8	7.1	6.4
Orissa	32.7	42.6	35.5	53.4	19.9	16.9	20.5	14.0	7.8	8.0	6.8	6.4
Punjab	45.9	45.4	57.1	62.6	14.5	13.0	11.7	7.1	4.2	6.6	4.1	4.2
Rajasthan	21.5	32.8	34.6	49.4	20.9	19.0	19.5	13.4	7.3	6.5	6.3	5.8
Tamil Nadu	42.7	55.7	47.4	61.1	15.1	10.8	12.0	8.0	7.7	6.2	5.8	5.1
Uttaranchal	29.3	41.5	40.8	59.2	20.9	12.6	20.6	10.9	7.1	8.1	6.5	6.7
West Bengal	46.1	62.0	58.5	70.2	18.4	11.1	12.9	7.3	8.3	6.8	6.6	5.8
Uttar Pradesh	12.3	33.3	21.1	45.1	29.1	26.3	27.2	19.6	7.6	7.9	6.5	6.0
India	29.6	44.2	42.5	55.1	20.3	17.4	16.6	11.7	8.0	7.7	6.5	6.5

In 2005-06, the ratio was close to one in the states of Andhra Pradesh, Kerala, Chhattisgarh, Karnataka, and Maharashtra, Tamil Nadu and West Bengal indicating small poor and non-poor differentials in contraceptive use. In other states too, the ratio has declined indicating that the poor-non poor differentials in contraceptive use are narrowing. Further, unmet need, a situation where a couple do not want any more children or want to postpone childbearing but not by using contraception, is higher among the poor than among the non-poor. If the level of unmet need for contraception of the poor is met with, the differentials in contraceptive use among the poor and non-poor will be further narrowed. Contraceptive use increased substantially in those states where unmet need has reduced. Similarly, the mean duration of post partum period has been computed for the poor and non-poor for 1992-93 and 2005-06. The mean duration of PPA is higher among the poor than among the non-poor cutting across the states and time period. Among the poor, the mean duration of PPA varies from 5 months in Haryana to 9.1 months in Jharkhand. Among the three proximate determinants of fertility, the increase in contraception is the fastest.

Section III: Decomposition of increased Contraceptive Use

To understand the factors affecting the increase in contraception, we have used the regression based decomposition analyses. Two logistic regression models for the period 1992-93 and 2005-06 are estimated and the dependent variable is the use of any method in the respective periods. We have included the age of women, education of women, education of husband, sex composition of living children, child loss, caste, religion, poverty, place of residence, region along with the poverty condition of the household, as covariates. Results of logistic regression analyses showed that the coefficients and the odd ratio are in the expected direction. For example, the odds of using contraception among women belonging to the 25-34 age group is 2.7 times higher than that among illiterate women (Appendix 1). All the coefficients are stable and statistically significant (1% level) over time. To understand the contribution of each covariate to the change in contraceptive use, regression decomposition analyses have been carried out. The three components, namely, the propensity, composition and interaction of the covariates on change in contraceptive use are shown in Table 6. The propensity refers to the change in the regression coefficient, that is, the likelihood of using contraception by different sub-groups along with the intercept component.

The compositional change refers to the change in composition, from illiterate to literate and so on. The interaction effect is the interplay of composition and propensity (Liao 1989, Njogu 1991, Martin and Njogu 1994).

Table 6: Result of Decomposition (logistic regression) of change in Contraception use in India, 1992-93 and 2005-06

Covariates	Percentage change in Contraceptive Use in India due to		
	Propensity	Composition	Interaction
Age of women	2.2	5.5	0.3
Education of women	-6.9	7.4	-3.1
Education of Husband	7.4	0.5	1.9
Sex Composition of living Children	-5.5	5.4	0.4
Child Loss	-1.2	4.6	1.2
Caste	-10.9	0.7	0.9
Religion	-0.3	-0.8	0.1
Poverty	3.5	3.8	0.7
Place of Residence	-6.7	1.3	0.7
Region	19.7	0.1	-0.4
Intercept	68.8	-	-
Total	70.0	27.2	2.7

Results show that about 70 percent change in contraceptive use has been explained by propensity, while 27 percent change is explained by composition. The interaction effect contributes 3 percent of the change in contraceptive use. The propensity is positive for age, education of husband, poverty and region. The effect of region is about 19 percent of the total change in contraceptive use, mostly in the Southern and Western parts of India compared to North India. Negative propensity was found in women's education, sex composition of living children, caste, place of residence and child loss. It indicates that the direction of the rate of change shows a declining trend among different sub-groups with respect to the reference category. This indicates that the use of contraception was higher among illiterate women and rural residents in 2005-06 compared to that in 1992-93. All changes in the composition have been attributed to the increase in contraception except that of religion. Among these, 7 percent increase is due to change in the educational composition of women, 6 percent due to increase in age and 4 percent due to change from poor to non-poor status. Change in the educational composition of the husband has little impact on the change in contraceptive use. These findings are similar to that of the change in contraceptive use during 1992-93 and 1998-99 (Diwedi et al 2007).

IV. Discussion and Conclusion

Fertility transition and poverty reduction in India are of global significance because of the population size and diversity in the level of socio-economic development within the country. Though reduction in fertility and poverty began in the 1970s, the pace of decline in fertility was intensified in the last two decades and by now the fertility transition in Indian states is a universal phenomenon amid wide regional inequalities in socio-economic development. While the southern states are leading in fertility transition with moderate economic growth, the western states are close to replacement level of fertility with higher economic growth, and the eastern states (mainly Orissa and West Bengal) are plagued with mass poverty and substantial reduction of fertility. The four northern states, namely, Bihar, Madhya Pradesh, Uttar Pradesh and Rajasthan contribute to more than half of the births in the country and to the low level of development. While researchers attribute the recent change in fertility to the diffusion process and specifically to the quantity-quality children trade off, little attention has been paid to understanding the relationship between poverty and fertility in India. This is partly because of data constraint, as the poverty estimates are derived from the consumption expenditure data collected by NSSO and it does not collect

fertility related information. On the other hand, the fertility estimates are derived either from the Sample Registration System (SRS) or from the National Family and Health Surveys (NFHS) that do not collect data on consumption expenditure or income. The common notion that poverty and fertility are positively related has proved wrong in many developing countries, and we believe that it also holds true in some of the Indian states. Besides, empirical evidence suggests increasing contraceptive use among uneducated women. Dreze and Murthi (2001) found that the association between poverty and fertility in the districts of India was negative but insignificant and we believe that the association is getting stronger over the years. In this paper, we attempt to understand the association of poverty reduction and fertility change in the different states of India. We confined the measure of poverty to economic proxies with the assumption that the relative ranking of consumption poor and asset poor are similar. We further used the cutoff point of the consumption poverty estimates to the wealth index for rural and urban areas separately. We are aware of the debate on the poverty estimates in India and the need to understand the multidimensional nature of poverty in the country. However, our cut-off point of consumption poverty is an illustration and this is minimum poverty by any measure. We have preferred the estimates of MRP to facilitate the comparison over the years.

We found that the pattern of poverty reduction and fertility decline are mixed in the country. States such as Andhra Pradesh, Assam, Haryana and Punjab had experienced substantial reduction in poverty (about half or more) and fertility (about one-third) while the poor performing states such as Uttar Pradesh, Orissa and Chhattisgarh had witnessed an almost similar percentage reduction in poverty and fertility. In fact, the maximum contribution to the reduction in fertility was among the poor in the state of Chhattisgarh followed by Madhya Pradesh. Contrary to this, the states of Bihar and Jharkhand, though experienced a significant reduction in poverty had a little or no decline in fertility level. These findings suggest that the poor are contributing to fertility transition in varying degree by space (state) and the correlation of change in poverty and fertility is weak in many parts of the country. The findings also shed light on the role of space, education, health services and other social and institutional factors in contributing to the reduction of fertility. The reductions in fertility are not much reflected with increase in age at marriage but more by increase in contraception. However, all the states had experienced reduction in ideal family size and desire for additional child irrespective of their poverty levels, an indication of changing attitude for small family norm. In fact in many of the states the poor and non-poor differentials in IFS and contraceptive use had narrowed down over the years. Result of decomposition analyses showed that the propensity explained about 70 percent change in contraception, while composition explains 27 percent of change. All the factors of composition are positive except that of religion. On the other hand, the regional effect on contraceptive use is large which brings into focus the spatial dimensions of contraceptive use in the country.

From the above analyses, we conclude that the association between poverty and fertility is weak and much of the fertility decline during the last twenty years has had to do with increased contraceptive use and little to do with poverty reduction. Barriers other than poverty may be emphasized so as to reduce fertility in Bihar, Jharkhand, Uttar Pradesh and Madhya Pradesh. We recommend meeting the unmet need of contraception (spacing method) among the poor, effectively implementing the policies to discourage early marriage among girls, involve community leaders in promoting contraception and improve the maternal care utilization and child survival among poor mothers. The poor are increasingly adopting contraception and contributing to the fertility transition despite their social and economic backwardness.

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Appendix 1: Result of Logistic Regression on Contraceptive Use in India, 1992-2006 (Dependent variable: use of any contraceptive method)

	1992-93			2005-06		
	Proportion	B	exp (b)	Proportion	B	exp (b)
Age						
Lt 25	0.305		1	0.242		1
25-34	0.358	1.005	2.7	0.37	1.009	2.7
35+	0.337	1.079	2.8	0.388	1.152	2.9
Education						
No Schooling	0.617		1	0.479		1
Lt 6 years	0.138	0.468	1.7	0.154	0.377	1.5
6-9 years	0.132	0.633	2.1	0.193	0.402	1.9
10 years and above	0.113	0.728	2.4	0.173	0.371	2.1
Sex composition of living Children						
No son but daughters	0.144		1	0.146		1
No daughter but sons	0.188	0.813	2.3	0.209	0.794	2.2
Both son and daughter	0.531	1.299	3.7	0.534	1.236	3.7
No living child	0.136	-1.768	0.2	0.111	-1.981	0.2
Caste						
SC	0.122		1	0.194		1
ST	0.088	-0.004	1	0.085	-0.188	1
Others	0.79	0.126	1.2	0.721	-0.021	1.1
Religion						
Hindus	0.82		1	0.813		1
Muslims	0.12	-0.751	0.5	0.133	-0.709	0.5
Others	0.06	-0.02	1	0.054	-0.163	1
Place of Residence						
Urban	0.261		1	0.341		1
Rural	0.739	-0.195	0.8	0.659	-0.305	0.8
Region						
North	0.127		1	0.13		1
Central	0.237	-0.746	0.5	0.231	-0.211	0.5
North eastern	0.038	-0.154	0.9	0.036	0.044	0.9
East	0.221	-0.069	0.9	0.232	0.023	0.9
West	0.145	0.287	1.3	0.146	0.479	1.3
South	0.233	0.291	1.3	0.224	0.529	1.3
Child Loss			1			1
No	0.718					
Yes	0.282	-0.198			-0.248	0.8
Husband Education						
No education	0.345			0.274		
Primary	0.257	0.291		0.162	0.377	1.3
Middle	0.308	0.19		0.45	0.402	1.2
Secondary	0.09	0.344		0.11	0.371	1.4
Poverty			1			1
Poor	0.329			0.193		
Non-poor	0.671	0.34	1.4	0.807	0.403	1.3
Intercept	-2.406			-1.574		

All the coefficients are significant.