Spatial Pattern of Development, Gender Disparity and Demographic Diversity in India: A Regional Analysis

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Introduction

India is a country of striking demographic diversity and comparisons between its states yield variations in basic demographic characteristics. For instance, the fertility and mortality situation in some states is more like that of a middle-income country, whereas in other states the situation is not as good. Interregional variations provide useful opportunities to study the determinants of demographic outcomes in India. Since the formulation of the demographic transition theory several researchers have studied the linkages between development and demographic outcomes. Generally, socio-economic development, fertility and mortality are believed to be negatively related. "When fertility declines, it does not decline uniformly in all segments of the population. The decline first appears among the more modernized and advanced segments. Therefore, the appearance of differentials in fertility by socio-economic development is a sensitive indicator of the early phase of fertility decline", (U.N. 1987). The United Nations (1987) defines development as "a multi- dimensional phenomenon, which includes level of economic production, education, provision of health services, status of women, nutritional status of population, quality of housing, distributions of goods and services, transport system and access to communication network". From the above definition it is clear that development includes both social and economic development. Caldwell, Reddy and Caldwell (1982), Dyson and Moore (1983), and Malhotra, Vanneman and Kishor (1995), have added cultural dimensions in understanding fertility differentials in India. There is considerable documentation that culture in India not only shows great diversity but also a distinct regional pattern. Numerous studies have attempted to examine the role of social, economic and cultural factors in explaining fertility decline. The relative role of these factors in explaining fertility and mortality remains debatable

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as one group opines that socio-economic development acts as the main force in triggering the transition where as another view suggests that to have a holistic look of the factors responsible for transition, it is necessary to consider cultural beliefs and practices in addition to socio-economic development. In what way socio-economic development will affect fertility depends on the way the new ideas are internalized, which in turn depends upon cultural beliefs and practices. Studies on India show that while regional distributions of gender disparity in literacy, juvenile sex ratios, age at marriage and village exogamy tend to be in the same direction, they often do not correspond with the regional distributions of female labour force participation or patterns of patrilineal residence (Libbee, 1980; Sopher, 1980).

Considering the rapid growth of population to be a hindrance to development, some developing countries have adopted strong family planning programmes (during the 70s and 80s) to reduce their population growth. Hence, in the present context there are at least three factors, which could have relevance in exerting influence on demographic transition. Apart from the two factors mentioned earlier the third factor is the 'strength of the family welfare programme'. India's family planning programme (now family welfare programme) despite being the oldest in the world, has not succeeded in developing a feeling for the small family norm and the quality of the services provided by the family welfare department is inadequate in many parts of the country. The favourable demographic situations in Kerala and Goa are believed to be the outcomes of social development rather than the strength of the family welfare programme. But, the recent decline of fertility in Andhra Pradesh and Tamil Nadu, where the family welfare programme is quite strong and socio-economic development is yet to reach noticeable levels suggests that the family welfare programme can independently, to an extent, reduce fertility. Malhotra et al. using district level data of 1981 census further investigated the north-south dichotomy in the demographic situation. These studies show that there exists a strong negative relation between patriarchy and fertility in India. But, the above studies did not include any variable to take care of the strength of family welfare programme. Another facet of the north-south dichotomy lies in the cultivation pattern. Cultivation of rice is more common in the south than in the north. It has been suggested that, since rice cultivation is more female labour intensive, it contributes positively towards female autonomy (Malhotra et. al. 1995). The specific role of this factor on fertility needs investigation since there are also areas in the north where rice is a predominant crop.

Need for the study

Though the variations in the above mentioned factors are well known, the state models do not take into account the possible inter regional variations within the state or similarities between neighboring regions across states. Some studies have been conducted to understand the variation in patriarchy, development and the family welfare programme at macro and micro levels to explain demographic diversity in India, but so far no notable study has captured the inter and intra regional variation and its interrelationship with demographic diversity in India, which appears to be important considering the vast diversity spreading across the length and breadth of the country. In most of the micro and macro level studies these "pockets" which are at odds with the overall pattern of that region, are overlooked or not captured fully.

Objectives

The present study attempts to investigate the following objectives.

1. To examine the regional variation in India in terms of socio-economic conditions, cultural traits, family welfare programme and demographic characteristics.
2. To investigate the role of socio-economic conditions, cultural traits and family welfare programme in explaining fertility and child mortality in India.

Methods and materials

Data sources

The basic data used for the present study has been gleaned from multiple sources as the study requires a wide array of information on development, patriarchy, family welfare programme and demographic facets of India. The prime sources of these data are Census of India 1991; Centre for Monitoring of Indian Economy (CMIE), 1993 and National Family Health Survey-II, (NFHS-II) 1998-99. The district level data obtained from the census and CMIE reports has been reclassified according to the NFHS regions giving due weightage to population size. As it is known that NFHS report does not give regional estimates for every state, districts has been clubbed together according to the NFHS sampling regions which are geographic to obtain estimates for the regions of those states included in the study where estimates are not given at regional level. Though no separate code was provided in the NFHS data set for the regions of each state (except for four states namely Bihar, Rajasthan, Madhya Pradesh and Uttar Pradesh),

it was possible to identify them from the district codes of 1991 Census used to form the NFHS geographic regions. The regions where sample size is not large enough to draw any meaningful conclusion have been reallocated to another region keeping in view the physiography, rainfall and soil conditions etc of the regions. The regions are divided into four broad groups: north, south, east and west. The north south dichotomy was identified by Dyson and Moore (1983) who opine that kinship pattern favours greater female autonomy and lower fertility in the south and the reverse in the north. Malhotra et al (1995), expecting for the regional variations in fertility, analyzed the pattern of patriarchy, development and social stratification accounting for the regional effect considering three regions north, south and east expecting that the fertility to be high in north, low in the south and intermediate in the east. In this study the states of Rajasthan, Maharashtra and Gujarat have been included in the west zone. The north zone comprises the states of Punjab, Haryana, Uttar Pradesh and Madhya Pradesh. West Bengal, Orissa and Assam have been included in the east zone. The south zone consists of Andhra Pradesh, Kerala, Tamil Nadu and Karnataka. Among the five regions of Assam only three regions were taken for the analysis as the other regions have very small sample size. Thus this analysis is done on 75 regions across the country. A number of variables are considered to represent each dimension of socio economic development, patriarchy and family welfare programme.

Choice of variables

The variation in socio-economic development has been studied through seven variables, viz. agricultural development, non- agricultural development, standard of living of the population, female literacy, children (6-14 years) attending school, non SC/ST population. The cultural factors are represented by the prevailing extent of patriarchy, which have been used as a proxy variable for gender discrimination. It is defined as the set of social institutions that favour man in the intra-familial allocation of resources and power, and deny women the opportunity to be self supporting, thereby making them dependent upon the male relatives for survival (Mason and Taj, 1987) The measures of patriarchy which are taken for this study are son preference, gender gap in school attendance, gender gap in immunization of children (12-23 months), women working for others, women exposed to mass media, area under rice cultivation, women's autonomy and gender gap in child mortality. The strength of the family welfare programme has been assessed through the extent of knowledge of women about the modern contraceptive

methods, contraceptive prevalence rate (CPR), mothers receiving ante-natal care (ANC), deliveries assisted by health professionals, children (12-23 months) fully immunized and percent of villages having health facility within the village or within five kilometers of the village. The variables which have been considered under demographic diversity are children ever born (CEB), percent of birth of order 3 and above, percent of women who have experienced at least one child loss and percent of women with two children not desiring any more. The definitions of the variables under different dimensions are given in appendix I.

Results and discussion

Socio-economic development

Agricultural development

Agricultural development is measured by the value of major crop output per hectare in rupees (source CMIE 1993). In terms of agriculture, southern regions are much more developed than their counterparts reflected in the mean agricultural output of major crops per hectare. The per hectare agricultural produce in the southern zone is Rs. 5353 compared to Rs. 4364 in the northern zone. The same value for the east and west zone is Rs 3850 and Rs 2387 respectively. This difference can be ascribed to the larger area under cash crops e.g. coffee, cashew, rubber etc. in the southern zone compared to the northern zone where the area under cash crops is quite limited. The greater agricultural productivity in the south may also be explained by the higher rainfall in these regions compared to the north. Nevertheless, the areas with irrigation facilities in the north enjoy better productivity. These areas are the northern plains of Punjab and eastern Haryana and the northwestern plains of Uttar Pradesh where agriculture is modernized to some extent. Though cash crops like tea, rubber and jute are produced in the east, they are unable to contribute much towards agricultural productivity, as there is areal limitation in the production of such crops. Regional variation in agricultural productivity can also be attributed to the climate, soil and geological formation of each region. In the north the minimum and the maximum major crop output per hectare are Rs 1619 (the Vindhya region of Madhya Pradesh) and Rs. 9524 (north-eastern plain of Haryana). Almost all the regions of Uttar Pradesh have medium agricultural productivity ranging from Rs. 3940 (eastern region) to Rs. 5385 (western region). Most of the regions of Madhya Pradesh have very low agricultural productivity where the output ranges from rupees 1619 per hectare (north-western part) to

rupees 2801 (northwest uplands). Bundelkhand region also has very low agricultural productivity (Rs. 2672). Agricultural out put is medium (Rs. 3000 to 5000) in all the regions of Haryana except in the northeastern plain (Rs. 9524). All the parts of Punjab plain are agriculturally well developed where the major crop output per hectare ranges from Rs. 6305 to Rs. 8340. In the south, high agricultural productivity is observed in all parts of Kerala, almost all parts of Tamil Nadu (except the southeast coast), the southern coast of Andhra Pradesh, Malanad coast and the southern plateau of Karnataka.

In the eastern zone low or very low agricultural productivity is observed in all the parts of Orissa and Bihar where the monetary return ranges from rupees 2378 (south plateau of Orissa) to Rs. 3674 (north Bihar plain). In the northwest and southwest valleys of Assam and north Bengal and the southern Delta of West Bengal the same value ranges from Rs. 3340 to Rs. 4604. The other two regions of West Bengal are well developed agriculturally, having a monetary return of almost Rs. 6000 per hectare. Very high agricultural productivity (Rs. 7410) is observed in eastern valley and Cachar of Assam, which is attributable to tea as the major crop. In the west zone most parts experience very low agricultural productivity the exception being the region 7 (rupees 4465) of Gujarat (parts of Sabarmati-Mahi plain). The lowest output obtained is from north arid plain of Rajasthan (Rs 918).

Some parts of south the zone also have low agricultural productivity such as the central-western part of Andhra Pradesh (Rs. 2093) and northern part of Karnataka bordering Maharashtra and Andhra Pradesh (Rs. 2147). Low agricultural productivity is also observed in the Marathawada and Vidarbha regions of Maharashtra, Aravalli range of Rajasthan, southern plateau and Telengana-Mahanadi region of Orissa. In general it is observed that agricultural productivity is low or very low in the central part of the country extending from Rajasthan and Gujarat in the west to Orissa and Bihar in the east. On the other hand high agricultural produce is obtained from southern (Kerala, most of Tamil Nadu, parts of Andhra Pradesh and Karnataka) and eastern (parts of Assam and West Bengal) states of the country. Intra zonal variation is least in the south zone and highest in the north zone. In terms of variation in agricultural productivity also south the zone is better off than the other zones. The variation in the agricultural development is particularly high in the west. The eastern and northern zones are more homogeneous in this respect.

Non - agricultural development

Greater industrial and trading activities have put southern and western India much ahead of northern and eastern India, in terms of non-agricultural productivity. Non-agricultural development is more along the western and southern coastal areas, particularly, the areas which have greater international accessibility through sea routes. It is also high in some pockets of north (Punjab plains) and parts of Saurashtra and Sabarmati plain of Gujarat where industrial, commercial and transport activities have contributed to higher non-agricultural development. In the southern states of the country non-agricultural development is moderately high in the states of Kerala and almost all parts of Tamil Nadu. In Kerala the proportion of workers in the non-agricultural sector is quite high in all parts of the states and ranges from 57 to 61 percent in all the regions except south Malabar Hills (39 percent). In the regions of Tamil Nadu the same value ranges from 32 to 44 percent. In the south the lowest level of non- agricultural development is observed in south coast Godavari depression and Rayelseema of Andhra Pradesh (23 to 27 percent), Malanad and coast, northeastern and central plateau of Karnataka (24-25 percent). In general the coastal areas are more developed than others. In the north almost all the parts of Uttar Pradesh (central eastern and Bundelkhand) and Madhya Pradesh (except central region) non-agricultural development is very low. Low non-agricultural development is also observed in the entire Bihar and Orissa. Ironically Bihar and Orissa are the richest states in India in terms of availability of mineral resources. In the western zone non-agricultural development is high in almost in all the parts of Gujarat and the Konkan region of Maharashtra. Intra zonal variation is not that much in each zone.

A comparative picture of agricultural and non-agricultural development shows that the entire state of Kerala, most of the parts of Tamil Nadu (except coastal area between the gulf of Mannar and the Indian Ocean), coastal Karnataka, south coastal area of Andhra Pradesh and Punjab plains in the north are better off both in terms of agricultural and non-agricultural development compared to other parts of these two zones. On the other hand, most parts of Uttar Pradesh, Bihar, Orissa, Rajasthan and Madhya Pradesh are less developed in terms of the above two indicators. Though non-agricultural development is high in Gujarat, agricultural development is very low.

Standard of living

Inequality in the standard of living index (SLI) is highest in the east zone followed by south, west and north zones respectively. This inequality is uniformly distributed over most of the regions in the east and south compared to the north where the inequality in SLI is least in Punjab and Haryana. On the other hand Bihar, Uttar Pradesh and Madhya Pradesh have a greater variation in SLI. The greater variation in SLI implies greater extent of poverty in those areas. In north India the variation is least in Bisht Doab of Punjab and highest in the south central parts of Madhya Pradesh. The same is true for the south is in the southern hills of Kerala and the northern coast of Andhra Pradesh.

Female literacy rate

Regarding the spread of education, the situation is extremely unfavourable in all the zones, but the south seems to be in a better condition. In the south zone, 53 percent of women aged 15-49 are literate. In fact, most of the regions across the four zones, witness female literacy rates ranging from 21 to 40 percent and among the states, Kerala leads in female literacy. The situation is favourable in Kerala where most of the regions have the female literacy rate of above 85 percent, the lowest being 78 percent in south Malabar. In most of the parts of Andhra Pradesh female literacy ranges from 23 to 32 percent, the highest being in the region of south coast (46 percent). In Karnataka, all the regions have female literacy of over 40 percent except the northeastern plateau where it is only 26 percent; the highest is in Malanad and the coastal area (65 percent). Tamil Nadu has a female literacy (15-49) of almost over 50 percent in all the regions.

Female literacy is very low in all the three regions of Bihar where it ranges from 21 percent (north Bihar plain) to 27 percent (south Bihar plain). The state has an overall literacy rate of 23 percent (women aged 15-49 years). Female literacy rate ranges from 34 percent (Telengana-Mahanadi region) to 50 percent (Coast and Delta) in the regions of Orissa, except in the southern plateau where it is as low as 11 percent. It has the lowest value among the selected regions of all the zones. Female literacy in West Bengal as observed is lowest in the western plain (30 percent) and the highest is in the southern Delta. The state has an overall female literacy of 49 percent. In the west zone, the highest female literacy is observed in the state of Maharashtra (52 percent) followed by Gujarat (49 percent) and Rajasthan (24 percent). In all the

regions of Maharashtra, female literacy rate is higher compared to the Indian scenario, which is in sharp contrast to Rajasthan where all the regions have very low female literacy rate ranging from 20 percent (Banaskantha-Chambal basin) to 27 percent (southern region). In the state of Gujarat, Kachch and the northern plain has the lowest female literacy rate (27 percent), whereas a part of Sabarmati-Mahi plain has the highest (60 percent). In the north, the situation is very poor in most parts of Uttar Pradesh (except the hilly region) and Madhya Pradesh. The states of Punjab and Haryana are better off where all the regions have moderately high female literacy rate ranging from 40 percent (north-eastern and south plain) to 72 percent (Bisht Doab).

Children attending school

One of the most important indicators of social development is children (6-14) attending school, which shows wide regional variations. It is lowest in the east (75 percent) zone and highest in the south (86 percent). In all the regions of Bihar only around 60 percent children aged 6-14 years attend school. The situation is also not good in the southern plateau of Orissa where only 59 percent children attend school. It is better in the regions of Assam and West Bengal where more than 70 percent children attend school. In most of the regions of the west zone, 70 to 80 percent children attend school, the exception being parts of Vidarbha in Maharashtra where 98 percent children attend school. The situation is also similar in all the states of Kerala and Punjab where more than 95 percent children attend school. For most of the regions of Uttar Pradesh and Madhya Pradesh this value ranges from 70 percent to 80 percent. In the hilly region of Uttar Pradesh 92 percent children attend school.

Age at marriage

Age at marriage is almost uniformly distributed in all the zones having never married women 62 percent to 64 percent in the age group 15-19. But a quick look at the intra zonal variations indicate that in most parts of Madhya Pradesh and Haryana (south-eastern border with Rajasthan and Central plain) more than 45 percent of women aged (15-19) are married. The same finding is true for the entire state of Andhra Pradesh and Rajasthan and some regions of Karnataka (north-eastern and north-western plateau). In fact in Andhra Pradesh almost 70 percent women get married in the age group 15-19(Andhra Pradesh has a median age at marriage of 15.1 years, the national average is 16.4 years). The age at marriage is the highest in

Kerala, where all the regions have more than 80 percent never married women in the age group (15-19) except South Malabar and West Hills (62 percent).

SC/ST population

The share of this socially deprived group has lower concentration in south and north India as compared to east and west India. The areas where almost more than 50 percent of the population are either SC or ST are the western plain in West Bengal, the northern hills and southern plateau of Orissa, the southern plains of Gujarat, Vidharbha, the southern region of Rajasthan, Chattisgarh and a part of the southern coastal area of Andhra Pradesh. In Orissa, more than 45 percent are SC or ST. In Kanyakumari, Malanad, coastal area of Karnataka, north Malabar and in south coastal area of Kerala lessthan five p[ercent of women are SC or ST. In fact, in the regions of Kerala more than 86 percent population are non SC or ST.

Gender disparity

Son preference

A strong preference for sons has been found to be pervasive in the Indian society, affecting both attitudes and behaviour with respect to children (Arnold et al., 1998; Arnold, 1996; Basu, 1989; Das Gupta, 1987; Kishor, 1995; Koeing and Foo, 1992; Murthi et al., 1995; Nag, 1991; Parsuraman et. al., 1994). One measure of patriarchy is son preference, which is measured by the index given in appendix. It shows that considerable amount of son preference exists in north India. It is highest in Uttar Pradesh (67.47) followed by Haryana (76.85), Madhya Pradesh (78.81) and Punjab (82.42). Among the regions of the north, only the southern Plain of Punjab does not show any bias towards sons. Though the states of West Bengal, Orissa, Assam and Gujarat as a whole do not show any kind of son preference but parts of Saurashtra and Sabarmati Plain of Gujarat, southwest valley of Assam, the southern plateau of Orissa and parts of the western plain of West Bengal show some bias towards sons. Son preference exists in almost all the parts of Bihar and Rajasthan. But if we see intra zonal variation in the southern zone then we can find that parts of Malanad, the coast of Karnataka and interestingly south Malabar Hills of Kerala show some bias towards son. Except the north the other zones does not show any sort of son preference. Reasons for higher son preference in the north may lie in the

history as India witnessed most invasions from the northern fronts in the past and hence there had been always a greater demand for sons to protect the population in times of external threats.

Gap in school attendance

Gap in school attendance is highest in the east zone where 87 girls attend schools for every 100 boys compared to 88 girls in the west, 90 girls in the north and 94 girls in the south. In the eastern regions gap in school attendance is highest in the parts of the western plain of West Bengal where only 66 girls attend school per 100 boys. This gap is also high in all the regions of Bihar and the southern plateau of Orissa where 29 girls were found missing from school per 100 boys. In the west zone the gap is most prominent in the regions of Rajasthan where 68 (North arid plain) to 77 girl (south-eastern region) attend school per 100 boys. Also in parts of Kachch, northern and southern plains of Gujarat the gap is noticieble. In most of the regions of the south zone more than 90 girls attend school per 100 boys. For the state as a whole the gap is minimum in Kerala and maximum in Uttar Pradesh. In western India the gap is prominent in almost all the parts of Rajasthan (except parts of Banaskantha -Chambal basin).

Sex ratio

Sex ratio (0-6) is considered as one of the important indicators of gender discrimination at early ages of life. Though sex ratio is often considered to be a demographic parameter, it has been considered here in the context of gender discrimination. The sex ratio is most imbalanced in the regions of the north zone. The situation is worst in Haryana where 17-19 girls were less per 100 boys. Also, in the regions of Punjab 13 to 21 girls were less per 100 boys except in Bishta Doab. In Sourashtra and Marathawada more than 20 girls per 100 boys were found unreported in the west zone. Though the sex ratio is not that much imbalanced in the east and south, the Puruliya region of West Bengal and northern coastal area of Andhra Pradesh show only 76 and 73 girls respectively in the age group (0-6) per 100 boys. Khandesh and Vidarbha also have a sex ratio favouring the boys where less than 85 girls are found per 100 boys. The regions where sex ratio favour the girls are the north hills of Orissa, parts of north Bengal and the western plain of Bengal, Kachch and the northern plains of Gujarat and Maharashtra, the eastern region of Uttar Pradesh, southcentral part of Madhya Pradesh, Rayelseema, Kongunad

and Nilgiri, Malanad, coast, and the southern plateau of Karnataka and south Malabar Hills of Kerala. In fact, in all the regions of Kerala more than 96 girls are found per 100 boys.

Gap in immunisation

Regarding the status of immunization there is hardly any gender gap in the south except in the southern coast of Andhra Pradesh, southern plateau of Karnataka, Malabar and the coast of Karnataka. But, in the north a considerable amount of gender disparity in immunization exists in all the regions of Uttar Pradesh and Madhya Pradesh. In the west the gap is prominent in Kachch, Sabarmati-Mahi plain and the eastern plain of Gujarat, Marathawada and Rajasthan. Gender gap in immunization is highest in the regions of Assam. The regions of Bihar also show a wide gap in immunization.

Women working for others

The proportion of women working for others is much higher in the south (31 percent) than in the north (14 percent). The same value is 24 percent and 22 percent in the east and west respectively. In fact, a vast area of the country has less than 10 percent women working for others. The areas where this value ranges upto 10 percent are all the regions of Punjab and Haryana, all parts of Uttar Pradesh (except the hilly region), all the regions of Rajasthan excluding Banaskantha-Chambal basin, the coastal area of Orissa and the southern Delta of Bengal. In the regions of the state of Bihar also the situation is not at all good where 10-13 percent of women work for others. Among the south Indian states, the regions of Kerala show a very low value of the indicator, which range from 14 to 21 percent. Except the southeastern coastal area (21 percent) of Tamil Nadu all other remaining regions of south India have more than 25 percent of women working for others.

Women exposed to media

In order to assess the reach of the mass media NFHS asked the respondents whether they read newspaper at least once a week, listened to radio at least once a week, watch television at least once a week and went to cinema hall at least once a month. From these questions we have calculated one index of exposure to mass media, which is percentage of women exposed to any mass media. Figure * shows the spatial variation in this variable. At the national level 60 percent

of women reported regular exposure to mass media. A majority of women in the south (79.26) are exposed to media compared to north (60.8). In the 75 regions of this study it varied from 18 percent in southern plateau of Orissa to 96 percent in the central Kerala coast. In general, exposure to mass media was very high on the west coast of India, Tamil Nadu, Andhra Pradesh, Kerala and southern Karnataka. In fact, in the regions of Kerala women exposed to any media is more than 90 percent excluding the south Malabar region. The exposure levels were moderate in Gujarat and interior Maharashtra. In the northern zone the high areas of mass media exposure were concentrated in the regions of Punjab and Haryana. In the east it was in eastern delta of the Bay of Bengal. In much of the northern plain and central upland the exposure to mass media was very low (under 45 percent). The regions of Orissa also show a low level of exposure (17 to 54 percent). The percent of women who are exposed to mass media is very low in all parts of Bihar having an overall percentage of 27.3. The situation in Rajasthan is also likewise. Obviously low exposure to mass media has caused severe problems in spreading health and family planning massages in the relatively high fertility regions of the north India.

Women's autonomy

NFHS has asked a number of questions in order to study the extent of female autonomy. We have defined one index in order to measure the level of women's autonomy in the different regions of the country using a few of these questions. The index is defined as the percent of women having decision-making power at least in purchasing jewellery, spending money, obtaining own health care or if they are allowed to keep money aside. The value of the index ranges from 42 percent in southern plateau of Orissa to 93 percent in the south coast of Kerala. All the regions of Orissa and Rajasthan have very low values of the index ranging from 48 to 51 in Orissa and 41 to 51 in Rajasthan. Two components of female autonomy viz. decision making power about spending money and obtaining healthcare have been examined independently considering the importance of these two components. The first is higher in north India where as the second is higher in south India. Decision making power in obtaining healthcare is least in north western part of Madhya Pradesh and highest in the coastal area between gulf of Mannur and Bay of Bengal in Tamil Nadu. Contrary to their zonal character are Punjab, Haryana and region 4 of Andhra Pradesh. All these variables show that the level of

patriarchy is much higher in the north (In other words, the status of women is low) compared to the south. Strength of patriarchy is intermediate in the other two zones.

Area under rice cultivation

Another variable, which is considered under the dimension of patriarchy, is area under rice cultivation. It is argued that since rice cultivation is more female labour intensive than wheat cultivation, female autonomy is higher in south India than in north India. Female labour force participation is expected to give them economic security and social mobility which in turn improves their status in the family. Because of this, in many studies area under rice cultivation is taken as an indicator of female autonomy. It shows little difference in north and south India. In south zone 32 percent of the net sown area is used for rice cultivation, compared to 23 percent in north zone. East and west zone lie in the two extremes, with east having nearly 69 percent and west having 12 percent area under rice cultivation. Area under rice cultivation is highest in the western plain of West Bengal (89 percent) and lowest in Kachch (no area under rice cultivation). All the regions of the east zone have more than 50 percent area under rice cultivation excluding the southern plateau of Orissa. In the west zone, the areas with high rice cultivation are found in Vidarbha and Konkan region (71 and 48 percent respectively). Most of the regions of west zone have below 10 percent area under rice cultivation. These areas are: most of the regions of Gujarat, Khandesh, Desh, Marthawada and all the regions of Rajasthan. In the north India less than five percent area under rice cultivation are found in all the regions of Haryana (except the northeastern plain), the southern plain of Punjab, central, Malwa plateau, northern and southwestern region of Madhya Pradesh and in Bundelkhand. In the remaining regions of north India, it varies from 25 percent to 40 percent the exception being Chattisgarh (78 percent). In the south zone area under rice cultivation is very low in southern, northwestern and northeastern plateau of Karnataka. It is highest in the southern coastal area of Andhra Pradesh (71 percent).

Family Welfare Programme

Contraceptive Prevalence Rate (CPR)

Perhaps the most important proximate determinant of fertility is the level of contraceptive use. In India as a whole, 43 percent of currently married women in the age

interval 15-49 or their husbands were using contraception at the time of the survey. The contraceptive prevalence rate (CPR) in south is 54 percent whereas in the east it is only 36 percent. This value is 52 percent and 42 percent in the west and the north. In the 75 regions, the contraceptive prevalence rate varied from 19 percent in the eastern region of Uttar Pradesh to 69 percent in southern coastal area of Andhra Pradesh. Figure 3.14 shows a map of regional estimates of contraceptive prevalence rate derived from the NFHS data. Regions with a high contraceptive prevalence rate (over 45 percent) form four distinct blocks: the whole of the west coast of India, adjoining hilly tracts, and Sourashtra form one block. The coastal regions of Andhra Pradesh and Tamil Nadu form another block. The northwestern region comprising of the states of Punjab and Haryana (except the south-eastern plain of Haryana where it is 39 percent) form the third block. The regions of West Bengal form the fourth block. The regions of low contraceptive use (20-30 percent) cover a vast area. These are the regions of Bihar, Assam and Uttar Pradesh excluding the hilly region. Low prevalence of contraceptive was also found in the regions of Rajasthan where it ranges from 34 to 37 percent. Bihar, where the contraceptive prevalence rate is uniformly distributed in all the regions, has a contraceptive prevalence rate of only 22 percent.

Antenatal care

In the country as a whole, 44 percent of the women reported that they had received antenatal care. But the regional estimates in the selected states yield a range of variation from 14 percent in Bundelkhand to 99 percent in the North Malabar region. As table 1 shows that the level of antenatal care was over 97 percent in all the regions of Kerala. In fact, in all the regions of the south zone the situation is much better compared to the other regions of the country where the minimum antenatal care is observed in northwest plateau of Karnataka, which is 70 percent. The most backward regions in this respect are the regions of Bihar, Uttar Pradesh, Rajasthan, Madhya Pradesh and Assam where the level of antenatal care ranges from 12 (central part of Uttar Pradesh) to 35 percent (eastern valley and Cachar of Assam). Elsewhere in India, relatively high levels of ANC have been reported in northwestern regions and West Bengal.

Deliveries Assisted by Trained Health Professionals

Deliveries assisted by health professionals in southern zone are almost twice (74 percent) than that in the north zone. The situation is worst in the east zone where only 32 percent of births are assisted by health professionals whereas the situation is somewhat inter mediate in the west where 51 percent of births are assisted by health professionals. The data on assistance at deliveries show a wide regional variation, which ranges from 15 percent in south plateau of Orissa and Vindhya region of Madhya Pradesh to 100 percent in Kanyakumari (south east coast of Tamil Nadu). In the eastern zone the percent of deliveries assisted by trained health professionals in the states of Orissa and West Bengal ranges between 41 and 54 percent excluding the north hills and the southern plateau of Orissa and north Bengal where it is only 15 to 30 percent. The level is also low in all the regions of Bihar and Assam (16-31 percent). In the regions of the western zone the level was between 46 to 68 percent, the exceptions being the regions of Rajasthan and the eastern plain of Gujarat where the observed value is between 30-35 percent. In the regions of Punjab and Haryana the deliveries assisted by trained health professionals range from 40 percent (south-east plain of Haryana) to 80 percent (south plain of Punjab). The situation is not so good in the states of Uttar Pradesh and Madhya Pradesh where in most of the regions the value ranges from 20 to 30 percent. In the southern regions this value ranges from 50 to 100 percent excluding the northeast plateau of Karnataka. Deliveries assisted by health professionals is highest in the state of Kerala where it is more than 95 percent in all the regions except south Malabar Hills, where also it is quite high (85 percent).

Immunization

The immunisation data shows the percentage of fully immunised children among those who were aged 12-23 months at the time of the survey. Children who had a BCG vaccination, three polio drops, three DPT and one Measles vaccination at any time before the survey have been taken to be fully immunised. The age cut-off of 12-23 months reduces the sample size considerably. But, it does not hinder our purpose of showing regional variation of this indicator. Children fully immunized are fewer in the north and east zones (33 percent and 36 percent respectively) compared to west and south zones (46 percent and 64 percent respectively). The situation is very poor in all of Bihar and Assam and some parts of Orissa where percent of children fully immunized ranges from eight to 19 percent. In the 75 regions

the percentage of fully immunised children varied from eight in the Vindhya region of Madhya Pradesh to 91 in the southeast coast of Tamil Nadu. All regions of Maharashtra, Kerala and Tamil Nadu show high levels of immunisation, but none of the regions have reached universal immunisation. Generally, the range here was between 55 to 90 percent. The regions in the south where immunisation was very low are the southern coastal area of Andhra Pradesh and northeast plateau of Karnataka where the level of immunisation ranged from 36 to 47 percent. In the north the regions of Punjab and Haryana showed high coverage where the range generally was from 50 to 75 percent. The backward regions where immunisation level did not rise above 25 percent were in Rajasthan, Bihar, Uttar Pradesh and the Assam valley.

Health facility

The percent of villages having a PHC/CHC/SC in the east is almost 73 percent whereas in the north it is 54 percent. In the south 62 percent and in the west 56 percent villages have a PHC/CHC/SC. The coefficient of variation is least in the east zone and the highest in the west zone. In the eastern zone more than 50 percent villages have health facility in the same village or within the five km of the village except parts of West Bengal, the highest being in the west plain of Bengal. The regions which have only 20 to 35 percent villages having health facility in the village or within 5 km of the village are parts of Sourashtra and Sabarmati plain, Desh, Bundelkhand, Malwa plateau, Central plain of Haryana, and the south Malabar and southern coastal areas of Kerala. In most of the remaining regions this value varies from 50 to 80 percent.

Demographic Variables

Fertility

We have considered children ever born (CEB) as one of the measures of fertility, the other being the birth order of 3 and above. Since there is a considerable amount of effect of age distribution on children ever born, in order to make comparable the regional estimates, we have standardized the CEB taking the population of India as the standard. This figure varies from 2.42 in the South to 3.3 in the North. The West zone and the East zone have values of 2.97 and 2.89 respectively. If we look at the inter-regional variation, a wide variation is found. Among the selected regions 21 have a standardized children ever born of more than three, 47 between two

and three, seven regions have a CEB less than two. The highest value (3.47) is observed in the northeastern region of Rajasthan (Arawalli range) and the lowest is observed in region 3 of Kerala (this region consists of the districts of Trissur, Ernakulam, Kottyam). Among the 75 regions, the regions which have standardized children ever born of more than three are north Bihar and south Bihar plain, the southern plateau of Orissa, North Bengal, the south-western valley of Assam, parts of Sourashtra, Marathwada, parts of Vidarbha, the whole of Rajasthan and Uttar Pradesh (except Uttaranchal), northern and southwestern parts of Madhya Pradesh, the Vindhyan region and northeast plateau of Karnataka. It is quite clear that the regions of high fertility cover a vast area. The regions of low fertility where the standardized children ever born is below two lie in south India. These regions are: Kongunad and Nilgiri, Coromondal, Kanyakumari (southeast coast), parts of Malanad and most of the parts of Kerala, except the Malabar hills.

Birth Order

Birth order is another good indicator of fertility. We have taken birth order of three and above in our study to examine the regional variation in reproduction. The proportions of birth of order three and above varies from 63 percent in the eastern plains of Punjab to six percent in south coast of Andhra Pradesh. Though the percent of births of order three and above in eastern plain of Punjab is as high as 63 percent, the children ever born is only 2.23. The regions where more than 50 percent women are experiencing births of order three and above are the southern delta of West Bengal, northwest valley of Assam, hilly regions of Uttar Pradesh, southern and eastern plains of Punjab and the northeastern plain of Haryana. The regions where less than 20 percent of births are of order three and above are concentrated in the south. In the other zones only Sabarmati-Mahi plain (region 7) of Gujarat has births of order three and above less than 20 percent, the exact value being 17.94.

Child loss

The mortality indicator considered in our study, is the proportion of women who have experienced child loss. The percent of women having experienced child loss varies from six in the west Hills of Kerala to 25 in the Vindhya region of Madhya Pradesh. Most of the regions where more than 20 percent women have experienced child loss fall in north India, while no such

region is there in south India. The regions where child mortality is very high (more than 20 percent of the women experiencing child loss) are: southern plateau of Orissa, parts of Vidarbha, parts of Sabarmati-Mahi Plain, most parts of Uttar Pradesh (except hilly region), Chattisgarh, Vindhya region, south central, south western and the northern region of Madhya Pradesh. In Rajasthan, this value ranges from 18 to 20 percent. Infact, in most of the regions of the country 15 to 20 percent women have experienced child loss. In this regard, the situation of the regions in Kerala is very encouraging where only six percent (west Hills) to nine percent (South Malabar Hills) of women have experienced child loss. The situation in Punjab is also quite good (10 to 12 percent). If we look at the regional variations within the states, some interesting results could be observed. In the Konkan region, child mortality is quite low at 10 percent though in Maharashtra and other regions 15 to 20 percent women experienced child loss. In Uttar Pradesh, Uttaranchal stands out in this regard. In Tamil Nadu, all the regions have value more than 14 percent except Kanyakumari (10 percent) and Coromondal (12 percent). These observations highlight the limitation of state specific models. Interestingly south Malabar and west the hills of Kerala show high fertility confirming the limitation of state specific model (Kerala has the lowest fertility level among the selected states).

Interrelationships among the study variables

The correlation matrix (not shown) shows that there exists a considerable degree of interrelationship among the variables included in the analysis. For example, agricultural development, non agricultural development and female literacy are highly and positively related suggesting that the areas which are better developed in one aspect are also relatively more developed in other aspects. These associations are more pronounced in the northern than in the southern regions where social development is not necessarily accompanied by economic development. The association between socio-economic development and status of women indicates a strong relationship. Most of the parts of Bihar, Rajasthan, Uttar Pradesh and Madhya Pradesh (except north-western part) are socio-economically backward and the status of women is also very low. There are regions in Punjab, Haryana, and some parts of Uttar pradesh where socio-economic development is high but the status of women is low. Most of the regions of south India are socio-economically developed and the status of women is also high in those regions. Some parts of southern zone though not socio-economically developed, have high

status of women. These regions are the northeastern and central western part of Andhra Pradesh and almost all the parts of Karnataka except the southeastern area bordering Kerala. There also exists a strong positive association between socio-economic development and the strength of FWP. Again the performances of the southern regions are very good. North central Karnataka breaks the contiguity of high socio-economic development and a strong family welfare programme. Some parts of north (entire Punjab, and Haryana) also show high levels of socio-economic development and strong family welfare programme. On the other hand, the status of women and the strength of the family welfare programme are positively related, implying that an improvement in the status of women through better health care, educational facilities, labour force participation and exposure to mass media is positively associated with an improvement in the family welfare programme. In Kerala, Tamilnadu and in the adjoining regions of Karnataka, status of women is high and so is the strength of the programme. The reverse is true for most part of Uttar Pradesh and Madhya Pradesh. It has been observed that where socio-economic development and status of women is low, fertility and mortality are high. These regions comprise of most parts of Uttar Pradesh and Madhya Pradesh and some parts of Karnataka. In the states of Kerala and Tamil Nadu, socio-economic development as well as the status of women is high and fertility is very low. A high level of socio-economic development and status of women is related to low child loss and vice versa. The regions with very high child mortality are located in the states of Uttar Pradesh, Rajasthan, Orissa and Madhya Pradesh. More than 20 percent of women in the southern plateau of Orissa, Sabarmati-Mahi Plain of Gujarat and parts of Vidarbha experienced child loss. Child mortality is the lowest in Kerala where socio-economic development and status of women is very high. It is observed that there is a correspondence between child mortality and children ever born in a region. In places where child mortality is low, children ever born is also low. However, north coastal Andhra has high child mortality but still children ever born is very low which suggests that there are variations within regions.

Since considerable multi-collinearity exists among variables considered in each dimension of socio-economic development, patriarchy and strength of family welfare programme, a factor analysis was performed to extract the dominant factors in each of them. KMO (Kaiser- Mayer- Olkin) Statistic was calculated in order to see the sample adequacy and the anti-image correlation matrix was also checked to know whether it makes sense to perform

factor analysis. One factor each emerged from the dimensions of socio-economic development and the strength of the programme. The factor extracted from the dimension of socio-economic development includes all the variables, which are considered to represent socio-economic development. This factor is referred to as the level of socio-economic development (SED).he variable which is excluded in the factor representing programme strength (PROG) is proportion of villages having a primary health center (PHC)/community health center (CHC)/sub center (SC). The variables included under patriarchy could be represented by two factors. The first factor includes the gap in school attendance, women exposed to media, and women's autonomy. Higher the value of this factor, higher is the status of women. The second factor includes son preference and women working for others. Area under rice cultivation did not figure in any one of the factors, which indicates that this variable is quite independent of the other variables considered to represent patriarchy. This contradicts the belief of some scholars that fertility is low in rice growing areas because of better female autonomy. In order to find out the relative role of each of the factors in explaining fertility and mortality a multi variate regression analysis has been performed. As it is a well known fact that mortality and fertility are interrelated, child loss has been taken as an independent variable in the regression equation of children ever born, and children ever born is taken as an independent variable in the regression equation of child loss. Also the affect of north, east and west zone were seen with the south as the reference category. Among the three factors only the programme factor has come out significant in reducing the number of children ever born. Women residing in areas with a strong family welfare programme are likely to have lower fertility compared to those in areas with a weak programme. Neither socio-economic development nor the status of women exerts a similar influence on fertility. The other variables, which have come out significant are the percent of women who have experienced child loss and the north zone dummy. The coefficients of north zone and the constant are positive. It is expected that those women who experience more child loss will go for higher order births in order to achieve their desired family size. Hence child loss significantly increases children ever born. Compared to the south, fertility is higher in other zones even after controlling for other variables. The interaction between socio-economic development and programme strength shows that in areas with a strong programme, the level of development and fertility are negatively related. The dominant factor which has come out to be significant in reducing child loss is socio-economic

development (SED). Socio-economic development initiates hygiene and health practices that reduce child loss. The analysis shows that the programme factor significantly increases child loss. This may be due to the fact that among the variables included in the factor of programme strength (PROG) only children immunized, mother's receiving ANC and deliveries assisted by health professionals reduces child mortality to some extent. As the availability of health facility was not there in the PROG factor we included that in our analysis considering the importance of this variable. The results do not differ significantly even then. It is possible that where there are health facilities, reporting error may be less. Child mortality in many parts of the country occurs due to diarrhoea, cholera and other water borne diseases. The other factor that came out to be significant in reducing child death is children ever born. The interaction between status of women and programme strength is negative, which signifies that the effect of the programme strength tends to reduce in areas where status of women is better. Even after controlling for others variables, child loss is significantly more in the north zone.

Summary and conclusion

The study shows that there exists a wide regional variation in socio-economic development, cultural traits and the strength of family welfare programme in India. Socio-economic development, gender disparity and strength of the family welfare programme are highly correlated. The area where socio-economic development is more, strength of the family welfare programme is also more and the status of women is better. Status of women is independent of area under rice cultivation, which negates the popular opinion that status of women is higher in regions where area under rice cultivation is more. Affect of the strength of the family welfare programme in reducing fertility is more than the socio-economic development whereas socio-economic development has more impact on reducing child mortality. The factor representing the status of women does not have that much affect in reducing fertility or child mortality as the factor of socio-economic development and strength of family welfare programme. Areas with more health facilities are not associated with lower child mortality, the reason may be better reporting.

Table 1: Level of socio-economic development in different regions

States	Regions	Region No. of the respective states	Agricultural development	Non-agricultural development	*C.V. in SLI	Female literacy rate	Children attending school	Never married women	Percent of non SC/ST population
Bihar	North Bihar Plain	1	3674	12.37	42.01	20.6	61.6	56.8	78.5
	South Bihar Plain	2	2843.69	19.08	42.76	27.1	62.9	62.4	72.2
	Jharkhand	3	2677	25.7	43.15	23.6	63.8	62.4	55.7
Orissa	North Hills	1	2622.46	24.48	43.22	39.2	77.7	70	39.8
	South Plateau	2	2378	15.02	39.26	10.8	59.6	79.5	25.3
	Tel-Mahanadi	3	2552.2	28.96	44.67	33.6	81.1	48.5	55.4
	Coast and Delta	4	2939.25	28.96	41.31	50	86.3	73.3	73.7
West Bengal	North Bengal	1	3339.12	34.34	35.73	44.6	78.8	70.4	69.5
		2	4604.03	28.65	42.5	33	75.8	30.7	71.5
	South delta	3	5995.75	52.95	41.11	61.6	83.9	57.1	75.9
	West plain	4	5679.14	28.31	39.35	43.1	77.9	47.7	52.5
		5	4059	24.09	39.48	29.8	73.9	61.5	51.5
Assam	North West Valley	1	3712.24	35.61	40.61	50.9	80	67	75.8
	South West Valley	2	3266.31	24.4	40.45	43	81.3	59.7	72.1
	East Valley and Cachar	3	7410	27.79	38.93	45.4	74.5	74.7	61.6
Gujarat	Saurashtra	1	2816.28	46.37	28.76	48.5	82.3	80.6	78.4
		2	1956.23	47.91	27.71	40.9	74.2	78.1	72.7
		3	3773	32.58	29.75	39.3	73.8	82.1	66
	Kachcha and No Plain	4	1283.26	29.87	38.02	29.6	68.9	63	62.5
		5	1892.31	30.49	35.21	49.7	73.7	71.1	73.5
	Sabarmati-Mahi Plain	6	1413.43	70.39	26.98	59.7	85	73.7	68
		7	4465	29.56	36.75	40.7	82.4	52	72
	Eastern Plain	8	2442.11	31.07	37.93	52.7	77.7	56.5	61.1
	South Plain	9	3527	43.62	38.26	58.4	85.5	71.4	49.7

Maharashtra	Konkan	1	3033.48	49.79	38.15	49.3	89.7	65.8	70.2
	Khandesh	2	2814.67	26.41	40.6	52.1	83.3	47.2	79
	Desh	3	2751.97	32.79	36.67	55.8	93.3	55.3	78.6
	Marathawada	4	1698.83	20.63	39.43	48.7	87.2	51.2	78.3
	Vidarbha	5	1964.47	32.08	41.65	52.3	84.6	76.4	58.3
		6	1751.68	24.53	43.77	57.1	98.2	81.3	50.2
Rajasthan	Western region	1	918.82	27.36	35.48	23.2	72.1	53.6	79.3
	North Eastern region	2	2059.73	33.46	31.19	26.9	77.6	56.4	71.3
	Southern region	3	1722.3	23.81	36.41	20.1	71.3	57.7	47.3
	South eastern	4	3076.41	26.59	32.42	23.8	78.2	56.1	66.6
Uttar Pradesh	Hill	1	3975.33	33.26	33.93	47.4	93.3	79.7	81.7
	Western	2	5394.6	37.24	34.42	29.8	72.9	68.7	81.3
	Central	3	4333.15	26.47	37.5	34.3	78.3	62.5	72.6
	Eastern	4	3939.65	23.43	34.91	25.9	79.4	61.6	75.2
	Bundelkhand	5	2672.45	20.62	37.96	28	75.1	53.7	79
Madhya Pradesh	Chattisgarh	1	1876.1	19.98	36.07	31.5	78.8	65	50.1
	Vindhya	2	1619.6	22.91	38.72	21.7	79.4	48.6	59.8
	Central	3	2140.47	38.79	37.11	43.8	81.7	55.6	72.3
	Malwa Plateau	4	2439	26.09	32.38	32.9	67.7	55.8	67.1
	South Central	5	2489.76	24.02	40.9	34.2	75	67.5	60.2
	South Western	6	2236.24	20.24	34.11	32.1	69.4	67.6	62.1
	Northern	7	2801.53	25.82	35.12	28.9	78.3	47.6	77.9
Punjab	North West Plain	1	6305	40.88	23.65	61.7	88.9	86	69.7
	Bisht Doab	2	6058.05	50.96	18.79	72.4	94.4	92	68.8
	Eastern Plain	3	7637.96	48.46	22.21	58.7	94.2	86.7	76.3
	Southern Plain	4	8339.7	30.85	25.04	46.3	90.9	75.8	72.9
Haryana	South East Plain	1	4751.43	53.41	28.51	44.8	84.7	67.7	83.9
	North East Plain	2	9524.41	45.1	25.55	50.8	92.7	83.4	79.9
	South Plain	3	4261.57	34.11	29.77	40.4	87.4	56	74.1
	Central Plain	4	4485.9	33.54	27.51	40.5	88.9	52.8	78.9

Andhra Pradesh	North Coast	1	4102.04	29.18	40.74	32.9	79.2	33.5	84.4
	South Coast	2	6787.97	30.03	39.71	45.9	80	46.5	73.9
	South Coast	3	4455.07	23.96	38.1	31.7	70.6	40.6	51.2
	Rayelseema	4	3956.9	25.37	38.03	32.5	76.8	41.6	78.4
	Telengana	5	2093.57	35.26	36.76	38.2	77.2	56.1	77.6
	Godavari Depression	6	4295.38	27.12	37.62	23.5	72.4	32.5	74.9
Tamil Nadu	Kongunad and Nilgiri	1	6717.62	40.47	39.77	54.6	90.1	65.7	77.2
	Eastern Uplands	2	5415.19	31.71	38.72	49.1	87.2	58.2	75.1
	Kanyakumari	3	8696	41.18	37	76.5	100	95.2	98.8
	Coromandal	4	7330.32	43.59	39.5	53.5	91.5	74	75.1
	South East Coast	5	3678.98	39.74	37.04	51.1	91.4	76.3	74.7
Karnataka	North Eastern Plain	1	2147.6	24.89	39.51	25.9	71.7	52.1	72.6
	North Western Plateau	2	3807.5	28.84	36.88	40.9	82.9	41.9	82.1
	Malanad	3	6704.41	47.97	34.12	65.3	89.5	85	91.7
	Coast	4	6066.19	24.05	36	47.9	85.3	70.1	81.6
	Central Plateau	5	3669.73	24.79	37.68	40	79.6	57.2	67.6
	Southern Plateau	6	5112.82	25.37	34.07	56.4	86.6	66	83.2
Kerala	North Malabar	1	6232.81	56.72	29.04	85.7	97.9	81.4	95.1
	South Malabar	2	6152.77	39.01	32.79	78.3	94.9	61.9	86.1
	West Hills	3	7549.31	61.53	27.19	93.7	98.6	88.8	88.1
	South Coast	4	7455.4	53.27	31.02	92.2	99.3	85.6	91.2

** Coefficient of variation in Standard of living index*

Table 2: Level of the variables considered under the dimension of gender disparity in different regions

States	Regions	Region No. of the respective states	Son preference index	Sex ratio	Gap in school attendance	Gap in immunisation	Women working for others	Women exposed to media	Area under rice cultivation	Women's autonomy	Decision making power in spending money	Decision making power in obtaining health care
Bihar	North Bihar Plain	1	68.63	92.99	72.88	98.29	10.59	26.1	52.38	76.6	53.8	13.2
	South Bihar Plain	2	89.06	93.73	79.65	41.66	12.91	27.7	54.61	67.3	46.5	23.6
	Jharkhand	3	84.28	96.42	79.46	104.81	11.7	28.8	88.16	73	53.6	25.4
Orissa	North Hills	1	117.96	102.71	94.74	111.26	20.05	37	72.38	41.6	35.6	11.1
	South Plateau	2	78.83	93.62	71.55	107.81	32.65	17.6	45.29	51.5	23.4	16.2
	Tel-Mahanadi	3	86.86	91.48	89.46	111.6	21.85	39.9	68.23	48	19.5	9.5
	Coast and Delta	4	95.04	90.96	93.16	85.05	8.78	53.8	67.82	55.4	37.7	11.6
West Bengal	North Bengal	1	107.28	85.95	91.19	42.72	28.62	70.6	63.67	86.2	57.9	19.3
		2	86.75	100.78	99.21	66.9	16.98	42.2	64.44	55.7	52	16.3
	South delta	3	115.48	87.78	101.07	108.72	7.88	70.4	77.86	59.9	56.9	17
	West plain	4	91.75	105.28	85.27	137.29	23.75	55.1	86.99	51.8	37.5	15.3
	Puruliya	5	72.4	76.51	65.81	69.2	18.21	43.3	88.87	78.8	47.2	13.9
Assam	North West Valley	1	100.86	95.11	99.37	37.5	20.2	56.1	69.33	71.1	47.4	55.4
	South West Valley	2	78.47	91.2	99.3	8.33	47.3	46.9	70.55	60.7	40.4	41.1
	East Valley and Cachar	3	97.73	91.75	88.6	50	74.2	57.3	65.92	66.1	36.1	47.8
Gujarat	Saurashtra	1	114.44	79.81	95	139.73	15.83	70.5	0.02	71.5	39.2	22.5
		2	84.34	92.78	90.73	104.25	23.8	50.4	0.05	85.4	33	32.4
		3	26.66	95.29	89.85	105.18	25.71	59.3	0.23	79.3	11.9	15.6
	Kachcha and North Plain	4	107.9	109.44	77.46	382.4	22.36	50	0	84.5	29.3	30.1
		5	103.16	85.76	86.78	75.38	17.89	65.6	2.07	82.1	33.3	43.3
	Sabarmati-Mahi Plain	6	79.1	87.12	89.05	72.67	21.81	82.3	10.77	84.5	51.2	36.6
		7	91.72	93.12	90.5	111.21	24.52	60.06	21.08	73.9	37.5	36.9
	Eastern Plain	8	100.53	83.07	80.58	76.5	25.96	64.8	16.04	82.3	43.1	31.1
	South Plain	9	99.07	86.66	99.3	88.57	26.5	71.1	29.04	86.9	60.1	36.1

Maharashtra	Konkan	1	117.2	98.26	94.13	125.35	14.66	66.4	71.24	68.1	56	31.3
	Khandesh	2	105.39	84.34	88	88.97	34.26	62.5	3.19	73.4	35.9	29.4
	Desh	3	171.05	96.24	100.42	113.1	27.84	77.4	5.15	73.6	39.7	35
	Marathawada	4	100.05	101.76	96.83	73.73	35.82	61.6	1.11	69.7	27.4	26.7
	Vidarbha	5	279.58	80.78	103.61	106.65	40.6	61.5	3.42	79.9	40.2	43.4
		6	112.78	98.21	101.75	84.89	26.86	63.4	47.72	78.3	41.4	37.7
Rajasthan	Western region	1	78.27	87.63	68.63	139.8	8.07	30.7	0.22	47.4	42.2	14.9
	North Eastern region	2	80.1	91.05	75.91	108.48	8.03	42	0.08	51.6	49.9	19
	Southern region	3	76.35	91.76	69.48	101.52	7.97	26.3	9.98	41.8	35	11.4
	South eastern	4	89.66	88.36	77.9	42.5	14.85	45.5	1.6	47.1	29.8	17
Uttar Pradesh	Hill	1	90.67	87.44	94.78	61.42	3.28	53.5	26.85	58.6	61.6	29
	Western	2	67.05	88.26	83.98	74.14	4.7	46.7	13.46	53.9	51.2	23.7
	Central	3	68.45	92.41	87.06	66.1	5.91	45.7	25.15	76.2	64.2	24.7
	Eastern	4	66.24	101.12	82.06	86.86	10.08	43.3	37.52	63.4	51.2	29
	Bundelkhand	5	60.32	82.33	81.77	91.26	12.29	40.7	1.84	67.2	23.1	15.5
Madhya Pradesh	Chattisgarh	1	76.45	93.88	88.87	63.63	29.61	58.3	78.43	64.8	35.3	27.2
	Vindhya	2	59.49	89.06	87.76	60.19	31.27	34.7	26.15	45.5	18.1	9.9
	Central	3	84.24	95.39	88.22	41.84	27.67	66.2	4.08	67	33.5	22
	Malwa Plateau	4	91.01	90.34	85.41	68.22	25.82	64.8	0.73	56.5	35.3	21.8
	South Central	5	79.18	96.29	86.69	57.2	33.26	53.4	28.41	64.9	32.1	22.9
	South Western	6	89.41	100.56	89.22	53.41	26.62	60	4.97	66.1	40.1	29.2
	Northern	7	76.89	81.47	83.15	32.77	14.87	46.9	2.19	55.4	39.7	15.8
Punjab	North West Plain	1	78.54	79.74	93.86	104.92	10.37	80.3	34.13	89.5	49.4	44.3
	Bisht Doab	2	77.91	96.2	99.26	101.69	6.69	89	25.86	91	64.3	49
	Eastern Plain	3	72.47	81.66	100.42	103.09	8.55	80.6	35.31	84.6	54.2	45
	Southern Plain	4	124.3	87.35	98.04	75	4.39	76.1	8.6	86.9	44	43.7
Haryana	South East Plain	1	66.92	86.02	90.15	110.1	8.77	69.6	3.73	77.5	53.4	31.3
	North East Plain	2	88.44	86.31	93.71	114.9	8.8	73.4	27.3	82.6	57.9	41.2
	South Plain	3	74.38	83.79	93.01	61.05	9.02	62.5	1.71	80	63.9	30.5
	Central Plain	4	69.12	83.21	96.02	108.5	7.5	60	4.2	73.9	57.6	27.6
Andhra Pradesh	North Coast	1	663	73.83	80.64	122.86	32.88	75.9	41.82	73.8	34	27
	South Coast	2	119.07	94.84	93.47	118	33.19	85.7	71.02	70.8	37.8	31.3
	South Coast	3	118.3	99.25	81.77	57.11	41.56	78.1	39.39	69.4	46.2	35

	Rayelseema	4	148	113.15	86.7	121.29	33.84	75	11.32	49.7	28.2	13.5
	Telengana	5	120.73	88.93	88.27	120.96	33.11	72	21.28	70.3	25.9	23.5
	Godavari Depression	6	147	91.89	84.15	132.82	48.32	68.5	38.79	73.6	28.5	29.5
Tamil Nadu	Kongunad and Nilgiri	1	171.43	109.22	92.09	96.6	41.8	81.2	26.27	88.5	45.5	58.5
	Eastern Uplands	2	169.89	90.03	101.03	93.63	45.22	81.3	26.97	80.7	34	29.1
	Kanyakumari	3	80	85	100	240.02	20.98	58.8	46.88	91.3	57.1	82.5
	Coromandal	4	120.02	99.82	94.68	91.84	31.5	81.4	57.63	84.8	36.6	35.1
	South East Coast	5	99.81	83.19	99.34	105.93	42.02	73.9	47.34	92	50	71.6
Karnataka	North Eastern Plain	1	108.32	96.12	88.52	92	36.4	56.5	2.83	63.2	31.8	23.1
	North Western Plateau	2	280.74	84.01	97.03	131.52	31.09	76.9	7.32	71.8	42.1	28.6
	Malanad	3	136.56	115.43	98.23	77.82	28	87.5	59.92	81.9	51.4	32.2
	Coast	4	62.06	101.83	96.43	100	28.15	90.3	32.47	77.4	51.1	26.8
	Central Plateau	5	171.87	93.97	95.33	86.73	29.6	79.2	8.19	68.8	37.3	19.7
	Southern Plateau	6	180.07	100.77	99.3	70.44	25.32	88.1	17.76	78.3	44.6	28.5
Kerala	North Malabar	1	103.3	97.61	99.69	105.35	14	89.4	19.7	83.1	52.9	55.5
	South Malabar	2	84.14	107.48	101.91	136.5	21.3	75.5	35.11	75.9	27.4	51.9
	West Hills	3	112.18	109.31	100.1	111.7	17.21	95.4	31.6	88.2	42	44.9
	South Coast	4	135.33	96.1	100.2	95.5	15.26	94	21.53	92.6	49.4	64.8

Table: 3 Status of family welfare programme in different regions

States	Regions	Region No. of the respective states	Antenatal care	Deliveries assisted by health professionals	Percent of children immunised	Percent of villages having a PHC/CHC/SC	Contraceptive Prevalence Rate
Bihar	North Bihar Plain	1	16	20.7	11.6	67.3	22.76
	South Bihar Plain	2	16.6	30.6	8.6	75.7	19.81
	Jharkhand	3	24.1	17.3	8.6	56.9	24.86
Orissa	North Hills	1	38	27.2	37	75	40.65
	South Plateau	2	35.2	15.7	27.1	86.7	35.92
	Tel-Mahanadi	3	59.2	41.7	55	50	38.9
	Coast and Delta	4	48.2	41.4	79	82.9	41.72
West Bengal	North Bengal	1	60.3	44.3	45.2	42.9	52.61
		2	42.8	32.6	24.1	75	42.24
	South delta	3	61.2	54.5	51.6	63.4	46.76
	West plain	4	59.9	45	49.5	83.3	52.79
	Puruliya	5	59	46	50	100	47.82
Assam	North West Valley	1	31.6	21.9	13.8	94.7	25.38
	South West Valley	2	26.4	15.8	19.4	70.8	20.53
	East Valley and Cachar	3	35	27	15.8	74.1	30.86
Gujarat	Saurashtra	1	54.1	56.6	42.6	25	53.71
		2	59.3	45.9	40.7	60	57.22
		3	46.7	46.7	45.8	80	61.76
	Kachcha & No Plain	4	57	49.6	34.2	45.5	42.02
		5	53.6	63.5	51	76.9	47.91
	Sabarmati-Mahi plain	6	74.2	66.7	46.9	25	50.19
		7	48.2	57.1	22.9	22.2	48.42
	Eastern Plain	8	56.5	35.8	43.5	81.3	55.7
	South Plain	9	73	54.5	64.6	56.3	60.3
Maharashtra	Konkan	1	60.1	49.3	70.9	77.8	50.18
	Khandesh	2	63.5	55.7	59.8	61.5	57.55
	Desh	3	68.5	62.1	79.3	34.8	68.23
	Marathawada	4	57.6	55	71.6	65.2	56.65
	Vidarbha	5	56.2	51.4	68	50	64.96
	Vidarbha	6	72.8	68.3	84.2	87.5	62.96
Rajasthan	Western region	1	17.9	29.6	12.2	44.1	37.48
	North Eastern region	2	23.7	38.5	17.3	59.5	36.68
	Southern region	3	27.7	36.7	19.8	60.6	34.38
	South eastern	4	28.2	40	12.6	53.1	37.43
Uttar Pradesh	Hill	1	17	29.9	34	65.9	41.53
	Western	2	15.1	23.6	13.2	70.9	22.45
	Central	3	12.7	18.8	24.4	59.1	21.18
	Eastern	4	15.6	22.3	22	75.2	18.6
	Bundelkhand	5	13.8	21.2	9.8	35.5	30.5
Madhya Pradesh	Chattisgarh	1	33.6	32.2	20	48.4	42.27
	Vindhya	2	19.9	15.7	8.4	50	34.5

	Central	3	28.1	33.8	18.4	56.7	43.26
	Malwa Plateau	4	32.6	38	28.6	33.3	52.05
	South Central	5	26.8	23.5	17.6	48.8	47.2
	South Western	6	33.7	27.6	24.5	51.7	44.95
	Northern	7	19.7	36.2	15.7	46.2	34.23
Punjab	North West Plain	1	50.7	59.6	62.9	59.1	53.42
	Bisht Doab	2	68.9	55.2	77	85	47.68
	Eastern Plain	3	60.7	62.9	69.1	71.4	57.55
	Southern Plain	4	42.1	80.3	51.2	36.4	57.21
Haryana	South East Plain	1	35.6	40.1	57.6	60	39.47
	North East Plain	2	43.7	48.1	75.7	57	60.58
	South Plain	3	36.8	36.4	43.8	62.5	54.92
	Central Plain	4	32.9	41	46.2	14.3	54.04
Andhra Pradesh	North Coast	1	81.2	62.4	54	69.2	60.45
	South Coast	2	89.4	76.4	55.9	65.5	69.51
	South Coast	3	73.2	62.2	47.6	42.9	46.35
	Rayelseema	4	72.2	53.4	42.7	45	52.56
	Telengana	5	79.8	62.4	51.1	56	55.64
	Godavari Depression	6	80.4	74.8	51.6	61.5	61.63
Tamil Nadu	Kongunad and Nilgiri	1	91.8	90.4	84.1	82.4	55.41
	Eastern Uplands	2	89.3	76.7	79.1	66.7	49.11
	Kanyakumari	3	96.4	100	55.6	100	46.57
	Coromandal	4	92.5	82.4	85	76	52.28
	South East Coast	5	91.8	87.8	91.4	86.7	41.63
Karnataka	North Eastern Plain	1	49.8	39.1	36.4	50	42.71
	North Western Plateau	2	70.3	60.9	48.6	60	54.77
	Malanad	3	89.5	76	73.2	90.9	54.43
	Coast	4	82.3	60.3	60	57.1	64.41
	Central Plateau	5	71.1	57.4	55	69.2	57.39
	Southern Plateau	6	79.7	62.2	69.8	86.7	64.46
Kerala	North Malabar	1	99.4	96.8	78.5	42.9	57.14
	South Malabar	2	97.7	85.6	54.5	33.3	42.6
	West Hills	3	98.6	99.3	72.3	46.7	58.7
	South Coast	4	97.9	97.3	86.2	20	65.45

Table 4: Level of demographic situation in different regions

States	Regions	Region No. of the respective states	Child loss	Children ever born	Small family norm	Birth of order 3 and above
Bihar	North Bihar Plain	1	16.3	3.07	34.6	26.94
	South Bihar Plain	2	15.8	3	33.3	26.58
	Jharkhand	3	13.2	2.63	29	25.9
Orissa	North Hills	1	15.4	2.72	20.9	35.32
	South Plateau	2	20.7	3.15	26.5	25.71
	Tel-Mahanadi	3	17.9	2.54	22.3	26.33
	Coast and Delta	4	18.1	2.71	24.5	40.18
West Bengal	North Bengal	1	12.3	2.69	26.3	35.84
		2	17.2	3.21	28.9	42.7
	South delta	3	13.5	2.5	22.8	51.14
	West plain	4	15.6	2.67	22.1	36.32
	Puruliya	5	15.9	2.91	26.6	34
Assam	North West Valley	1	12	2.93	27.1	56.19
	South West Valley	2	11.7	3.05	28.8	46.28
	East Valley and Cachar	3	14.1	2.8	26.7	79.82
Gujarat	Saurashtra	1	16.9	2.77	25.1	30.86
		2	19	3.18	29	31.74
		3	14.2	2.91	23.6	33.33
	Kachcha and North Plain	4	15.8	3.07	29.8	28.35
		5	16.7	2.8	23.8	27.82
	Sabarmati-Mahi plain	6	15.9	2.48	22.9	46.85
		7	23.3	2.85	21.2	17.94
	Eastern Plain	8	19	2.47	20.9	28.41
	South Plain	9	14.1	2.51	18.7	28.83
Maharashtra	Konkan	1	10.2	2.49	18.1	30.76
	Khandesh	2	16.1	2.94	22.2	25.34
	Desh	3	15	2.65	16.7	25.71
	Marathawada	4	19	3.1	24.5	30.66
	Vidarbha	5	19	3.03	24.4	35.23
		6	20.6	2.3	18.6	37.66
Rajasthan	Western region	1	17.9	3.27	30.8	27.87
	North Eastern region	2	19.6	3.47	35.1	33.58
	Southern region	3	18.3	3.13	30.5	34.28
	South eastern	4	20.5	3.2	29.8	36.57
Uttar Pradesh	Hill	1	11.9	2.38	24.9	51.21
	Western	2	18.6	3.23	37.2	39.4
	Central	3	20.4	3.15	36.8	41.13
	Eastern	4	21.7	3.36	37.9	31.97
	Bundelkhand	5	20.6	3.24	36.6	32.87
Madhya Pradesh	Chattisgarh	1	22.2	2.82	29.1	21.48
	Vindhya	2	24.6	3.39	36.2	24.02
	Central	3	16.2	2.91	32.8	41.27
	Malwa Plateau	4	19.3	2.85	28.3	33.87
	South Central	5	21.7	2.92	29.5	24.26
	South Western	6	21.1	3.21	34.3	24.26
	Northern	7	20.7	3.19	37.1	33.09

Punjab	North West Plain	1	10.7	2.26	20.7	72.72
	Bisht Doab	2	12	2.04	18.2	71.64
	Eastern Plain	3	14	2.23	18.4	63
	Southern Plain	4	11.7	2.22	15.9	59.82
Haryana	South East Plain	1	16.1	2.66	27.4	47.82
	North East Plain	2	12	2.35	21.4	54.72
	South Plain	3	12.3	2.51	22.3	32.87
	Central Plain	4	17.1	2.63	25.6	46.48
Andhra Pradesh	North Coast	1	18.8	2.37	17.8	11.11
	South Coast	2	15.4	2.19	15.1	5.78
		3	19.1	2.39	25.7	23.88
	Rayelseema	4	17.3	2.51	25.7	12
	Telengana	5	13.5	2.59	25.9	17.02
	Godavari Depression	6	16.6	2.43	20	11.92
Tamil Nadu	Kongunad and Nilgiri	1	14.3	1.91	15.2	20.81
	Eastern Uplands	2	16.8	2.09	17.1	28.6
	Kanyakumari	3	10	1.77	18.6	9.52
	Coromandal	4	12.6	1.99	15.7	28.15
	South East Coast	5	15.9	2.03	19.3	30.09
Karnataka	North Eastern Plain	1	18.5	3.16	32.3	19.14
	North Western Plateau	2	16.2	2.58	22.1	20.12
	Malanad	3	14.4	1.9	15.6	25
	Coast	4	15.5	2.22	19	11.26
	Central Plateau	5	17.8	2.51	24.1	15.93
	Southern Plateau	6	12.7	2.14	18.1	22.02
Kerala	North Malabar	1	8.4	1.78	14.4	16.66
	South Malabar	2	9.3	2.11	20.8	18.99
	West Hills	3	6	1.4	5.6	27.3
	South Coast	4	6.7	1.5	6.4	16.61

Table 5: Results of regression analysis of Children Ever Born (CEB) and Child loss

Constant and variables	CEB	Constant and variables	Child loss
Constant	2.205*	**Constant**	6.26
SED	-.138	SED	-.546*
PROG	-.534*	PROG	.443**
STATUS	-.107	STATUS	-.177
NORTH	.285*	NORTH	.303*
EAST	.061	EAST	-.177
WEST	.072	WEST	.037
SED*PROG	-.028	SED*PROG	.073
SED*STATUS	-.066	SED*STATUS	-.156
PROG*STATUS	-.035	PROG*STATUS	-.079
SED*PROG*STATUS	.035	SED*PROG*STATUS	-.062
Child loss	.190**	CEB	.431*
Standard error of the estimate	.17233	Standard error of the estimate	1.29331
R Square	.873	R Square	.711
Adjusted R Square	.851	Adjusted R Square	.661

** $p<.001$, ** $p<.05$*

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Appendix I

➢ The variables considered under socio-economic development are defined as:

- **Agricultural development (Agri):** Value of major crop output per hectare (in Rs.) (Source: CMIE, 1993).

- **Non-agricultural development (Non-Agri):** Percent of male main workers in non-household industries; construction; mining and quarrying; and service sector (Source: Census of India, 1991). [*Main workers are defined as those who have worked for a major part of the year, i.e., more than six months or 183 days during the reference period. In the absence of GDP, data on industrial production at the district level and participation of workers in the above mentioned non-agricultural activities are considered as good indicators of non-agricultural development*].

- **Standard of Living Index (SLI):** Simple Coefficient of variation in SLI (Source: NFHS, 1998-99).

- **Female literacy rate (F-lit):** Percent of literate women (15-49) (Source: NFHS, 1998-99).

- **Children (6-14) attending school (Chsc):** Percent of children age 6-14 attending school. (Source: NFHS, 1998-99).

- **Never married women (15-19) (Nvmw):** Percent of never married women in the age group 15-19 years. (Source: NFHS, 1998-99).

- **Non-Scheduled Caste (SC)/ Schedule Tribe (ST) population (Non sc/st):** Percent of ever-married women (15-49) who are neither SC nor ST (a proxy variable for Non SC/ST population). (Source: NFHS, 1998-99). [*The Government of India has identified some castes and tribes as socially and economically backward, for whom the constitution of India has conferred special protection. Such castes and tribes are called Schedule castes and Schedule tribes*].

o The variables considered under the strength of FWP are defined below:

- **Women knowing any method of family planning (FPK):** Percent of ever-married women (15-49) having knowledge of any modern method of family planning. (Source: NFHS, 1998-99).

- **Children Immunized (CHIMM):** Percent of children (12-23 months) fully immunized (Source: NFHS, 1998-99).

- **Deliveries Assisted by Health Professionals (D_HP):** Percent of deliveries assisted by trained health professionals (Source: NFHS, 1998-99).

- **Contraceptive Prevalence Rate (CPR):** The percent of currently married women using any modern method of contraception (Source: NFHS, 1998-99)

- **Health Facility (PHC/CHC/SC):** Percent of villages having a PHC/CHC/SC within the village or within 5 km of the village (Source: NFHS, 1998-99)

o The variables considered under patriarchy are defined as:

- **Son preference index (Sonindex):** This is an average value of two ratios. The first ratio is the percent of women with two children both daughters not desiring additional children to percent of women with two children both sons not desiring additional children. The second ratio is the proportion of women with three children, at least two of them daughters, not desiring additional children to percent of women with three children at least two of them being sons, not desiring additional children.

Theoretically the index sometimes may be mathematically undefined as the denominator may be zero. However here we assume that the denominator will never be zero. It is quite a realistic assumption considering the sample size we have.

Generally it is felt that if son preference is high, then desire to have more children will be higher among women having daughters only or a majority of their children being daughters. Therefore, a lower value of this index will reflect a greater extent of son preference. (Source: NFHS, 1998-99)

- **Gap in school attendance (G-schatt):** Ratio of female to male children (6-14) attending school (Source: NFHS, 1998-99).

- **Gap in immunization (G-imm):** Ratio of female to male children (12-23 months) fully immunized. (Source: NFHS, 1998-99).

- **Women working for others (W_others):** Percent of women (15-49) working for someone else. (Source: NFHS, 1998-99).

- **Women exposed to media (W_media):** Percent of women (15-49) exposed to any mass media (newspaper, radio, television or cinema) during the reference period. (Source: NFHS, 1998-99).

- **Area under rice cultivation (Area_rice):** Percent of net sown area under rice cultivation. (Source: CMIE, 1993).

- **Women's Autonomy (W_auto):** Percent of women having decision making power at least in purchasing jewellery, or spending money, or obtaining own health care or if they are allowed to keep money aside (Source: NFHS, 1998-99).

- The variables considered under demographic diversity are defined below:

- **Standardized CEB**: Standardized value of mean number of children ever born to currently married women (15-49) (Source: NFHS, 1998-99). [*The standardized mean CEB for a region has been calculated by considering the distribution of mothers by age for the country as a whole as the standard*].

- **Women with small family norm (Norm)**: Percent of currently married women (15-49) with two children not desiring any more children. (Source: NFHS, 1998-99).

- **Child Loss:** percent of women having experienced at least one child loss (Source: NFHS, 1998-99).

- **Birth order:** Percent of birth of order 3 and above.