India 2016

Population Transition

Selected Papers of
Bhopal Seminar 2016

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Introduction

Aalok Ranjan

The present monograph includes a selection of the research papers that were presented at the Annual Bhopal Seminar 2016: Population Transition in India - Opportunities and Challenges. The Seminar was organised by the 'Shyam' Institute at Bhopal during 14 through 16 January 2016. The present monograph is the tenth in the series of annual monograph published by the 'Shyam' Institute on the basis of the research papers presented at the Annual Bhopal Seminar on contemporary issues in population and development in India. The Annual Bhopal Seminar was instituted by the 'Shyam' Institute in 2007 to promote and facilitate research and debate on contemporary population and development issues. Over the years, the Annual Bhopal Seminar has emerged as an important platform for presenting and debating research related to population and development issues in India, especially for young researchers.

This monograph includes ten research papers covering different aspects of population transition in India. The papers included in the monograph have been selected from the papers presented at the Annual Bhopal Seminar 2016 on the basis of a three-step selection process. The first step of the selection process involved the Chairperson and the Rapporteur of different technical sessions of the Annual Bhopal Seminar 2016 who were requested to select at the most two research papers presented in the technical session. On the basis of the recommendations put forward by the Chairperson and the Rapporteur of each technical session, the presenting author of the research paper was informed about the selection of the paper for publication in the monograph and was asked to submit the revised paper on the basis of the discussions and deliberations at the Seminar for consideration to publish the paper in the monograph of the Seminar. The revised papers were then peer reviewed and selected for publication in the monograph. The selected research papers so selected were then thoroughly edited at the Institute and the edited version of the research paper was sent to the presenting author of the research paper for her or his approval of the edited version of the research paper for publication in the monograph of the Seminar.

The papers included in the present monograph cover a range of issues related to population transition in India and its implications for social and economic development of the country. These include future population growth in India on the basis of population projections prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations; determinants of the nutritional status of mothers and children; immunisation status of children 12-23 months of age; dynamics of population growth at the local level; health concerns of the old people and those who provide services to the old people in the family; infertility and childlessness in the context of fertility transition; concerns and issues related to disability; gynecological morbidity; use of maternity care services by married adolescent girls and changes in the female workforce at the local level. The papers included in the monograph provide a good understanding of contemporary issues related to population transition in India. The conclusions and recommendations put forward in the papers included in the present monograph may provide a sound rationale for planning and programming for contemporary population and development issues facing the country.

The first paper of the monograph analyses the demographic components of the future population growth in India on the basis of the latest population projections prepared by the Population Division of the United Nations. The paper employs a decomposition methodology to analyse how much of the future population growth in the country will be the result of the changes in the level of fertility and mortality independent of age or the intrinsic growth rate and how much of the future population growth will be the result of the changes in the age structure effects on the birth rate and the death rate. The paper concludes that between 2015 and 2100, India's population is the most likely to increase by around 375 million or by around 28.6 percent. There will be a decrease in the intrinsic growth rate of the population as the result of the decrease in fertility and mortality independent of age. This decrease in the intrinsic growth rate is the most likely to result in a decrease of around 553 million in the population of the country. Similarly, changes in the age structure effects on the birth rate and the death rate is the most likely to result in a decrease of 645 million in the population of the country. However, there will be an increase of around 1572 million in the population of the country as the result of the increase in the size of the population. The paper observes that the decrease in the age independent birth rate or the total fertility rate and the decrease in the age independent death rate or the increase in the expectation of life at birth will contribute towards a decrease in the size of the population stock of the country in the years to come. Similarly, changes in the age structure of the population, as reflected through the age structure effects on the birth rate and the death rate will also contribute to the decrease in the size of the population stock. However, these decreasing effects will be countered by the effects attributed to the increase in the size of the population. The paper also observes that the population of the country is the most likely to continue to increase till the year 2068 when it will peak at around 1754 million. The paper suggests that the future increase in the population of the country will be driven largely by the very large size effect of the population, although both fertility and mortality levels and age structure effects on the

birth rate and the death rate are the most likely tend to decrease instead increase the population of the country in the coming years.

The second paper of the monograph focusses on the factors that influence the nutritional status of mothers and children. Using the data available through the National Family Health Survey 2005-06, the paper concludes that a multi-dimensional approach should be adopted to address the challenge of under-nutrition in children of India. The paper also confirms that an important dimension of child under-nutrition is the nutritional status of the mother. The paper concludes that if the nutritional status of the mother is poor then there is a high probability that the nutritional status of the child will also be poor. The paper recommends that efforts directed towards improving the nutritional status of children must also incorporate efforts that are directed towards improving the nutritional status of women. The mother and the child should be considered as a dyad in all planning and programming towards reducing the prevalence of under-nutrition in children below five years of age in India.

The third paper of the monograph analyses the immunisation status of children aged 12-23 months in Madhya Pradesh on the basis of the data available through different rounds of the Annual Health Survey which was conducted by the Registrar General and Census Commissioner of India and covered nine states of the country including Madhya Pradesh. The paper observes that the prevailing full immunisation coverage rate among children aged 12-23 months in Madhya Pradesh was quite low and full immunisation coverage will have to be improved substantially in the state in the context of the Sustainable Development Goals announced by the United Nations and endorsed by the Government of India. The paper argues that special attention needs to be given to Scheduled Tribes children who have traditionally been left out of the public health care programmes and activities. The paper observes that both the demand side and the supply side of child immunisation are weak in Madhya Pradesh and recommends specific efforts directed towards enhancing the demand side of child immunisation such as motivating parents to fully vaccinate their children as there is a big gap between children who received full immunisation and children who received any immunisation. The paper recommends that increasing the demand for child immunisation must be associated with the efforts to streamline the supply side of child immunisation in the state so as to ensure universal accessibility of basic immunisation services. The paper also emphasises the need of analysing the recent data on child immunisation by social class so as to highlight social class disparities in child immunisation in the state. There is also a need to adopt a zero tolerance policy with regard to children who have received no vaccination.

The fourth paper included in this monograph presents a detailed analyses of the population dynamics in the Moradabad Division of Uttar Pradesh, the largest state of the country in terms of population size but one of the least developed states of India. The paper uses the data available through the population census which is the only source of data to analyse the demographic dynamics at the local level in India. Most of the analyses related to demographic dynamics in the country are confined to national and state level. This paper is one of the few papers which have attempted to analyse the demographic

dynamics at the sub-state level. The analysis reveals that the demographic dynamics at the local level is radically different from the demographic dynamics at the state or at the national level and there are opportunities as well as challenges to modifying the demographic dynamics at the local level in the context of social and economic development. The paper also observes that within the Division, the demographic dynamics is quite fluid across the constituent districts and suggests that the districts of the Division are at different stages of development which may have an impact on the demographic dynamics of districts in the Division. The Government of India already emphasises a decentralised approach for planning and programming population and development related activities to address the diversity in both population and development and social and economic development across the country.

The fifth paper of the monograph discusses that self reported health problems of the old people as care receivers and self report health problems of those who take care of the old people or care providers in the family. The paper is based on a survey carried out in the urban areas of the National Capital Territory of Delhi. The paper recognises that there is substantial difference between subjective health assessment as measured through self-reported health problems as compared to the assessment made by medically qualified persons. The present study is based on the subjective health assessment of the old people and care takers of the old people in the family as it is based on the response of care receivers and care givers. The findings presented in the paper suggest that the relationship between care receivers and care givers matters significantly in case of subjective health assessment. Old care givers and care receivers are found to be significantly more likely to report bad health outcomes as compared to young care givers. The analysis also shows that old female care receivers are more likely to report bad health outcomes than old male care receivers and argues that this is a general phenomenon as women are more likely to report bad health outcomes than men. The paper also reveals that caste and economic status of the household are important predictors for reporting bad health outcomes by both care givers and care receivers. Similarly, time spent on care giving and care receiving are other important predictors of bad health outcomes reported by both care givers and care receivers. The paper also concludes that self reported health outcomes of both care givers and care receivers vary by different care giving and care receiving activities.

Infertility and childlessness in the context of fertility transition is the subject of the sixth paper of the monograph. Using the data available through the decadal population census in India, the paper concludes that there is definitely an increase in the prevalence of childlessness in the country and there are substantial within country variations in both the incidence of infertility and the prevalence of childlessness. The prevalence of childlessness appears to have increased in every age group over the last three decades with the major increase in the younger age groups. The paper also observes that the increase in the prevalence of childlessness is relatively higher in urban than in rural areas of the country and background social and economic characteristics of women have a strong bearing on both incidence of infertility and prevalence of childlessness in all regions of the country. The paper concludes that issues related to infertility and childlessness in India

demand attention at the policy and programme level given the fact that both incidence of infertility and prevalence of childlessness is increasing in an environment of fertility transition. The paper recommends that infertility should not be viewed just as a matter of health concern but also as an issue of social welfare. The paper finds that the lack of accurate data remains a big hindrance for infertility studies in India.

The next paper of the monograph calls for action to address disability issues and concerns in India. The paper argues that issues of disabled youth, disabled women and disabled old should not be neglected in any policy discourse and stresses that equal opportunity and full participation of the disabled population should be ensured in the society and the economy. The paper reviews at some length various policies and programmes that have launched to address issues and concerns of the disabled in India but argues that these policies and programmes have not been properly implemented so that services are not reaching to the persons with disabilities. The paper observes that the disabled are often excluded from the mainstream social and economic activities, denied of their human rights; face various forms of discrimination ranging from denial of educational opportunities to segregation and isolation because of the imposition of physical and social barriers. It is argued that policies and programmes directed towards the welfare of the disabled should percolate to the grass root levels of the society. The paper suggests that there also is a need to change the attitude of the society towards the disability and disabled persons by not underestimating the abilities and potential of persons with disabilities.

The eighth paper of the monograph presents a comprehensive picture of the gynecological morbidity in India on the basis of district level analysis. Using the data available through the District Level Household and Facility Survey 2007-08, the paper observes that there are sharp regional and spatial differences in the level and pattern of gynecological morbidity in India. The prevalence of gynecological morbidity is generally found to be higher in married women compared to unmarried women in all regions of the country. The paper also finds relatively high prevalence of gynecological morbidity in districts located along the central axis running from western Madhya Pradesh to West Bengal. The paper also observes that the level of gynecological morbidity in a district is associated with the level of a number of socioeconomic and demographic variables in the district which suggests that self-reporting of gynecological mortality is associated with contextual factors.

The last but one paper of the monograph focusses on the utilisation of maternity services by married adolescent women in four states of India - Uttar Pradesh, West Bengal, Gujarat and Tamil Nadu. Using the data available through the National Family Health Survey 2005-06, the paper observes that social and economic determinants of the utilisation of maternal health care services by married adolescent women vary widely not only across the four states of the country but also in terms of the type of maternal health care services - antenatal care, natal care and postnatal care. The paper recommends that a state-specific and service-specific approach should be adopted for the universalisation of

the utilisation of maternal health care services by the adolescent married women in the country.

The last paper of the monograph analyses the extent and the pattern of the participation of females in social and economic production activities in the Moradabad Division of Uttar Pradesh. Based on the data available through the population census, the paper observes that there has been a shift of female workers from the primary to the secondary and tertiary sectors of the economy in the Moradabad Division and in all of its constituent districts and the shift to the tertiary sector has been quite substantial. However, despite this shift, work opportunities for females in the Division still remain confined largely to the primary sector of the economy despite a decrease in the proportion of female workers in the primary sector of the economy. The analysis also reveals that the opportunities of the productive participation of females vary widely across the Community Development blocks of the Division. These variations have implications for the growth of the economy of the Division.

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Demographic Components of Future Population Growth in India

Aalok Ranjan

Introduction

According to the latest population projections prepared by the Population Division of the United Nations, India's population was estimated to be around 1311 million in 2015 (United Nations, 2015). According to the medium variant of the population projections, India's population is projected to increase to about 1754 million by 2068 and then decrease to around 1660 million by 2100. These estimates are based on the assumption that the country will achieve the replacement fertility sometimes during the period 2030-35 and then the total fertility rate will continue to decrease to 2085 and then increase marginally to reach 1.80 by 2100. These projections also suggest that India will become the most populous country of the world by 2022 surpassing the population of China. These projections, however do not take into account the recent change in the population policy of China from one-child policy to two-child policy. An implication of this policy change in China may be that India may not surpass the population of China as projected by the United Nations Population Division.

In this paper, we analyse the demographic components of the future change in India's population stock on the basis of the population projections prepared by the United Nations Population Division. By population stock, we mean the size and structure of the population. In a population that is closed to migration, the change in the population stock is determined by the initial population size, changes in fertility and mortality levels and changes in the population age structure. This means that the change in the population stock can be decomposed into the change attributed to the change in population size; change attributed to fertility transition; change attributed to mortality transition; and the change attributed to age structure transition. Such analysis helps in understanding how different drivers of population growth are expected to contribute to the future growth of the population of the country.

The analysis of the key drivers of population growth has always been an area of interest to demographers. The approach adopted for such analyses is based on the projection of the population stock at a future date under a set of assumptions about future trends in the components of population growth (Andreev, Kantorova and Bongaarts, 2013; Bongaarts, 2009; 1994; Bongaarts and Bulatao, 1999; Frejka, 1973; 1981). These analyses are built upon the hypothetical cohort-component projection methodology which is based on the classical demographic transition model. For example, the recent paper by Andreev, Kantorova and Bongaarts (2013) compares four types of population projections - standard, natural, replacement and momentum - to analyse components of future population growth in the world and in different countries of the world. According to this analysis, population momentum resulting from changes in the age structure of the population will be the key driver of the future population growth under the assumption that fertility will sooner or later decrease to the replacement level and will remain at that level for a long period. It is estimated that the change in the population age structure alone will account for an increase of 447 million in India's population between 2010 and 2100.

Methodology

Change in the population stock (size and structure) is the result of changes in factors that affect the stock (Schoen, 2002). In the absence of migration, there are only two factors that affect the population stock - number of births and number of deaths. A birth leads to an increase in the population stock whereas a death leads to a decrease in the population stock. The larger is the difference between the number of births and the number of deaths in a given time period, the larger is the increase in the population stock during that period. The change in the population stock, therefore, is determined by three factors: 1) initial size of the population stock; 2) gap between the birth rate and the death rate or the natural population growth rate; and 3) length of the period during which the given natural population growth rate prevails (Vallin, 2006). A synthetic index that characterises the change in the population stock over time is the population multiplier, which is the number by which population is multiplied between two points of time (Chesnais, 1979; 1986). The population multiplier can be calculated theoretically as well as empirically. The theoretical approach involves approximation either by an analytical model (Keyfitz, 1977) or by numerical simulation (Frejka, 1973). Empirical approach involves examination of historical evidence complemented by long range population projections (Chesnais, 1990).

Number of births and number of deaths in a give time period, on the other hand, are determined by the size of the population and birth rate and death rate respectively. Birth and death rates, in turn, are influenced by two groups of factors. The first group of factors include individual fertility and individual mortality or the probability of a birth and the risk of a death. The second group of factors include age structure effects on the birth rate and the death rate since both the probability of birth and the risk of death vary by age. This means that the change in the population stock is determined by the change in the

initial size of the population and the change in the national population growth rate. The change in the natural population growth rate is influenced by the change in birth and death rates. The change in the birth rate is determined by the change in the probability of birth and the change in the age structure effects on the birth rate. Similarly, the change in the death rate is determined by the change in the risk of death and the change in the age structure effects on the death rate. These considerations suggest that the change in the population stock should be analysed in terms of the change in the probability of a birth, change in the risk of death, change in the age structure effects on birth and death rates and the change in the size of the population.

Fundamentally, the change in the population stock is the elaboration of the basic differential equation

$$\partial P/\partial t = mP \tag{1}$$

where P is the population stock and m is the force of change which may be an instantaneous rate or probability or risk of change with respect to the demographic behaviour of interest (Schoen, 2002). One special but very useful feature of the change in the population stock is that population growth is logically closed. Classically, this is reflected through the balancing equation

$$P(t) = P(0) + B(0,t) - D(0,t) + I(0,t) - O(0,t) \tag{2}$$

where t stands for time, B(0,t) is the total number of births; D(0,t) is the total number of deaths; I(0,t) is the total immigrations and O(0,t) is the total emigrations during time t. Assuming that population is closed to migration or the net migration is either zero or very near to zero,

$$P(t) - P(0) = B(0,t) - D(0,t). \tag{3}$$

Dividing both the sides by PY(0,t), person years lived during time t, we get

$$r = b - d. \tag{4}$$

Here r is the natural population growth rate, b is the (crude) birth rate and d is the (crude) death rate. In the absence of migration, r serves as a useful indicator of the change in the population stock. When $r=0$, the population stock remains unchanged over time. When $r>0$, the population stock increases and when $r<0$, the population stock decreases. The quantum of increase or decrease in the population stock depends on the size of the population size at time 0 and the magnitude of r.

The change in the natural population growth rate over time may be decomposed as

$$\nabla r = r_2 - r_1 = (b_2 - b_1) - (d_2 - d_1) = \nabla_b - \nabla_d. \tag{5}$$

Let f denotes the probability of birth or the birth rate independent of age structure effects, then we can write

$$b = f*(b/f) = f*ab \tag{6}$$

The ratio $ab = b/f$ represents the age structure effects on the birth rate. Following Kitagawa (1955), the change in the birth rate can be decomposed as

$$\nabla b = (b_2 - b_1) = f_2 * ab_2 - f_1 * ab_1$$
$$= [(f_2 - f_1) * (ab_1 + ab_2)/2] + [(ab_2 - ab_1) * (f_1 + f_2)/2]$$
$$= \partial_f + \partial_{ab} \quad (7)$$

Similarly, let l denotes the risk of death or the death rate independent of age structure effects then we can write

$$d = l * (d/l) = l * ad \quad (8)$$

$$\nabla d = (d_2 - d_1) = l_2 * ad_2 - l_1 * ad_1$$
$$= [(l_2 - l_1) * (ad_1 + ad_2)/2] + [(ad_2 - ad_1) * (l_1 + l_2)/2]$$
$$= \partial_l + \partial_{ad} \quad (9)$$

Substituting from (8) and (9) in (5), we get

$$\nabla r = (\partial_f + \partial_{ab}) - (\partial_l + \partial_{ad})$$
$$= (\partial_f - \partial_l) + (\partial_{ab} - \partial_{ad}) = \partial_i + \partial_a \quad (10)$$

Equation (10) suggests that the change in the natural growth rate r over time is the algebraic sum of the change in fertility or the probability of birth; change in mortality or the risk of death; change in the age structure effects on the birth rate; and the change in the age structure effects on the death rate. A decrease in fertility results in a decrease in the natural growth rate. Similarly, a decrease in the age structure effects on the birth rate also leads to a decrease in the natural growth rate. On the other hand, a decrease in mortality as well as a decrease in the age structure effects on the death rate results in an increase in the natural growth rate. Equation (10) suggests that the change in the natural growth rate can be broken down into change in the intrinsic growth rate which is determined purely by fertility and mortality levels while the other is determined totally by the change in the age structure effects on birth and death rates. Equation (10) thus addresses the issue of which demographic indicators are more efficient in analysing the change in the population stock over time. It takes into the account both change in fertility and mortality levels and change in the population age structure in explaining the change in the population stock.

Application of equation (10) requires measurement of the probability of birth or the birth rate independent of age structure effects (f), and the risk of death or death rate independent of age structure effects (l). The most commonly used measure of the probability of birth is the total fertility rate. Horiuchi (1991) has shown that the ratio of the birth rate to the total fertility rate is a measure of age structure effects on the birth rate. The unit of measurement of the birth rate is however different from the unit of measurement of the total fertility rate. It may however be noted that the total fertility rate is actually the un-weighted sum of age-specific birth rates. Dividing the total fertility rate

by 35, the length of the reproductive life span, gives the average birth rate per woman of reproductive age group. Finally, multiplying the average birth rate per reproductive age woman by the proportion of reproductive age females in the population (w) gives a measure of the probability of birth or birth rate independent of age structure effects with the same unit of measurement as the birth rate. In other words

$$f = w * (\text{TFR}/35)$$

where TFR denotes the total fertility rate. It may be noticed that f is essentially a scalar multiple of TFR.

On the other hand, the life table death rate is a measure of mortality which is independent of the age structure of the population. It can therefore be taken as the measure of the death rate independent of age structure effects. The life table death rate is the reciprocal of the expectation of life at birth (e_0). Thus, the risk of death or death rate independent of age structure effects may be estimated as

$$l = 1/e_{0.}$$

Data

The present analysis is based on the estimates and projections of population of India based on the latest, 2015 revision, of the world population prospects prepared by the United Nations Population Division (United Nations, 2015). The preparation of each new revision of the world population prospects involves two distinct processes. The first is related to the incorporation of new information about the demography of each country or area of the world and, in some cases, a reassessment of the past. The second process, on the other hand is related to the formulation of detailed assumptions about future paths of fertility, mortality and international migration, again for every country or area of the world (United Nations, 2015a).

The world population prospects 2015 provide estimates and projections for member countries of the United Nations covering a 150-year time horizon, which is subdivided into past estimates (1950-2015) and future projections (2015-2100). United Nations Population Division has prepared eight variants of population projections for each country on the basis of different assumptions about the future trajectories of the factors that influence population growth - fertility, mortality and migration. The approach adopted for the purpose of projection is the most commonly used component projection method which requires that the components of population change are projected in advance. The method actually involves calculation of the effect of assumed future trend and pattern in fertility, mortality, and migration on the size of the population at some given point in the future (Preston et al, 2001).

The underlying assumption in the population projections prepared by the United Nations Population Division is that both fertility and mortality will continue to decrease

in future also. In case of future course of fertility, three assumptions - medium decrease, slow decrease and fast decrease - have been made. Corresponding to the three fertility assumptions, the variants - medium variant, high variant and low variant - of population projections are prepared by the United Nations. Under the slow fertility decrease assumption, fertility is projected to remain 0.5 children above the medium fertility decrease over most of the projection period. On the other hand, under the fast fertility decrease assumption, fertility is projected to remain 0.5 children below the medium fertility decrease over most of the projection period. By contrast, only one assumption has been made about the future course of mortality. The future course of fertility and mortality has been based on the application of probabilistic projection methods. Detailed projection methodology adopted by the United Nations Population Division has been described elsewhere (United Nations, 2015a).

In the present analysis, we use the medium variant of the population projection for India prepared by the United Nations Population Division to analyse the demographic components of the projected population growth during the period 2015 through 2100. The medium variant of the projected population is termed by the United Nations Population Division as the most likely. It may be pointed out that the projected growth of the population of the country is contingent upon the projected decrease in the levels of fertility and mortality.

Results

Key indicators of the future population growth in India during 2015-2100 as revealed through the medium variant of population projections prepared by the United Nations Population Division are presented in table 1. India's population will continue to increase till 2068 and will decrease subsequently. Between 2015 and 2068, India's population is the most likely to increase by very close to 34 per cent which means that between 2015 and 2068, around 443 million people are likely to be added to the population of the country in 2015. After 2068, the population of the country will start decreasing so that, by 2100, the population of the country will decrease to almost 1660 million. This means that between 2068 and 2100, the population of the country will decrease by 94 million so that India's population in 2100 is the most likely to be higher by around 27 percent of the population in 2015. The projections prepared by the United Nations Population Division are based on the assumption that the country will achieve the replacement fertility sometime during 2030-35 and then the total fertility rate will continue to decrease till 2080-85 to reach an all-time low of 1.792 and then will increase marginally to almost 1.80 during 2095-2100. On the other hand, it is also assumed that the expectation of life at birth in the country will increase steadily from around 69 years during 2015-20 to almost 85 years during 2095-2100.

Projected trend in the natural population growth rate is presented in table 2 which suggests that the average annual population growth rate in the country will continue to

decrease throughout the period under reference. It is the most likely that the average annual population growth rate in the country will turn negative during 2070-75 only and will continue to decrease till 2100. It is also projected that both the age independent birth rate and the age independent death rate will continue to decease throughout the period under reference. The decrease in the age independent birth rate will however be faster than the decrease in the age independent death rate.

Table 2 also suggests that the age structure effects will inflate the age independent birth rate by around 11 percent during 2015-20. The inflating effect of the age structure on the age independent birth rate will however tend to decrease and will turn negative during 2055-60 so that instead of inflating, age structure effects will start deflating the age independent birth rate. The age structure effects will continue to decrease till 2070-75 but will increase marginally after 2075. However, age structure effects will continue to deflate the age independent birth rate throughout the period 2055-2100.

On the other hand, age structure effects are projected to deflate the age independent death rate by almost 50 percent during 2015-20. However, the deflating effect of the age structure on the age independent death rate is projected to decrease with time so that during 2095-2100, the deflating effect will be reversed so that instead of deflating, the age structure will inflate the age independent death rate. The decrease in the deflating effect of the age structure on the age independent death rate is a reflection that the age structure of the population will get increasingly older during the period under reference.

Table 3 decomposes the change in the natural population growth rate into the change in the age independent birth rate, change in the age independent death rate, change in the age structure effects on the birth rate and the change in the age structure effects on the death rate. It may be noticed that a decrease in the age independent birth rate and age structure effects on the birth rate decreases the natural population growth rate while a decrease in the age independent death rate and the age structure effects on the death rate increases in the natural population growth rate. The table suggests that primary drivers of the decrease in the natural population growth rate will be the decrease in the age independent birth rate or the probability of a birth and the increase in the age structure effects on the death rate. On the other hand, the decrease in the age independent death rate will tend to marginally slow down the decrease in the natural population growth rate.

Table 4 presents the projected change in the net addition to the population in different 5-year periods. For example, it is projected that the net addition to the population during the period 2020-25 will be around 5 million less than the change in the net addition to the population during the period 2015-2020. This change in the net addition to the population can be decomposed into the change attributed to i) change in population size; ii) change in the age independent birth rate; iii) change in the age independent death rate; iv) change in the age structure effects on birth rate; and v) change in the age structure effects on death rate. Table 4 suggests that the change in the age independent birth rate, the change in the age structure effects on the birth rate and the

change in the age structure effects on death rate will contribute to decrease the net addition to the population. On the other hand, change in the age independent death rate and the change in the size of the population will tend to increase the net addition to the population.

Table 4 also suggests that the net addition to the population of the country is projected to decrease by more than 102 million during the period 2015 through 2100. During the period 2015-20, the net addition to the population of the country is projected to be around 80 million. This means that during the period 2095-2100, the net addition to the population of the country will be around -23 million or the population of the country will decrease by around 23 million during this period. This projected decrease in the net addition to the population may be attributed to a projected decrease of 63.9 million (62 percent) as the result of the decrease in the age independent birth rate; a projected decrease of 56.4 million (55 percent) as the result of the change in the age structure effects on the death rate; a projected decrease of 13.8 million (13 percent) as the result of the change in the age structure effects on the birth rate; a projected increase of 16.1 million (16 percent) as the result of the increase in the size of the population; and a projected increase of 15.6 million (15 percent) as the result of the decrease in the age independent death rate. The projects decrease in the net addition of the population as the results of the decrease in the age independent birth rate, age structure effects on the birth rate and the age structure effects on the death rate will be around 134 million. On the other hand, the projected increase in the net addition to the population as the results of the increase in the size of the population and as the result of the decrease in the age independent death rate will be around 32 million so that the decrease in the net addition to the population will be around 102 million during the period under reference.

Alternatively, the intrinsic population growth rate - the difference between the age independent birth rate and the age independent death rate - is projected to decrease from 2.755 per 1000 during 2015-20 to -2.296 during 2095-2100. On the other hand, the natural growth rate accounted by the age structure of the population - the difference between age structure effects on birth rate and age structure effects on death rate - is projected to decrease from 0.605 per 1000 to -0.034 during this period. The intrinsic population growth rate is projected to turn negative during the period 2040-45 but the natural population growth rate accounted by the population age structure is projected to turn negative during 2090-95 only (Table 3).

In other words, the decrease in the intrinsic growth rate will result in a decrease of around 48 million in the net addition to the population during the period under reference. On the other hand, the decrease in the growth rate attributed to the change in the age structure of the population will result in a decrease of around 70 million in the net addition to the population during the period under reference so that the decrease in the natural growth rate will result in a decrease of around 118 million in the net addition to the population. This means that during 2095-2100, the population of the country will decrease by about 39 million. However, the increase in the size of the population will account for an increase of about 16 million in the net addition to the population so that the

actual decrease in population during 2095-2100 will be of the order of around 23 million or average annual decrease of around 4.6 million per year (Table 4).

Finally, it is projected that India's population will increase by around 375 million between 2015 and 2100 or by around 28.6 percent. This increase will be the result of a decrease of around 553 million as the result of the decrease in the intrinsic growth rate resulting from the decrease in the age independent birth rate and the age independent death rate; a decrease of 645 million as the result of the decrease in the growth rate attributed to the change in the age structure of the population reflected through the age in the age structure effects on the birth rate and the death rate; and an increase of around 1572 million as the result of the increase in the size of the population (Table 5). In other words, the decrease in the age independent birth rate or the total fertility rate and the decrease in the age independent death rate or the increase in the expectation of life at birth will contribute towards a decrease in the size of the population stock of the country in the years to come. Similarly, changes in the age structure of the population, as reflected through the age structure effects on birth rate and death rate will also contribute towards a decrease in the size of the population stock of the country. However, these decreasing effects will be countered by the effects attributed to the increase in the size of the population. As the result, the population of the country is projected to increase by around 443 million between 2015 and 2070. After 2070, the population of the country will start decreasing so that the increase in population will reduce to 345 by 2100.

Conclusions

This paper attempts to quantify contribution of the change in demographic drivers of population change to the change in population stock in India during the period 2015-2100. It is well known that the change in the population stock over time is determined by the initial size of the population stock, changes in the levels of fertility and mortality and changes in the age structure of the population if the population is closed to migration. However, the population transition theory does not provide estimates of the relative contribution of the change in demographic drivers to the change in the population stock. The present analysis shows that the increase in India's population in future will be driven largely by a very large size effect despite a decrease in fertility and mortality as well as a decrease in the age structure effects on birth and death rates. The analysis is based on the medium variant of India's future population growth as projected by the United Nations Population Division which are based on the assumptions made by the United Nations about future fertility and mortality trends. If these assumptions are not realised, than the future growth of the country will be different.

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Table 1
Projected population growth in India 2015-2100
Medium variant of 2015 revision of UN projections

Year	Population (Million)	CBR (0/00)	CDR (0/00)	TFR	E_0 (Years)	W(15-49) (Million)
2015	1311.051					336.738
2020	1390.745	19.09	7.28	2.34	69.08	358.407
2025	1465.370	17.76	7.31	2.23	70.50	376.162
2030	1533.250	16.51	7.46	2.14	71.72	387.873
2035	1592.702	15.28	7.67	2.06	72.88	394.683
2040	1642.840	14.16	7.96	1.99	73.94	397.787
2045	1684.493	13.32	8.31	1.94	74.93	398.534
2050	1718.017	12.65	8.71	1.89	75.87	395.969
2055	1743.760	12.06	9.09	1.86	76.86	390.339
2060	1761.218	11.50	9.51	1.83	77.79	383.316
2065	1770.418	11.02	9.98	1.82	78.66	376.788
2070	1772.628	10.62	10.37	1.80	79.61	368.540
2075	1768.328	10.31	10.80	1.80	80.48	359.012
2080	1758.801	10.07	11.15	1.79	81.36	348.724
2085	1744.868	9.86	11.45	1.79	82.21	338.469
2090	1727.988	9.68	11.62	1.79	83.13	328.787
2095	1708.251	9.52	11.82	1.79	83.95	319.394
2100	1685.603	9.39	12.06	1.80	84.64	310.223

Source: United Nations (2015)

Table 2
Projected trend in natural population growth rate, age independent birth rate, age independent death rate and age structure effects on the birth rate and age structure effects on the death rate in India 2015-2100.

Period	*r* Natural population growth rate (0/00)	*f* Age independent birth rate (0/00)	*l* Age independent death rate (0/00)	*ab* Age structure effects on birth rate (0/00)	*ad* Age structure effects on death rate (0/00)
2015-20	11.804	17.230	14.476	1.1076	0.5030
2020-25	10.455	16.400	14.184	1.0829	0.5150
2025-30	9.057	15.549	13.944	1.0621	0.5348
2030-35	7.609	14.713	13.722	1.0388	0.5593
2035-40	6.199	13.922	13.525	1.0169	0.5884
2040-45	5.008	13.242	13.346	1.0057	0.6226
2045-50	3.941	12.622	13.181	1.0021	0.6606
2050-55	2.975	12.059	13.011	1.0002	0.6984
2055-60	1.992	11.554	12.854	0.9955	0.7398
2060-65	1.042	11.165	12.713	0.9870	0.7848
2065-70	0.249	10.841	12.562	0.9798	0.8257
2070-75	-0.486	10.539	12.425	0.9783	0.8688
2075-80	-1.081	10.274	12.291	0.9801	0.9072
2080-85	-1.591	10.038	12.164	0.9827	0.9417
2085-90	-1.944	9.836	12.030	0.9840	0.9662
2090-95	-2.298	9.665	11.911	0.9848	0.9920
2095-2100	-2.669	9.519	11.815	0.9866	1.0208

Source: Author's calculations based on table 1

Table 3

Decomposition of the change in the natural population growth rate in India 2015-2100

Period	∇r	∂f	∂l	∂ab	∂ad	$\partial i = \partial f - \partial f$	$\partial a = \partial ab - \partial ad$
	0/00	0/00	0/00	0/00	0/00	0/00	0/00
2015-20/20-25	-1.349	-0.91	-0.149	-0.415	0.173	-0.761	-0.588
2020-25/25-30	-1.398	-0.913	-0.126	-0.333	0.278	-0.787	-0.611
2025-30/30-35	-1.448	-0.877	-0.121	-0.353	0.339	-0.756	-0.692
2030-35/35-40	-1.410	-0.814	-0.113	-0.313	0.396	-0.701	-0.709
2035-40/40-45	-1.191	-0.688	-0.108	-0.152	0.46	-0.580	-0.612
2040-45/45-50	-1.066	-0.623	-0.106	-0.047	0.503	-0.517	-0.550
2045-50/50-55	-0.967	-0.564	-0.115	-0.024	0.495	-0.449	-0.519
2050-55/55-60	-0.982	-0.503	-0.113	-0.055	0.537	-0.390	-0.592
2055-60/60-65	-0.95	-0.386	-0.108	-0.097	0.575	-0.278	-0.672
2060-65/65-70	-0.793	-0.319	-0.122	-0.079	0.517	-0.197	-0.596
2065-70/70-75	-0.735	-0.296	-0.116	-0.017	0.538	-0.180	-0.555
2070-75/75-80	-0.595	-0.26	-0.119	0.02	0.474	-0.141	-0.454
2075-80/80-85	-0.51	-0.231	-0.117	0.026	0.422	-0.114	-0.396
2080-85/85-90	-0.353	-0.199	-0.128	0.014	0.297	-0.071	-0.283
2085-90/90-95	-0.353	-0.169	-0.116	0.008	0.309	-0.053	-0.301
2090-95/95-2100	-0.372	-0.144	-0.097	0.017	0.342	-0.047	-0.325
2015-20/95-2100	*-14.473*	*-8.075*	*-2.027*	*-1.618*	*6.807*	*-6.022*	*-8.455*

Source: Author's calculations.

Table 4

Decomposition of the change in the natural population growth rate in India 2015-2100

Period	Change in the net addition to the population	Change in the net addition to the population attributed to						
		Change in population size	Change in age independent birth rate	Change in age independent death rate	Change in age structure effects on birth rate	Change in age structure effects on death rate	Change in intrinsic growth rate	Change in growth rate attributed to age structure
2015-20/20-25	-5.070	4.299	-6.319	-2.885	-1.034	1.198	-5.286	-4.083
2020-25/25-30	-6.745	3.481	-6.678	-2.439	-0.922	2.031	-5.756	-4.469
2025-30/30-35	-8.428	2.657	-6.715	-2.700	-0.928	2.598	-5.788	-5.297
2030-35/35-40	-9.314	1.895	-6.469	-2.490	-0.898	3.149	-5.57	-5.638
2035-40/40-45	-8.486	1.288	-5.640	-1.245	-0.888	3.776	-4.753	-5.021
2040-45/45-50	-8.128	0.842	-5.236	-0.396	-0.894	4.232	-4.342	-4.628
2045-50/50-55	-7.783	0.513	-4.836	-0.203	-0.989	4.245	-3.847	-4.448
2050-55/55-60	-8.284	0.269	-4.383	-0.476	-0.980	4.673	-3.403	-5.149
2055-60/60-65	-8.258	0.101	-3.392	-0.855	-0.947	5.059	-2.445	-5.914
2060-65/65-70	-6.991	0.018	-2.822	-0.695	-1.078	4.571	-1.744	-5.266
2065-70/70-75	-6.509	0.001	-2.620	-0.149	-1.027	4.768	-1.593	-4.917
2070-75/75-80	-5.228	0.027	-2.294	0.174	-1.051	4.186	-1.243	-4.012
2075-80/80-85	-4.405	0.078	-2.029	0.225	-1.029	3.708	-1.001	-3.483
2080-85/85-90	-2.946	0.136	-1.732	0.119	-1.120	2.590	-0.612	-2.471
2085-90/90-95	-2.858	0.194	-1.456	0.067	-1.002	2.666	-0.454	-2.598
2090-95/95-2100	-2.910	0.263	-1.231	0.148	-0.827	2.918	-0.404	-2.77
2015-20/95-2100	*-102.342*	*16.062*	*-63.852*	*-13.798*	*-15.613*	*56.367*	*-48.239*	*-70.165*

Source: Author's calculations.

Table 5

Decomposition of the increase in population of India: 2015-2100

Period	Increase in population	Increase attributed to population size	Increase attributed to age independent birth rate	Increase attributed to age structure effects on birth rate	Increase attributed to age independent death rate	Increase attributed to age structure effects on death rate	Increase attributed to intrinsic growth rate	Increase attribute to growth rate accounted by age structure
2015-20	79.694	79.694	79.694	79.694	79.694	79.694	0	0
2020-25	74.624	83.994	73.375	76.809	78.661	80.893	-5.286	-4.084
2025-30	67.879	87.474	66.697	74.371	77.739	82.924	-11.042	-8.553
2030-35	59.452	90.131	59.982	71.671	76.811	85.521	-16.829	-13.85
2035-40	50.139	92.026	53.514	69.182	75.913	88.67	-22.399	-19.488
2040-45	41.652	93.314	47.873	67.936	75.025	92.446	-27.152	-24.51
2045-50	33.525	94.156	42.637	67.541	74.131	96.678	-31.494	-29.137
2050-55	25.743	94.669	37.801	67.338	73.142	100.923	-35.341	-33.585
2055-60	17.459	94.937	33.418	66.862	72.162	105.596	-38.744	-38.734
2060-65	9.201	95.038	30.026	66.007	71.215	110.655	-41.189	-44.648
2065-70	2.21	95.057	27.204	65.312	70.137	115.226	-42.933	-49.914
2070-75	-4.3	95.057	24.584	65.163	69.11	119.994	-44.526	-54.831
2075-80	-9.528	95.084	22.29	65.337	68.059	124.18	-45.769	-58.843
2080-85	-13.932	95.163	20.261	65.562	67.03	127.888	-46.769	-62.326
2085-90	-16.879	95.299	18.529	65.681	65.91	130.478	-47.381	-64.797
2090-95	-19.737	95.493	17.073	65.748	64.908	133.143	-47.835	-67.395
2095-2100	-22.647	95.757	15.842	65.896	64.081	136.061	-48.239	-70.165
2015-2100	*374.552*	*1572.343*	*670.8*	*1166.109*	*1223.728*	*1810.972*	*-552.928*	*-644.863*

Source: Author's calculations.

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Factors Influencing Nutritional Status of Mothers and Children in Major States of India

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Introduction

Nutritional status of the population is the most important determining factor of its health (Pelletier, 1994). If nutritional status of a person is not good, then the person may lack stamina to fight diseases and, as a result, he or she may be infected by many diseases (Ruzicka and Kane, 1985). Globally, about 60 percent of childhood deaths occur due to child under-nutrition (Bellagio Study Group, 2003). At the same time, exposure to repeated illness and poor diet are major causes of child under-nutrition in the developing countries (Mosley and Chen, 1984). It is estimated that about 27 percent of children under age five in the developing countries were under nourished at the beginning of the present century (WHO, 1999). India is one of the 20 countries of the world which have a very high burden of child under-nutrition (Ramchandra et al, 2009).

Child under-nutrition has always been a major public health problem in the developing countries. The most commonly used approach to measure and monitor child under-nutrition is the anthropometric approach which compares anthropometric measurements of a child with those of the reference child. Among different anthropometric measurement, weight and height of the child are commonly used and based on these two measurements, three indicators of child under-nutrition are stunting (chronic under-nutrition) wasting (acute under-nutrition) and underweight (composite indicator of stunting and wasting). Both weight and height of the child are directly influenced by the quantity and quality of the food intake and the prevalence of infections (IIPS and Macro International, 2007).

Childhood is a very crucial period for the life of every individual. Adequate nutrition is required during this period for the normal growth and development of the child (Ford et al, 1989). It has been observed that the prevalence of under-nutrition increases steeply during the first two years of life because of poor infant feeding practices.

Exclusive breast feeding during the first six months of life and food supplement after six months play a significant role in deciding the nutritional status of the child. As such, mother's milk is very important for the health and nutrition of infants. Even the modern science and technology has not been able to produce a better food for infants which can replace mother's milk (Mishra et al, 1999; Griffiths et al, 2002). Another factor that influences the nutritional status of the child is the birth interval. Many studies have shown that the longer is the birth interval the better is the nutritional status of the child, although it is also observed that the association between the birth interval and the nutritional status of the child is significant only when the birth interval is more than 36 months (Dewey and Cohen, 2007).

The prevalence of child under-nutrition is not evenly distributed across different population groups but is exceptionally high in some groups but low in other groups (Das and Sahoo, 2011) because the nutritional status of the child is affected by many socio-economic and demographic factors (Mishra et al, 1999; Griffiths et al, 2002). It is globally accepted that there exists a strong relationship between the nutritional status of the child and the health status of the mother and the child. Anaemic and weak women give birth to low birth weight babies. Prevalence of underweight and stunting varies significantly by age. During the first three years of life, prevalence of both severe and moderate form of stunting increases. Stunting increases with the increase in the birth order but it is not influenced very much by mother's age at the first birth (Mishra et al, 1999). Educational status of the mother has an inverse relationship with stunting and underweight in children. Similarly, it has been observed that the prevalence of under-nutrition is higher in children belonging to poor families than in children belonging to better off families. The prevalence of child under-nutrition has also been found to be higher in Scheduled Castes and Scheduled Tribes which are also known as the most deprived sections of the community (Das and Sahoo, 2011; Ramchandra et al, 2009). It has also been observed that the prevalence of low birth weight babies is lower in women who delivered their first birth in the middle ages (25 - 35 years). Women delivering the first birth at younger or older ages have relatively higher chance of delivering low birth weight babies (Rahman and Nasrin, 2009). It has however been observed that the prevalence of child under-nutrition is higher in urban poor as compared to their counterparts living in rural areas (Kanjilal et al, 2010). It has also been observed that although the prevalence of under-nutrition is relatively low in the urban areas as compared to that in the rural areas, yet inequality in the nutritional status of children is relatively high in urban as compared to rural areas (Zere and Mclntyre, 2003).

According to the National Family Health Survey 2005-06 (NFHS 3), the prevalence of child under-nutrition varies significantly across the major states of India. The prevalence of stunting in children below five years of age has been found to be the lowest in Kerala (25 percent) whereas more than fifty percent children below five years of age surveyed in Uttar Pradesh, Bihar, Gujarat, and Madhya Pradesh have been found to be stunted at the time of the survey. These states also have considerably high rural-urban differentials in the prevalence of stunting in children below five years of age. On the other

hand, nutritional status of children have been found to be relatively better in the north-eastern states of the country. In some of these states, the prevalence of child under-nutrition has been found to be even lower than that in Kerala (Radhakrishna and Ravi, 2004). In the north and central India, there is also substantial gender disparity in child under-nutrition as women, especially, young women have very little decision making power within the family. As a result, they are unable to take decisions related to the health and nutritional status of their children.

The above considerations provide the rationale for the present study which is directed towards analysing factors that influence the nutritional status of mothers and children in selected major states of India. The study is based on the data available through the 2005-06 round of the National Family Health Survey which was conducted by the International Institute for Population Sciences (IIPS and ORC Macro, 2007). The study attempts to identify state-specific factors that may be responsible for the observed variation in the prevalence of under-nutrition among children below five years of age across the major states of the country. It is expected that the analysis will facilitate formulation of state-specific policies and programmes for the reduction of the prevalence of child under-nutrition which remains one of the major development challenges in the country.

Data Source

The study is based on the data available through the third round of the National Family Health Survey (NFHS) which was carried out during 2005-06. The National Family Health Survey Programme was launched by the Government of India, Ministry of Health and Family Welfare in the early 1990s. Over the years, the NFHS programme has emerged as an important source of data on population, health, and nutrition for the country as a whole and for its constituent states. The third round of the NFHS (NFHS-3) was designed to provide, among others, estimates of important indicators related to family welfare, maternal and child health, and nutrition for India and for its constituent states. NFHS-3 interviewed all women aged 15-49 years and all men aged 15-54 years, a departure from the earlier practice which surveyed only ever married women aged 15-49 years. The survey provided the data about the height and weight of all children below five years of age, anaemia in women aged 15-49 years and men aged 15-54 years in the surveyed households. On the basis of these data, height-for-age, weight-for-height and weight-for-age was calculated for every child below five years of age covered under the survey. The child specific height-for-age, weight-for-height and weight-for-age was compared with the corresponding values of the reference child or the standard population to estimate the prevalence of stunting, prevalence of wasting and prevalence of under weight. These estimates constituted the basic data set for the present analysis. In addition, NFHS 3 also provided data related to a number of household level and mother specific characteristics that are known to influence the nutritional status of children and their mother. These data also constituted the basis for the present analysis.

Methodology

The following indicators of the nutritional status of the population have been used as the dependent variables in the present analysis:

i) Height-for-age
ii) Weight-for-height
iii) Weight-for-height
iv) Body Mass Index (BMI) of the mother.

On the other hand, demographic and socio-economic factors used as independent variables include the following:

1) Age of mother at first birth
2) Birth order of child
3) Birth interval
4) Age of the child
5) Sex of the child
6) Place of the residence
7) Age of the mother at first marriage
8) Education of the mother
9) Economic status of the household
10) Caste
11) Religion.

Both bivariate and multivariate analyses have been carried out to analyse the factors influencing the variation in the prevalence of child under-nutrition across the states of the country. The bivariate analysis comprises of calculating the Spearman's rank order correlation coefficient between the prevalence of under-nutrition in children and mothers and a number independent variables. The multivariate analysis, on the other hand, involved logistic regression analysis. The dependent variable in the logistic regression is a dichotomous variable which takes the value 1 if the child or the mother is under nourished and 0 otherwise. The independent variables, on the other hand, included birth order, preceding birth interval, time of initiating breast feeding, age of the mother at the first birth, age and sex of the child, education of the mother, economic status of the household and religion and caste.

Results

Table 1 gives estimates of the prevalence of stunting, wasting and underweight in children below five years of age in India and across the major states of the country. The prevalence of stunting is the highest in Uttar Pradesh whereas the prevalence of wasting and the prevalence of underweight and wasting is the highest in Madhya Pradesh. In the rural areas, the prevalence of stunting, underweight and wasting has been found to be the highest in Uttar Pradesh, Madhya Pradesh and Bihar respectively. In the urban areas, on

the other hand, the prevalence of stunting is the highest in Uttar Pradesh whereas the prevalence of underweight and wasting is the highest in Madhya Pradesh. The prevalence of wasting is also higher in rural as compared to the urban areas across all states of the country accept Assam, Punjab and Rajasthan where the prevalence of wasting is almost the same in rural and urban areas. At the national level, all three indicators of child under-nutrition have lower prevalence in urban areas as compared to rural areas.

The prevalence of under-nutrition is in general higher in male than in female children (Table 2). There are however some states where the prevalence of under-nutrition is higher in female than in male children, although the difference is not substantial. The prevalence of stunting is higher in female than in male children in Bihar, Madhya Pradesh, Orissa and Uttar Pradesh whereas the prevalence of wasting is higher in female than in male children in Andhra Pradesh, Assam and Himachal Pradesh. On the other hand, the prevalence of underweight is higher in female than in male children in nine states of the country.

The birth interval is found to have a direct impact on the prevalence of stunting. In all states, the prevalence of stunting is lower in children with a birth interval of at least 36 months than in children with birth interval less than 36 months (Table 3). The prevalence of underweight is also lower in children with birth interval at least 36 months in general. The only exceptions are Andhra Pradesh and Rajasthan. The scenario is however not so straightforward in case of the prevalence of wasting as in eight states, the prevalence of wasting is higher in children with birth interval of at least 36 months as compared to the prevalence of wasting in children with a birth interval of less than 36 months.

All the three indicators of under-nutrition have been found to be higher in children with birth order 3 and above as compared to children with birth order less than 3 (Table 4). The difference between the two groups of children is the highest in Himachal Pradesh in case of stunting. At the national level, the prevalence of stunting in children with birth order 3 and above is more than 11 percentage points higher than the prevalence of stunting in children with birth order less than three.

The prevalence of stunting and underweight has been found to be higher in children belonging to poor households as compared to children belonging to non-poor households. At the national level, there was a significant difference in the prevalence of under-nutrition in children belonging to poor and non-poor households. The difference in the prevalence of child under-nutrition in children from poor households and in children from non-poor households has been found to be comparatively small in Tamil Nadu, Uttar Pradesh and Assam. Similarly, the prevalence of child under-nutrition has been estimated to be higher in Scheduled Castes/Tribes children compared to non Scheduled Castes/Tribes children in all states of the country. The educational status of the mother also has a direct impact on the nutritional status of the child as in all states, the prevalence of under-nutrition in children of uneducated mothers is higher than the prevalence of under-nutrition in children of educated mothers. The difference in the

prevalence of under-nutrition in children of uneducated mothers and children of educated mothers is the highest in Karnataka.

The body mass index (BMI) and the level of haemoglobin are the two indicators that are commonly used to measure the nutritional status of women. A woman is classified as underweight if her BMI is less than 18.5 kg/m^2. On the other hand, if the haemoglobin level of the woman is less than 12 g/dl then she is classified as anaemic. On the basis of these criteria, the prevalence of underweight in mothers has been found to be the highest in West Bengal (47.0 percent) and Bihar (44.8 percent) but the lowest in Kerala (15.7 percent). On the other hand, the prevalence of anaemia in mothers has been found to be the highest in Assam but the lowest in Kerala. Similarly, the prevalence of underweight in mothers has been found to be relatively lower in the urban areas as compared to that in the rural areas in all states of the country with the only exception of Rajasthan where the prevalence of underweight in mothers has been found to be relatively higher in the urban areas. The prevalence of anaemia in mothers has also been found to be higher in the rural areas than in the urban areas in all major states except Bihar, Punjab and Uttar Pradesh. The nutritional status has also been found to be poor in women from poor households than in women from non-poor households.

Table 7 presents the Spearman's rank order correlation coefficient between the rank of the state in child under-nutrition and the rank of the state in mother under-nutrition in different population sub-groups. The table shows that the rank order correlation coefficient is statistically significant in all but two population sub-groups - poor households and educated mothers. The table clearly highlights the importance of the nutritional status of the mother in deciding the nutritional status of the child. It is obvious from the table that improving the nutritional status of women is an essential and a priori condition for improving the nutritional status of children.

Table 8 presents results of the logistic regression analysis. The dependent variable used in the logistic regression analysis is the weight of the child which is a dichotomous variable. If the child is underweight then the dependent variable takes the value 1, otherwise, it takes the value 0. Five models have been fitted. The first model considers only child related variables as explanatory variables. The next two models take into account mother related variables also whereas the last two models take into account household level factors. Results of the analysis are in expected directions. The odds of the child being underweight increase with the increase in birth order, delay in initiating breast feeding and age of the child but decrease with the increase in the birth interval and the age of the mother at the first birth. This shows that birth spacing has a very strong impact on the nutritional status of children. On the other hand, odds of a child being underweight decrease with the increase in the education of the mother and her nutritional status. Similarly, odds of a child being underweight decrease with the increase in the economic status of the household. The table also shows that odds of a child being under weight are comparatively higher in Scheduled Castes and Scheduled Tribes children than in non-Scheduled Castes/Tribes children. Finally, odds of a child being underweight are lower in rural than in urban areas.

Conclusions

Child under-nutrition remains a major public health and development challenge that India is facing today. The present analysis suggests that a multi-dimensional approach is required to address this challenge. An important dimension of child under-nutrition, as the present analysis confirms, is the nutritional status of the mother. If the nutritional status of the mother is poor then there is a high probability that the nutritional status of the child will also be poor. This means that efforts directed towards improving the nutritional status of children must also incorporate efforts that are directed towards improving the nutritional status of women. In other words, the mother and the child should be treated as a dyad in all planning and programming for addressing child under-nutrition. This is, unfortunately, not the case at present as efforts directed towards reducing child under-nutrition pay little attention to the nutritional status of the mother. There is a need of adopting an integrated approach covering both the mother and the child towards reducing the prevalence of child under-nutrition in the country.

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Table 1

Prevalence of stunting, wasting and underweight in children by residence across major states of India 2005-06.

states/country	Stunting			Underweight			Wasting		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Andhra Pradesh	45.8	37.0	42.7	35.1	28.3	32.7	13.1	10.8	12.3
Assam	47.4	35.2	46.1	37.7	26.3	36.4	13.5	14.2	13.6
Bihar	56.7	48.2	55.7	57.1	48.4	56.1	27.5	25.6	27.3
Gujarat	54.5	46.4	51.5	48.2	39.0	44.7	20.1	16.1	18.6
Haryana	47.8	38.2	45.5	41.1	35.3	39.7	20.1	17.7	19.5
Himachal Pradesh	39.5	27.2	38.3	37.6	24.1	36.3	20.0	15.2	19.5
Karnataka	47.6	36.3	43.6	41.1	31.3	37.6	18.4	16.7	17.8
Kerala	25.5	22.4	24.6	26.2	15.0	22.7	18.2	10.5	15.8
Madhya Pradesh	51.4	44.4	49.8	62.5	51.2	59.9	36.4	31.9	35.4
Maharashtra	49.3	42.4	46.3	41.5	30.7	36.8	18.2	13.9	16.3
Orissa	46.6	35.2	45.1	42.5	30.4	40.9	20.6	13.5	19.6
Punjab	37.2	35.3	36.5	26.5	21.3	24.6	8.9	8.9	8.9
Rajasthan	46.6	34.7	44.1	42.8	31.2	40.4	20.4	20.9	20.5
Tamil Nadu	31.9	30.9	31.5	32.6	26.8	30.0	22.8	20.6	21.8
Uttar Pradesh	58.0	50.2	56.5	44.1	35.0	42.3	15.4	13.0	14.9
West Bengal	48.0	29.5	44.3	42.0	24.8	38.6	17.6	13.8	16.8
India	50.7	39.9	48.1	45.7	32.8	42.5	20.8	16.8	19.8

Source: IIPS and Macro International (2007)

Table 2

Prevalence of stunting, wasting and underweight in children by sex across major states of India, 2005-06.

States/Country	Stunting		Underweight		Wasting	
	Male	Female	Male	Female	Male	Female
Andhra Pradesh	42.8	42.6	31.8	33.8	12.0	12.7
Assam	46.8	45.3	34.2	38.6	12.8	14.4
Bihar	54.3	57.3	54.6	57.9	28.8	25.5
Gujarat	51.6	51.4	46.8	42.3	18.9	18.4
Haryana	46.6	43.9	40.3	38.9	20.5	18.0
Himachal Pradesh	40.6	35.8	36.7	35.9	19.0	20.0
Karnataka	44.6	42.6	38.6	36.5	18.2	17.4
Kerala	25.8	23.2	23.9	21.4	16.2	15.3
Madhya Pradesh	49.4	50.2	59.4	60.4	37.1	33.6
Maharashtra	47.6	44.7	36.7	36.8	17.3	15.2
Orissa	43.5	46.6	39.8	42.0	20.5	18.6
Punjab	36.6	36.3	23.7	26.0	9.5	8.1
Rajasthan	44.8	43.3	41.1	39.6	21.0	20.0
Tamil Nadu	33.0	29.7	31.7	28.0	23.9	19.4
Uttar Pradesh	55.9	57.1	41.2	43.5	15.1	14.8
West Bengal	44.7	43.9	37.2	40.0	17.8	15.8
India	48.1	48.0	42.0	43.0	20.5	19.1

Source: IIPS and Macro International (2007)

Table 3

Prevalence of stunting, wasting and underweight in children by birth interval in months across major states of India 2005-06.

State/country	Stunting		Underweight		Wasting	
	<36	>=36	<36	>=36	<36	>=36
Andhra Pradesh	46.6	44.7	33.2	35.0	12.4	12.0
Assam	54.3	43.7	45.0	36.0	14.1	17.2
Bihar	58.8	57.8	58.8	58.7	29.1	25.5
Gujarat	58.4	43.9	48.6	38.0	17.4	17.5
Haryana	52.9	42.4	46.0	41.4	19.7	22.3
Himachal Pradesh	44.4	40.4	42.4	36.0	21.7	22.5
Karnataka	48.9	41.7	42.1	35.0	18.3	18.1
Kerala	27.7	25.0	31.3	22.1	21.6	13.4
Madhya Pradesh	53.4	47.3	63.4	59.7	36.2	36.2
Maharashtra	54.5	43.2	42.6	34.6	16.6	18.8
Orissa	51.1	45.1	46.6	40.8	21.4	21.5
Punjab	44.2	35.4	31.6	23.4	11.2	7.5
Rajasthan	46.8	44.8	41.6	44.7	19.5	24.2
Tamil Nadu	39.9	27.4	20.6	20.9	23.0	20.4
Uttar Pradesh	59.7	54.9	44.4	42.8	14.3	17.3
West Bengal	50.4	43.7	44.2	38.3	19.9	17.1
India	53.7	47.0	46.9	42.8	20.6	20.8

Source: IIPS and Macro International (2007)

Table 4
Prevalence of stunting, wasting and underweight in children by birth order across major states of India 2005-06.

Country/state	Stunting		Underweight		Wasting	
	<3	>=3	<3	>=3	<3	>=3
Andhra Pradesh	41.5	46.9	31.7	36.2	11.6	14.9
Assam	42.0	51.8	30.7	44.4	11.5	16.4
Bihar	51.3	59.2	50.3	60.7	26.4	27.9
Gujarat	48.3	56.9	42.3	48.9	18.3	19.2
Haryana	42.6	50.6	36.8	44.8	18.1	21.9
Himachal Pradesh	33.7	51.4	32.8	46.3	17.8	24.6
Karnataka	40.5	50.9	34.4	45.4	16.5	21.0
Kerala	22.9	32.5	20.5	33.2	15.2	18.5
Madhya Pradesh	46.4	53.1	55.0	64.7	33.6	37.1
Maharashtra	44.4	51.1	34.8	42.0	15.6	18.1
Orissa	39.4	54.1	35.7	49.1	18.4	21.4
Punjab	32.4	47.2	20.6	35.1	8.0	11.4
Rajasthan	39.9	48.1	35.1	45.4	19.4	21.6
Tamil Nadu	28.9	39.8	27.3	38.7	19.8	28.4
Uttar Pradesh	53.0	59.2	37.8	45.8	13.7	15.9
West Bengal	40.3	53.0	35.7	44.6	16.1	18.2
India	43.3	54.4	37.4	49.4	18.2	22.0

Source: IIPS and Macro International (2007)

Table 5
Prevalence of under-nutrition among mothers in major states of India 2005-06

Country/state	Underweight			Anaemic		
	Rural	Urban	Total	Rural	Urban	Total
Andhra Pradesh	45.6	23.3	38.3	70.8	66.0	69.2
Assam	41.8	29.9	40.4	74.8	67.2	74.0
Bihar	46.3	33.6	44.8	70.2	75.6	70.8
Gujarat	49.0	27.4	41.0	63.4	55.7	60.6
Haryana	40.0	25.2	36.5	64.5	62.4	64.0
Himachal Pradesh	36.9	19.4	35.3	47.1	40.9	46.5
Karnataka	41.2	28.1	36.6	55.3	49.6	53.3
Kerala	17.9	10.9	15.7	35.9	34.7	35.5
Madhya Pradesh	45.2	33.1	42.4	65.0	54.3	62.5
Maharashtra	47.7	30.4	40.1	56.4	49.9	53.6
Orissa	44.8	31.6	43.0	66.6	55.6	65.2
Punjab	22.3	17.0	20.4	42.9	49.3	45.2
Rajasthan	39.7	40.1	39.8	60.2	53.6	58.8
Tamil Nadu	33.9	20.6	28.0	59.8	52.4	56.5
Uttar Pradesh	38.6	27.9	36.5	55.8	57.1	56.0
West Bengal	51.1	31.5	47.0	69.3	65.0	68.4
India	42.4	28.0	38.8	62.5	56.1	61.0

Source: IIPS and Macro International (2007)

Table 6
Prevalence of under-nutrition among mothers by economic status of the household in major states of India 2005-06.

Country/state	Underweight		Anaemia	
	Poor	Non-poor	Poor	Non-poor
Andhra Pradesh	52.2	31.9	73.8	67.2
Assam	44.7	33.3	76.2	70.2
Bihar	51.0	33.6	70.2	71.8
Gujarat	53.6	36.3	67.6	57.9
Haryana	54.9	31.8	70.7	62.2
Himachal Pradesh	39.2	34.9	52.7	45.8
Karnataka	48.2	30.3	57.3	51.2
Kerala	24.5	15.2	37.7	35.4
Madhya Pradesh	46.0	35.2	66.8	54.0
Maharashtra	52.9	35.2	60.2	51.0
Orissa	49.9	30.3	68.5	59.0
Punjab	38.0	18.4	49.5	44.8
Rajasthan	43.6	36.3	63.4	54.6
Tamil Nadu	39.0	24.0	67.6	52.5
Uttar Pradesh	42.5	29.2	56.9	55.0
West Bengal	55.9	32.9	71.7	63.1
India	47.6	30.7	65.7	56.5

Source: IIPS and Macro International (2007)

Table 7

Rank correlation coefficient between proportion of mothers underweight and the proportion of children underweight in different population sub-groups in India 2005-06.

Proportion of children underweight	Proportion of mothers underweight							't'
	Rural	Urban	Poor	SC/ST	Educated	Uneducated	Total	
Rural	0.61**							2.85
Urban		0.58**						2.68
Poor			0.43					1.78
SC/ST				0.74***				4.09
Educated					0.42			1.75
Uneducated						0.59**		2.74
Total							0.71***	3.79

Source: Authors' calculations

Table 8
Odds ratio showing the variation in underweight among children under age 5 year in India NFHS-3

Background characteristics		Model-1	Model-2	Model-3	Model-4	Model-5
Birth order	1-2®					
	3-5	1.329***	1.305***	1.155***	1.119***	1.118***
	6+	1.831***	1.819***	1.473***	1.355***	1.349***
Previous birth interval	<24 months®					
	24-35 months	0.946	0.939	0.929*	0.926*	0.930*
	36-47 months	0.907**	0.902**	0.894**	0.883**	0.886**
	>=48 months	0.767***	0.804***	0.806***	0.813***	0.819***
When put to breast	within 1 hour®					
	within 1-24 hours	1.184***	1.182***	1.134***	1.136***	1.171***
	within 1-24 days	1.360***	1.332***	1.199***	1.183***	1.221***
Age of mother at first birth	<20 years®					
	20-24 years	0.854***	0.903***	0.98	1.019	1.022
	>=25 years	0.600***	0.703***	0.848**	0.897	0.907
Age of child	0 year®					
	1 year	1.614***	1.579***	1.588***	1.613***	1.622***
	2 year	1.751***	1.779***	1.779***	1.814***	1.809***
	3 year	1.764***	1.803***	1.795***	1.830***	1.835***
	4 year	1.663***	1.708***	1.679***	1.720***	1.729***
Sex of child	Male®					
	Female	1.067**	1.066**	1.059*	1.049	1.039

Background characteristics		Model-1	Model-2	Model-3	Model-4	Model-5
BMI of mother	Under-weight®					
	Normal		0.606***	0.625***	0.659***	0.663***
	Over-weight		0.311***	0.373***	0.462***	0.471***
	Obese		0.189***	0.239***	0.313***	0.299***
Education of Mother	No education®					
	Primary			0.756***	0.849***	0.858***
	Secondary			0.583***	0.779***	0.789***
	Higher			0.326***	0.539***	0.542***
Economic status	poorest®					
	Poorer				0.782***	0.790***
	middle				0.636***	0.651***
	richer				0.533***	0.534***
	richest				0.380***	0.383***
Caste of house head	SC/ST®					
	Others					0.833***
Place of residence	Urban®					
	Rural					0.922*
Constant		0.403	0.556	0.753	0.932	1.086

Remarks: *p<0.1, **p<0.05, ***p<0.01
Source: Authors' calculations

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Level of Immunisation among Children Aged 12-23 Months in Madhya Pradesh

BP Thiagarajan

Background

Childhood immunisation is a simple preventive health care service. It is also a good indicator of the accessibility and the outreach of the health care delivery system - public or private. The level of immunisation of children is mainly influenced by both supply and demand factors. The supply factors are related to the uninterrupted supply of vaccines to the public through the health care services delivery system. The demand factors, on the other hand, are determined by the knowledge level of the family and the community about immunisation, type of care given to the child, accessibility of the family to the health facilities, commitments of the family to return to the health facility to complete the immunisation schedule etc. It is well-known that immunisation of infants and young children can protect them from 12 serious diseases. It is also well known that control of vaccine preventable diseases (VPD) can reduce morbidity and mortality in children considerably. In this context, universal immunisation of children against six VPDs is perhaps the most cost effective yet effective public health intervention to reduce child mortality and morbidity. Because of this fact, immunisation services to children are available free of cost in all public health facilities in the country throughout the year.

The proportion of children aged 12-23 months fully immunised is the commonly used indicator to assess the success of the immunisation efforts. The available evidence, however, indicates that this proportion varies widely across the states of the country and inter-state differentials in this proportion have persisted over time despite improvements in this proportion. The variation in the proportion of children aged 12-23 months fully immunised across states also indicates the variation in the organisational efficiency and administrative capacity of the public health care delivery system across the states of the country. The performance in terms of the immunisation status of children aged 12-23 months reflects the performance of the public health care delivery system.

In India concerted effort towards universal immunisation of children against six vaccine preventable diseases started in 1978 when the Expanded Programme of Immunisation was launched. In 1985, Government of India launched the Universal Immunisation Programme which aimed at immunising all children of the country against the six vaccine preventable diseases - Diphtheria, Tetanus, Whooping Cough, Poliomyelitis and Measles. As a result of these efforts, the proportion of children aged 12-23 months of age has shown an increasing trend in the country and in all of its states. Similarly, in more than two third (68 percent) districts of the country, the proportion of children 12-23 months of age fully immunised has shown an increasing trend during the period 2002-04 through 2012-13 (Table 1). There is, however, noticeable variation not only in the level of this proportion but also in the rate of increase in this proportion across the states (Tables 2 and 3).

Among different states of India, the proportion of children 12-23 months of age fully immunised is comparatively low in states located in the northern region of the country whereas this proportion is relatively high in the southern part of the country. Like any other northern states, the proportion of children aged 12-23 months of age is very low in Madhya Pradesh. This proportion actually decreased from 25 percent in 1992-93 to 20 percent in 1998-99 but increased to 40 percent in 2005-06 and to 56 percent in 2015-16 according to the fourth round of the National Family Health Survey (Government of India, 2016). This trend indicates that Madhya Pradesh is still to go a long way to achieve the goal of universal immunisation of children.

Objectives

It is in the above context that the present analyses current levels and past trend in the proportion of children aged 12-23 months fully immunised in Madhya Pradesh and compares the achievement of Madhya Pradesh with other states of the country, especially states which are known as the Empowered Action Group (EAG) states. These include, in addition to Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Uttar Pradesh, Uttarakhand, Odisha and Rajasthan. The paper also attempts to analyse the variation in the proportion of children aged 12-23 months fully immunised across the districts of the state. The inter-district disparity in this proportion appears to have persisted over time. It is argued that the immunisation coverage of children in the state can be increased substantially just by reducing and ultimately eradicating the within state disparity or inequality.

Data source

The analysis is based on the data available through the Annual Health Survey (AHS) programme of the Government of India. Under this programme, three rounds of household survey were carried out by the Registrar General and Census Commissioner of India in states which constitute the Empowered Action Group (EAG) states. The first

round of the AHS was carried out in 2010-11. Data available through the 2010-11 round of the AHS serves as the baseline for the present analysis. Subsequently, two updation rounds have been carried out by the Registrar General and Census Commissioner - one in 2011-12 and the second during 2012-13. In addition, data available through the 2011 population census and the National Family Health Survey 2005-06 have also be used in the analysis.

Results and Discussion

About Madhya Pradesh. Madhya Pradesh is the second largest state in terms of area but sixth most populous state of the country according to the 2011 population census. The state had recorded the sixth highest decadal population growth rate in the country during the period 2001-11. The literacy rate in the state is the eighth lowest in the country while the proportion of children aged 0-14 completed years to the total population is the fourth highest. The state has the dubious distinction of having the highest infant mortality rate in the country. According to the sample registration system, the infant mortality rate in the state was 52 infant deaths per 1000 live births in 2014 which is well above the national average of 39 infant deaths per 1000 live births (Government of India, 2016). Because of the large geographical area, the population density in the state (308 per square km) is lower than the national average. On the other hand, more than 35 percent of the population of the state is either Scheduled Castes or Scheduled Tribes. Scheduled Castes and Scheduled Tribes are known for misconceptions and mistaken beliefs, especially about immunisation of children. The state has a high proportion of non-institutional deliveries and low level of contraceptive use. These and other obstructing factors pull the proportion of fully immunised children down in the state.

Immunisation status. According to the Annual Health Survey, the proportion of fully immunised children aged 12-23 months in the state recorded 21 percent increase from 54.9 percent in 2010-11 to 66.4 percent in 2012-13. Among the nine EAG states where the Annual Health Survey was carried out by the Census Commissioner and the Registrar General of India, the increase in the proportion of children aged 12-23 months fully immunised in the state was the third lowest in Madhya Pradesh, next to Uttar Pradesh and Assam only (Table 3).

Among the nine states that constitute the EAG states, there were 90 out of 248 districts (32 percent) where the proportion of fully immunised children was estimated to be less than 50 percent at the baseline - in 2010-11. In Madhya Pradesh, the proportion of fully immunised children was estimated to be less than 50 percent in 16 out of 45 (36 percent) districts that existed in 2010-11. However, at the second updation (2013-14), there were only 7 out of 45 districts (16 percent) in the state where the proportion of children fully immunised was estimated to be less than 50 percent. By comparison, in 47 out of 284 (17 percent) districts in the nine EAG states, the proportion of children fully immunised was estimated to be less than 50 percent. There is however no district in the

state where the proportion of fully immunised children exceeded 90 percent at the second updation of AHS in 2012-13.

The second updation of AHS also suggests that there were around 4 percent children aged 12-23 months in the state who did not receive any vaccination. This indicates poor efficiency of the implementation of immunisation related activities in the state. Moreover, it has also been observed that at least 30 percent of children aged 12-23 months were partially immunised (Table 4). Obviously, the proportion of children fully immunised can be increased significantly if the partially immunised children in the state are converted into fully immunised children through improving the administrative capacity and organisational efficiency of the Universal Immunisation Programme in the state.

According to the National Family Health Survey 2005-06, only about 25 percent of children aged 12-23 months in the state had vaccination card at the time of the survey. This proportion has however increased significantly to more than 90 percent at the time of the second updation of the Annual Health Survey in 2012-13. Availability of the vaccination card may be seen as an indicator of the care given to the child by the services provider. At the same time, the availability of the vaccination card may also be viewed as a reflection of the respect given by the parents of the child to the existing health care services delivery system.

The social, economic and cultural dynamics of the state has implications to the performance of the immunisation programme in the state as reflected through the proportion of children fully immunised. The obstructing factors which primarily pull the proportion of children aged 12-23 months who are fully immunised down in the state include high proportion of non-institutional deliveries (17.4 percent) and low levels of contraceptive use (63.2 percent). These factors also appear to contribute substantially to the variation in the proportion of fully immunised children across the districts.

Within Madhya Pradesh, the proportion of children aged 12-23 months immunised fully varies widely across the districts. According to the second updation round (2012-13) of AHS, this proportion was only around 31 percent in district Tikamgarh which is the lowest in the state. By contrast, more than 85 percent children aged 12-23 months were found to be fully immunised in district Indore (Table 6). Obviously, reduction in the inter-district disparity in the full immunisation coverage can go a long way in achieving the goal of universal child immunisation in the state. The strong inter-district disparity in the full immunisation coverage rate also appears to have persisted over time because of a number of endogenous and exogenous factors. Some of these factors are discussed below.

Urbanisation is low in the state. Less than 28 percent of the state population was living in the urban areas according to the 2011 population census. There are only five districts - Bhopal, Indore, Gwalior, Jabalpur and Ujjain - where more than 40 percent of the population lived in the urban areas. By contrast, in four districts - Dindori (4.6 percent), Alirajpur (7.8 percent), Sidhi (8.3 percent), Jhabua (9.0 percent) and Seoni (11.9 percent) - there is little urbanisation. Large proportion of rural population

combined with low population density and scattered settlement of villages leads to inaccessibility of health services thereby lowering the level of full immunisation.

The theory of "inverse equity hypothesis" can be applied to analysing the inter-district disparity in full immunization coverage rate in Madhya Pradesh. This hypothesis envisages that public health interventions tend to increase the inequality or disparity in coverage initially because the coverage will increase initially in those children who are relatively better off. It is only when the wealthy children reach the level of improvement beyond which further improvement is unlikely to make more progress, then the poor begin to catch up and the inequality gap begins to reduce (Victoria et al, 2000). Thus the timing factor is important in reducing the inter-district disparity in the full immunisation coverage rate in the state. The inverse-equity hypothesis is very much applicable to Madhya Pradesh as Indore, Bhopal and Jabalpur districts are amongst the most developed districts of the state and the full immunisation coverage rate in these districts is the highest in the state. At the same time, districts Tikamgarh, Chattarpur, Barwani and Dindoi are amongst the most backward districts of the state in terms of the degree of urbanisation, population density, sex ratio, female literacy etc. In these districts, the proportion of fully immunised children is the lowest in the state. It appears that a certain minimum threshold of social and economic development is a pre-condition to achieve the goal of universal child immunisation in these districts. For example, the proportion of home deliveries and the unmet need of family planning is very high in Dindori, Chattarpur, Tikamgarh and Damoh districts and proportion of fully immunised children is also very low in these districts. There are 10 districts in Madhya Pradesh which are termed as hot-spot districts because of high infant and maternal mortality and because of low coverage of full antenatal care, institutional deliveries and full immunisation of children aged 12-23 months. These districts are: Dindori, Sidhi, Tikamgarh, Chattarpur, Damoh, Sagar, Damoh, Shadol Satna, Rewa and Panna. In addition, health infrastructure variables like proportion of health sub centres located in villages and number of health centres are lower in those districts where the full immunisation coverage rate is low.

Conclusions

In the wake of MDGs, SDGs and the recently launched Mission Indradhanush, national immunisation coverage rates have to be improved and expanded, especially in children from tribal communities who are traditionally left out of the public health care system. In Madhya Pradesh, concerted efforts are very much required to enhance the demand side of child immunisation such as motivating parents to fully vaccinate their children and streamlining the supply side of child immunisation to improve the accessibility of immunisation services. Further analysis of the recent data on child immunisation by social class is expected to throw more light regarding better programme implementation in the state, which is the need of the hour. Zero tolerance policy should be adopted by the government with regard to children who have received no vaccination. The village which has even one child with no vaccination should be identified and

necessary steps should be undertaken to fully vaccinate these children. An immunisation programme designed for Scheduled Tribes will be an appropriate strategy for the state.

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Table 1
Full Immunisation in terms of number of districts in Madhya Pradesh and All AHS states from Baseline survey to AHS 2nd Updation Round

State	0-30	30-50	50-70	70-90	90 & above	Total
Madhya Pradesh						
Baseline (2010-11)	2	14	24	5	0	45
2nd updation (2012-13)	0	7	23	15	0	45
All AHS states						
Baseline (2010-11)	24	66	112	80	2	284
2nd updation (2012-13)	3	44	128	107	2	284

Source: Author's calculations

Table 2
Percentage of children age 12-23 months who received vaccinations at any time and percentage with a vaccination card seen by the interviewer, by state, India, 2005-06

Country/State	All basic vaccinations	No vaccination	Vaccination card available
India	43.5	5.1	37.5
North			
Delhi	63.2	9.1	30.4
Haryana	65.3	7.8	27.0
Himachal Pradesh	74.2	1.9	57.5
Jammu and Kashmir	66.7	4.5	49.1
Punjab	60.1	6.6	38.5
Rajasthan	26.5	5.5	20.8
Uttarakhand	60.0	9.1	48.4
Central			
Chhattisgarh	48.7	2.5	33.1
Madhya Pradesh	40.3	5.0	25.4
Uttar Pradesh	23.0	2.7	20.3
East			
Bihar	32.8	7.0	34.4
Jharkhand	34.2	4.4	40.7
Orissa	51.8	11.6	54.5
West Bengal	64.3	5.9	71.9
North East			
Arunachal Pradesh	28.4	24.1	35.0
Assam	31.4	15.2	46.6
Manipur	46.8	6.5	51.3
Meghalaya	32.9	16.5	32.6
Mizoram	46.5	7.0	38.7
Nagaland	21.0	18.4	24.9
Sikkim	69.6	3.2	59.7
Tripura	49.7	14.7	67.7
West			
Goa	78.6	0.0	74.3
Gujarat	45.2	4.5	36.4
Maharashtra	58.8	2.8	46.1

Country/State		All basic vaccinations	No vaccination	Vaccination card available
South				
	Andhra Pradesh	46.0	3.8	37.2
	Karnataka	55.5	6.9	52.8
	Kerala	75.3	1.8	75.3
	Tamil Nadu	80.9	0.0	36.9

Source: IIPS and Macro International (2007)

Table 3
Immunisation status for all states DLHS-4 and AHS second Updation Round (2012-13)

States	Full immunisation coverage rate		
	Total	Rural	Urban
Goa	89.1	89.0	89.4
Chandigarh	85.8	87.1	85.2
Sikkim	85.2	86.2	81.4
Kerala	82.5	81.7	83.3
West Bengal	79.5	80.8	76.2
Karnataka	77.6	76.4	79.5
Uttarakhand	79.6	na	na
Andaman	75.0	67.7	88.2
Chhattisgarh	74.1	na	na
Mizoram	71.2	59.9	82.0
Rajasthan	74.2	na	na
Punjab	68.4	67.2	70.7
Maharashtra	66.2	66.7	65.3
Puducherry	66.0	61.0	68.3
Bihar	69.9	na	na
Jharkhand	69.9	na	na
Himachal Pradesh	63.0	62.0	72.7
Andhra Pradesh	60.9	62.8	55.8
Assam	64.4	na	na
Tamil Nadu	56.2	58.6	53.1
Odisha	68.8	na	na
Madhya Pradesh	66.4	63.5	73.8
Manipur	54.1	46.5	69.2
Haryana	52.1	51.0	54.5
Arunachal Pradesh	49.2	44.6	63.6
Meghalaya	48.9	46.8	61.0
Tripura	48.0	44.1	65.0
Telengana	47.5	48.8	45.8
Uttar Pradesh	52.7	na	na
Nagaland	35.6	35.5	35.7

Note : DLHS4 for all states except AHS states (AHS second updation)

Table 4
Full immunisation coverage rate in EAG states

States	Full immunisation coverage rate
Uttarakhand	79.6
Rajasthan	74.2
Bihar	69.9
Jharkhand	69.9
Odisha	68.8
Madhya Pradesh	66.4
Assam	64.4
Uttar Pradesh	52.7

Source: AHS second Updation Round (2012-13)

Table 5
Child Immunisation details in Madhya Pradesh AHS Baseline and 2nd Updation Round

Particulars	2010-11	2012-13
Having immunisation card	85.3	90.5
Received full vaccination	54.9	66.4
Received partial vaccination	40.8	30.0
Not received any vaccination	4.3	3.6
Received BCG vaccine	94.2	95.7
Received 3 doses of DPT vaccine	66.6	76.3
Received 3 doses of polio vaccine	69.4	77.7
Received measles vaccine	80.7	85.4

Source: Annual Health Survey

Table 6
Level of immunisation among children 12-23 months in Madhya Pradesh by districts, AHS Second Updation Round

SN	State/ Districts	Immunisation status			
		Card seen	Full	Zero	Partial
Madhya Pradesh		90.5	66.4	3.6	30.0
1	Balaghat	98.3	82.5	2.8	14.7
2	Barwani	84.4	68.3	4.2	27.5
3	Betul	91.6	64.7	3.0	32.3
4	Bhind	90.5	71.3	3.4	25.3
5	Bhopal	96.1	71.9	2.1	26.0
6	Chhatarpur	82.8	43.5	4.7	51.8
7	Chhindwara	92.4	62.2	5.2	32.6
8	Damoh	81.9	42.4	6.2	51.4
9	Datia	93.1	63.5	6.2	30.3
10	Dewas	92.0	74.1	2.7	23.2
11	Dhar	92.8	69.8	2.3	27.9
12	Dindori	86.6	68.6	3.8	27.6
13	East Nimar	87.9	64.5	3.4	32.1
14	Guna	84.7	69.2	3.0	27.8
15	Gwalior	97.5	76.3	0.9	22.8
16	Harda	92.2	61.3	4.4	34.3
17	Hoshangabad	95.4	67.4	1.9	30.7
18	Indore	97.7	85.5	1.7	12.8
19	Jabalpur	95.1	70.5	4.3	25.2
20	Jhabua	76.2	57.4	10.9	31.7
21	Katni	92.0	63.6	1.4	35.0
22	Mandla	79.1	51.3	6.8	41.9
23	Mandsaur	92.5	67.5	3.9	28.6
24	Morena	91.0	73.4	1.5	25.1
25	Narsimhapur	97.7	70.5	3.5	26.0
26	Neemuch	96.0	74.7	2.2	23.1
27	Panna	79.8	38.4	6.2	55.4
28	Raisen	87.2	53.2	3.8	43.0
29	Rajgarh	92.4	75.9	2.7	21.4
30	Ratlam	96.5	82.2	2.1	15.7
31	Rewa	90.3	61.1	2.0	36.9
32	Sagar	82.5	55.0	5.2	39.8
33	Satna	87.6	54.7	3.4	41.9
34	Sehore	92.9	77.6	4.3	18.1

SN	State/ Districts	Immunisation status			
		Card seen	Full	Zero	Partial
35	Seoni	92.8	65.1	2.6	32.3
36	Shahdol	81.9	48.3	8.1	43.6
37	Shajapur	97.2	77.4	1.9	20.7
38	Sheopur	89.3	64.9	4.7	30.4
39	Shivpuri	91.0	64.3	2.8	32.9
40	Sidhi	80.0	60.1	9.1	30.8
41	Tikamgarh	77.2	31.5	5.7	62.8
42	Ujjain	95.2	81.1	2.5	16.4
43	Umaria	79.1	40.8	10.9	48.3
44	Vidisha	94.6	48.9	3.2	47.9
45	West Nimar	95.2	68.1	0.8	31.1

Source: Annual Health Survey 2012-13

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Dynamics of Population Growth in Uttar Pradesh A Study of Moradabad Division

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Introduction

The state of Uttar Pradesh is divided into 71 districts under 18 divisions as they existed at the time of 2011 census. Moradabad Division is one of the 18 Divisions of the state. Administratively, Moradabad Division is divided into 4 districts, 20 sub-districts (Tahsils), 36 Community Development (CD) blocks, 62 towns (46 statutory towns and 16 census towns) and 7063 villages as they existed at the time of 2011 census. The Division is located between $28^0$15' N and $29^0$45' N latitudes and $78^0$0' E and $79^0$30' E longitudes. It is bounded by Uttarakhand in the north, Aligarh division of Uttar Pradesh in the south, Bareilly division in the east and Saharanpur and Meerut divisions in the west. Geographically, Moradabad division is a part of Northern Upper Ganga Plain and regionally, it is part of Western Uttar Pradesh. The division ranks 9th in the state in terms of the geographical area accounting for around 5.4 percent of the area of the state (2,40,928 Km^2). District Bijnor with an area of 4,561 Km^2 is the largest district in the division in terms of geographical area whereas district Jyotiba Phule Nagar with an area of 2,249 Km^2 is the smallest one. The Division is the 8th most populous division of Uttar Pradesh with total population of 12.6 million (6.6 million males and 6.0 million females) accounting for 6.3 percent of the total population of the state according to the 2011 population census. The Division accounted for 6.8 per cent of the total increase in the population of Uttar Pradesh during 2001-2011.

This paper presents a comprehensive picture of population and development transition in Moradabad division with a view to highlight population concerns and development challenges that the Division faces. Moradabad Division is one of the most densely populated and under-developed Division of Uttar Pradesh. At the same time, population transition in the Division remains slower than that in the state. Decline in the child sex ratio, especially in urban areas and decline in the work participation rate,

especially in rural areas of the Division is a cause of concern. The Division also needs attention and support for its significant share of Scheduled Castes (20.4 percent) and Muslim (45.6 percent) population. As such, the Division presents a distinctive prospect to study the dynamics of population growth and social and economic development and to explore the linkages between the two.

The analysis is based primarily on the data available through the decennial censuses, sample registration system and through the Annual Health Survey carried out by the Registrar General and Census Commissioner of India. In addition, evidence available through the National Family Health Survey has also been used. The analysis has been carried out for the Division as a whole in relation to the state and separately for each district of the Division.

Socio-economic and Demographic Profile

According to the 2011 population census, the population of the Moradabad division was 12.6 million at 0.00 hours of 1st March 2011. About 72 percent of the population (9.1 million) in the Division lives in the rural areas whereas the urban population accounts for 28 percent (3.5 million) of the population of the Division. Among different districts of the Division, Moradabad district is the most populous with a population of 4.8 million (37.8 percent of the Division population) while Jyotiba Phule Nagar district accounts for only 14.6 percent of the Division population. District Moradabad district also has the largest rural population of 3.2 million (35.2 percent of the rural population of the Division as well as the largest and urban population of 1.6 million (44.4 percent of the urban population of the Division). Table 1 presents the socio-economic and demographic characteristics of the population of the Division and its constituent districts for 2001 and 2011.

During the ten years between 2001 and 2011, the population of the Division increased by about 2.2 million which implies a decadal growth of 21.2 percent. Population growth has been more rapid in urban than in rural areas of the Division. The urban population of the Division increased by 28 percent during the ten years between 2001 and 2011 whereas the rural population increased by just around 20 percent. The decadal population growth has been the highest in Moradabad district (25.2 percent). The decadal growth in the rural population has been the highest in Jyotiba Phule Nagar district (22.2 percent) whereas the decadal growth in the urban population has been the highest in Moradabad district (35.2 percent).

The density of the population in the Division remains well above the state average which indicates that the Division is more densely populated than the rest of the state. Moreover, the population density of the Division increased by 177 absolute points between 2001 and 2011and this increase has been higher than the increase in the population density in the state. District Moradabad is the most densely populated district of the Division with a population density of 1283 inhabitants per km^2 followed by the

Rampur district (987 inhabitants per km^2). Population density is the lowest in the Bijnor district (807 inhabitants per km^2).

The population sex ratio in the Division is unfavourable to females. At the 2011 population census, there were 910 females for every 1000 males in the Division. Although the population sex ratio is getting increasingly favourable to females, yet the female deficit in the population persists. The female deficit is relatively the highest in Moradabad district (906 females for every 1000 males) followed by Rampur district whereas it is relatively the lowest in the Bijnor district (917 females for every 1000 males). However, the increase in the population sex ratio has relatively been the slowest in the Bijnor district but relatively the fastest in the Moradabad district. Increase in the population sex ratio has also been more rapid in the rural as compared to the urban population.

Almost 2 million population of the division is below 7 years of age – 1.5 million rural and 0.5 million urban. The proportion of population aged 0-6 years is relatively the highest in Moradabad district (16.4 percent) followed by Jyotiba Phule Nagar district (16.3 percent) while this proportion is relatively the lowest in Bijnor district (15.3 percent). During 2001-2011, the proportion of population aged 0-6 years decreased by 4.1 percentage points in the Division. This decrease was relatively the most rapid in the Rampur district (4.5 percentage points) but relatively the slowest in the Jyotiba Phule Nagar district (3.8 percentage points). There has been a marginal decrease in the population 0-6 years in the rural areas during 2001-2011 population aged 0-6 years increased albeit marginally in the urban areas.

Moradabad Division has recorded a marked decrease in the sex ratio of the population aged 0-6 years from 912 girls per 1000 boys in 2001 to 906 girls per 1000 boys in 2011. The decrease in this sex ratio has been more rapid in rural than in urban population. The decrease in the sex ratio of the population aged 0-6 years has been the most rapid in district Bijnor district followed by district Jyotiba Phule Nagar. However, the child sex ratio has increased in Moradabad and Rampur districts during 2001-11. The sex ratio of the population aged 0-6 years has increased in rural and urban areas in the Moradabad and Rampur districts of the division, although the increase has been marginal in the rural areas of the two districts.

More than 20 percent population of the Division is Scheduled Castes. The proportion of Scheduled Castes population decreased marginally from 17.14 percent in 2001 to 16.98 percent in 2011. By contrast, Scheduled Tribes have insignificant presence in the Division. The proportion of the Scheduled Castes population is the highest in Bijnor district (21.4 percent) but the lowest in Rampur district (13.2 percent). Growth of Scheduled Castes population in different districts of the Division has also been different. The growth has been the highest in district Jyotiba Phule Nagar (22.8 percent) but the lowest in district Rampur (19.6 percent).

About 53 percent of the population of the Moradabad division is Hindu and about 46 percent is Muslim. The proportion of Hindu population decreased substantially from 54.2 percent in 2001 to 52.8 percent in 2011. However, the proportion of Muslim

population increased considerably from 44.2 percent in 2001 to 45.6 percent in 2011. During this period, the proportion of Hindu population has decreased and the proportion of Muslim population has increased in the state of Uttar Pradesh as well as in the country. Such decrease in the proportion of Hindu population and increase in the proportion of Muslim population is very rapid in the Moradabad division than that of Uttar Pradesh and India as a whole. The proportion of the Muslim population is the highest in the Rampur district of the division (50.6 percent) and the lowest in the Jyotiba Phule Nagar district (40.8 percent). The over all growth of the Muslim population in the division during 2001-11 is 26.0 percent (24.6% in India and 25.2% in Uttar Pradesh) against the 18.7 percent growth of Hindu population (16.8% in India and 18.9% in Uttar Pradesh). Growth of Muslim population in the division is more rapid in urban than in rural areas. Growth of Muslim population in different districts of the division has been different. The growth of the Muslim population has been the highest in the Moradabad district (29.6 percent) but the lowest in the Bijnor district (21.8 percent).

The population sex ratio in both Scheduled Castes and Scheduled Tribes of the Division is higher than the state average. In Scheduled Tribes, the population sex ratio increased markedly from 840 females per 1000 males in 2001 to 886 females per 1000 males in 2011 whereas in Scheduled Tribes, it increased from 872 females per 1000 males to 900 females per 1000 males. The increase in the Scheduled Castes sex ratio has however been relatively the highest in Moradabad district but the lowest in the Bijnor and Rampur districts.

The population sex ratio in both Hindus and Muslims of the Moradabad division is lower than the state average. In Hindus, the population sex ratio increased markedly from 870 females per 1000 males in 2001 to 897 females per 1000 males in 2011 whereas in Muslims, it increased from 899 in 2001 to 926 in 2011. The population sex ratio in Hindus is relatively the highest in district Bijnor (902 females per 1000 males) but the lowest in district Rampur (891 females per 1000 males). The population sex ratio in Muslims is also the highest in district Bijnor (938 females per 1000 males) but the lowest in district Moradabad (918 females per 1000 males). The increase in the Muslims sex ratio has however been relatively the fastest in district Moradabad but the slowest in district Jyotiba Phule Nagar.

The number of literates in the Division increased from 4.00 million in 2001 to 6.43 million in 2011. This means that the effective literacy rate (number of literates aged 7 and above per 100 population aged 7 and above) increased from 48.4 percent in 2001 to 60.6 percent in 2011. The increase in the effective literacy rate has been more marked in females than in males. The female effective literacy rate increased from 36.3 percent in 2001 to 51.4 percent in 2011 whereas the male effective literacy rate increased from 59.0 percent to 69.0 percent during this period. As the result the gender gap in effective literacy rate in the Division decreased sharply during the decade.

Among the districts, the effective literacy rate is the highest in Bijnor (68.5 percent) followed by Jyotiba Phule Nagar (63.8 percent) but the lowest in Rampur (53.3

percent) and Moradabad (56.8 percent). In all districts of the Division, increase in female effective literacy rate has been relatively faster than male effective literacy rate so that the gender gap in the effective literacy rate has decreased. This reduction has however been the highest in Bijnor district but the lowest in Rampur district.

Total number of workers in the Division increased from 30.9 lakh in 2001 to 38.4 lakh in 2011. A person is classified as a worker in the population census if he or she has worked for at least one day during the year prior to the census. However, the work participation rate increased only marginally from 29.8 percent to 30.4 percent. The male work participation rate (48.2 percent) in the Division is however substantially higher than the female work participation rate (10.9) percent. The male work participation rate in Moradabad district decreased from 31.0 percent in 2001 to 29.7 percent in 2011 because of a very substantial decrease in the female work participation rate in the district. By contrast the female work participation rate changed little in Jyotiba Phule Nagar district but increased in other districts of the Division.

Another discerning feature of the Division is that the proportion of main workers to total workers decreased from 82.3 percent in 2001 to 77.1 percent in 2011 which indicates towards the marginalisation of the workforce in the Division. The decrease in this proportion has been more or less the same in all districts in the division. However, the proportion of female main workers to total female workers increased from 48.5 percent in 2001 to 50.9 percent in 2011 and the increase has been consistent in all districts except Moradabad district where the proportion of female main workers to total female workers decreased from 57.0 percent in 2001 to 51.7 percent in 2011. In the urban areas of the Division also, the proportion of urban female main workers to total urban female workers in the division decreased from 69.2 percent in 2001 to 66.5 percent in 2011. This proportion also decreased in Moradabad and Jyotiba Phule Nagar districts but increased substantially in Rampur district but marginally in Bijnor district.

The workforce in the Division is constituted largely by the workers engaged in agriculture - cultivators and agricultural labourers other than those engaged in plantation activities. The proportion of cultivators to total workers has however decreased between 2001 and 2011 but that of agricultural labourers has increased. This trend again indicates towards casualisation of labour force in the Division. There has also been a marginal decrease in the proportion of workers engaged in household industries whereas the proportion of other workers to total workers has shown an increasing trend. The decrease in the proportion of cultivators has been very pronounced in Rampur district. On the other hand, the proportion of workers in household industry increased in Moradabad and Rampur districts but decreased in Bijnor and Jyotiba Phule Nagar districts.

Growth Trends and Regional Disparities

During the 110 years between 1901 through 2011, the population of the Division increased from 2.5 million to 12.6 million with the period 1911-21 recording a decrease

from 2.60 million to 2.40 million. The net addition to the population also increased in every decade since 1921-31. During 2001-11, net addition to the population decreased marginally compared to the net addition during 1991-2001 Since 1981, the decadal population growth has shown a decreasing trend so that during 2001-2011, the population of the Division increased by only 21.9 percent (Table 3).

The increase in population has been different in different districts of the Division. In district Jyotiba Phule Nagar district, the increase has been the highest among all districts of the Division. By contrast, the net addition to the population has been the lowest in Rampur district. However, the decadal population growth decreased in all districts of the Division during the period 2001-2011. This decrease was very sharp in Bijnor district but marginal in Moradabad district (Table 3).

Regional Growth Trends

The population of the Division increased at an average annual growth rate of 1.98 percent per year during the period 2001-2011 which is higher than the national growth rate of 1.63 percent per year and the state average of 1.84 percent per year. The average annual population growth rate has been the slowest in the Bijnor district (1.62 percent per year) but the most rapid in the Moradabad district (2.25 percent per year). The growth of the population has slowed down considerably in all districts of the Division during the period 2001-11 compared to the period 1991-2001. This slow down has been the most rapid in Bijnor district but the slowest in Moradabad district.

In order to analyse the disparity in population growth across the districts of the Division, the coefficient of variation in the average annual population growth rate is calculated since 1901 through 2011 which shows that the disparity in population growth across districts was very high during 1920s and 1930s; high during 1960s. However, after 1960s, the coefficient of variation has decrease indicating a decrease in disparity. It was during 2001-11 that the coefficient of variation increased again.

Regional distribution

The distribution of the population across the districts of the Division has also changed over time. In 1901, Moradabad district accounted for 34.1 percent of the population of the Division while district Jyotiba Phule Nagar accounted for only 13.1 percent of the population of the Division. The corresponding proportion was 31.0 percent for the Bijnor district and 21.8 percent for the Rampur district. By 2011, the share of the Moradabad district increased to 37.8 percent while that of the Jyotiba Phule Nagar district increased to 14.6 percent but the share of Bijnor district to the population of the Division decreased to 29.2 percent and that of Rampur district decreased to 18.5 percent (Table 4). In other words, the population of the Division is getting increasingly concentrated in

Moradabad and Jyotiba Phule Nagar districts of the Division at the cost of Bijnor and Rampur districts.

Fertility Trends and Patterns. Population growth is determined largely by the natural population growth rate which is determined by the prevailing level of birth and death rates which, in turn, are influenced by the prevailing levels of fertility and mortality. Data available through the sample registration system suggest that the birth rate in Uttar Pradesh decreased from 39.6 live births per 1000 population in 1981 to 35.7 live births per 1000 population in 1991; 32.1 live births per 1000 population in 2001; and to 27.2 live births per 1000 population in 2011. On the other hand, total fertility rate decreased from 4.6 live births per woman of reproductive age in 2001 to 3.4 live births per woman of reproductive age in 2011.

Estimates of fertility indicators for the districts of the Division are available through Annual Health Surveys (AHS) 2010-11, 2011-12 and 2012-13. According to AHS 2010-11, the birth rate was the highest in Jyotiba Phule Nagar district (26.5) followed by Moradabad district (25.8). On the other hand, the birth rate was the lowest in the Bijnor district (24.5). AHS 2010-11 also suggests that Bijnor is the only district in the Division where total fertility rate was below the Division (3.7) and state average (3.6). Besides Bijnor district, total fertility rate was equal to the Division average in the Rampur and Jyotiba Phule Nagar districts. The three consecutive Annual Health Surveys 2010-11, 2011-12 and 2012-13 reveal that in all districts of the Division both birth rate and the total fertility rate have decreased over time. The decrease in the birth rate has however been the fastest in Rampur and Bijnor districts but the slowest in Jyotiba Phule Nagar district. Similarly, the decrease in total fertility rate has been the fastest in Bijnor district (Table 5).

Mortality Trends and Patterns. Like fertility, mortality has also decreased in the Moradabad division and in all the four districts of the Division. However, the quantum of the decrease has not been the same in all the four districts. Data available through the sample registration system reveal that the crude death rate in Uttar Pradesh decreased from 16.3 deaths per 1000 population in 1981 to 11.3 deaths per 1000 population in 1991; to 10.1 deaths per 1000 population in 2001; and to 7.9 deaths per 1000 population in 2011. The average death rate for the Division has however been estimated to be 8.2 deaths per 1000 population in 2011 which is well above the state average. Among the districts of the Division, the death rate varies from 9.1 deaths per 1000 population in Rampur district to a minimum of 7.7 in Bijnor district. Data available through the Annual Health Survey indicates that the death rate has decreased in all the four districts of the Division, although the rate of decrease is different in different districts. The decrease in the death rate has been the most rapid in Bijnor district. Similarly, the infant mortality rate also varies across the districts of the Division. In district Jyotiba Phule Nagar, 72 out of every 1000 new born fail to survive to their first birth day and this proportion is the highest among the four districts of the Division. By contrast, the infant mortality rate is estimated to be only 60 infant deaths per 1000 live births in Rampur district. The infant mortality rate has decreased in only two districts of the Division with the most rapid decrease in Rampur district. There has however been little change in the infant mortality

rate in Bijnor district while there has been an increased in the infant mortality rate in Jyotiba Phule Nagar district (Table 6).

Conclusions

The present analysis highlights intra-regional disparities in demographic situation in the Moradabad Division of Uttar Pradesh. Salient features of the demographic dynamics of the Division may be summarised as under:

- The child sex ratio (sex ratio in population aged 0-6 years) is getting increasingly unfavourable to the girl child. In Bijnor and Jyotiba Phule Nagar districts the decrease has been very rapid. One reason for this decrease may be the increase in sex selective abortions as the society of the Division is highly male dominated. This aspect needs to be examined further. Social values of girls and women are intrinsically linked to certain customs (dowry, lineage and death rights) as well as education and economic opportunities. Increased awareness and effective implementation of PNDT Act along with schemes incentivising girls and other social awareness programmes need to be carried out to reverse the trend in the child sex ratio in the Division. There is also a need to explore whether the female child deficit in the Division is technology induced (spread of technology for identifying sex of the foetus and its social diffusion effect) or influenced by social and economic factors or a combination of both.
- Scheduled Caste and Muslims constitute a major share of the population of the Division. The poor demographic scenario of the Division may be attributed largely to the poor demographic situation of Scheduled Castes and Muslims. This aspect may be further explored through a comparative analysis of demography by social class and religion.
- Effective literacy rate in the Division has increased but the female effective literacy rate is still below 48.6 percent, although the male-female gap in female literacy rate has decreased. Concerted efforts are required to increase the effective literacy rate in females. Universal elementary education to all girl children may be required in this context.
- The female work participation rate is quite low in the Division and it has decreased rapidly in one of the districts of the Division. Female Work Participation Rate (FWPR) is one of the robust indicators of development. As such, low FWPR in the Division is a matter of concern. FWPR is determined by a multitude of factors such as education, poverty, economic opportunities, social status of women and supporting facilities for care of young ones and elderly. There is a need to design and implement programmes within the existing provisions and schemes to improve women's work participation especially in areas that enhance their productivity and self-worth and lead to economic

empowerment. These may include promotion of group based enterprises for women especially through formation of self help groups for non-farm activities; access to credit and markets along with appropriate skills development; training to adolescent girls in non-traditional areas as well as in artisan work to promote self reliance among younger generation; strengthening MGNREGA activities with a focus on women workers to improve village infrastructure and connectivity to enhance market access.

- The Division has also witnessed increasing casualisation of the labour force. This indicates a decrease in the opportunities of full and regular employment in the Division and warrants appropriate programmatic corrections in the employment sector. Given this profile of the Division, more employment opportunities need to be created in agriculture and allied activities while support can be enhanced to make household industries more productive.
- Fertility in the Division remains well above the replacement level and there are notable intra-division spatial variations in the level of fertility. There is a need to examine the factors that are responsible for intra-division variations in fertility in the Division.
- It will be interesting to explore whether regional variations in population dynamics of the Division are the result of the inter-district variations in the level of social and economic development. It is well known that a certain threshold of social and economic development is necessary for hastening the pace of population transition. The prevailing population scenario suggests that such a threshold of social and economic development is still missing in most of the districts of the Division.

Table 1

Socio-economic and demographic characteristics in different districts of the Moradabad division, Uttar Pradesh, 2001-2011

Background Characteristics	Uttar Pradesh		Moradabad Division		Districts under Moradabad Division							
					Bijnor		Moradabad		Rampur		Jyotiba Phule Nagar	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Population composition (%)												
Male	52.7	52.3	53.1	52.3	52.7	52.2	53.3	52.5	53.2	52.4	53.0	52.4
Female	47.3	47.7	46.9	47.7	47.3	47.8	46.7	47.5	46.8	47.6	47.0	47.6
Rural	79.2	77.7	73.2	71.9	75.7	74.9	69.5	67.0	75.0	74.8	75.4	75.1
Urban	20.8	22.3	26.8	28.1	24.3	25.1	30.5	33.0	25.0	25.2	24.6	24.9
Child	19.0	15.4	20.2	16.1	19.7	15.3	20.3	16.4	20.7	16.2	20.2	16.3
Scheduled Castes	21.1	20.7	17.1	17.0	20.9	21.4	15.9	15.3	13.4	13.2	17.3	17.3
Scheduled Tribes	0.1	0.6	0.03	0.03	0.1	0.1	0.01	0.01	0.02	0.02	0.002	0.01
Hindu	80.6	79.7	54.2	52.8	56.4	55.2	53.8	52.1	47.0	46.0	59.9	58.4
Muslim	18.5	19.3	44.2	45.6	41.7	43.0	45.5	47.1	49.1	50.6	39.4	40.8
Sex Ratio (Females per 1000 males)												
Total	898	912	884	910	896	917	875	906	879	909	885	910
Rural	904	918	879	909	893	917	870	904	871	906	880	907
Urban	876	894	896	915	904	917	886	912	902	917	899	920
Scheduled Castes	900	908	873	900	881	903	861	899	869	891	882	908
Scheduled Tribes	934	952	840	886	898	926	877	817	511	729	714	843
Child	916	902	912	906	905	883	912	916	922	924	911	903

Background Characteristics	Uttar Pradesh		Moradabad Division		Districts under Moradabad Division							
					Bijnor		Moradabad		Rampur		Jyotiba Phule Nagar	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Effective literacy rate (%)												
Person	56.3	67.7	48.4	60.6	58.1	68.5	44.8	56.8	38.8	53.3	49.5	63.8
Male	68.8	77.3	59.0	69.0	68.8	76.6	54.9	64.8	48.2	61.4	62.6	74.5
Female	42.2	57.2	36.3	51.4	46.1	59.7	33.0	47.9	27.9	44.4	34.6	52.1
Rural	52.5	65.5	45.2	59.4	57.0	68.5	39.2	53.4	34.0	52.4	47.9	63.4
Urban	69.8	75.1	56.8	63.6	61.2	68.3	56.6	63.4	52.2	56.0	54.1	65.1
Crude work participation rate (%)												
Person	32.5	32.9	29.8	30.4	28.2	29.5	31.0	29.7	28.3	31.6	31.9	32.6
Male	46.8	47.7	47.3	48.2	46.4	48.0	47.9	47.7	47.1	49.8	47.6	47.6
Female	16.5	16.7	10.0	10.9	7.9	9.5	11.7	9.9	6.9	11.5	14.1	16.0
Rural	33.9	33.4	30.9	30.8	29.3	30.0	32.8	29.7	28.5	31.8	32.8	33.6
Urban	26.9	31.2	26.8	29.5	25.1	28.2	26.9	29.7	27.7	31.0	29.2	29.5
Workers by activity (%)												
Main	72.9	67.8	82.3	77.1	80.1	77.2	84.1	77.9	84.0	76.5	80.1	75.7
Marginal	27.1	32.2	17.7	22.9	19.9	22.8	15.9	22.1	16.0	23.5	19.9	24.3

Background Characteristics	Uttar Pradesh		Moradabad Division		Districts under Moradabad Division							
					Bijnor		Moradabad		Rampur		Jyotiba Phule Nagar	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Workers by occupation (%)												
Cultivators	41.1	29.0	37.5	26.9	29.3	21.3	37.6	26.0	41.4	29.1	47.9	36.3
Agricultural labourers	24.8	30.3	21.6	26.3	28.1	28.6	17.8	23.9	24.6	31.2	15.6	22.0
Household industry workers	5.6	5.9	6.3	5.9	6.2	4.8	5.5	6.3	6.6	7.4	8.0	5.3
Others	28.5	34.8	34.7	40.9	36.5	45.2	39.1	43.9	27.4	32.4	28.6	36.4

Source: Authors' calculations based on 2001 and 2011 population census data

Table 2

Population (in million) in different districts of the Moradabad division, Uttar Pradesh and India: 1901-2011

Years	India	Uttar Pradesh	Moradabad Division	Districts under Division				Proportion of population in Moradabad division with respect to Uttar Pradesh
				Bijnor	Moradabad	Rampur	Jyotiba Phule Nagar	
1901	238.40	46.65	2.51	0.78	0.85	0.55	0.33	5.37
1911	252.09	46.01	2.6	0.80	0.91	0.54	0.35	5.65
1921	251.32	44.56	2.4	0.74	0.86	0.47	0.33	5.39
1931	278.98	47.48	2.58	0.83	0.92	0.48	0.35	5.44
1941	318.66	53.92	2.87	0.91	1.06	0.49	0.41	5.32
1951	361.09	60.27	3.19	0.98	1.19	0.56	0.46	5.29
1961	439.23	70.14	3.85	1.18	1.42	0.70	0.55	5.49
1971	548.16	83.85	4.81	1.48	1.75	0.90	0.68	5.74
1981	683.33	105.14	6.26	1.93	2.26	1.18	0.89	5.95
1991	846.42	132.06	8.08	2.45	2.97	1.50	1.16	6.12
2001	1028.74	166.20	10.36	3.13	3.81	1.92	1.50	6.23
2011	1210.85	199.81	12.63	3.68	4.77	2.34	1.84	6.32

Source: Authors' calculations based on 2001 and 2011 population census data

Table 3

Decadal population growth and average annual exponential growth rate in districts of Moradabad Division, Uttar: India 1901-2011

Period	Decadal growth rate (%)							Average Annual Exponential Growth Rate (%)		
	India	Uttar Pradesh	Moradabad Division	Districts under Division				India	Uttar Pradesh	Moradabad Division
				Bijnor	Moradabad	Rampur	Jyotiba Phule Nagar			
1901-11	5.7	-1.4	3.8	3.3	5.9	-0.3	5.9	0.56	-0.14	0.37
1911-21	-0.3	-3.2	-7.7	-8.2	-5.1	-14.4	-5.1	-0.03	-0.32	-0.8
1921-31	11.0	6.6	7.7	12.8	7.1	2.6	7.1	1.04	0.64	0.74
1931-41	14.2	13.6	11.1	8.9	14.7	2.8	14.7	1.33	1.27	1.05
1941-51	13.3	11.8	11.1	8.1	12.7	13.9	12.7	1.25	1.11	1.05
1951-61	21.6	16.4	20.8	20.9	19.6	25.3	20.2	1.96	1.52	1.89
1961-71	24.8	19.5	24.9	25.0	22.8	28.5	23.9	2.22	1.78	2.23
1971-81	24.7	25.4	30.1	30.1	29.2	30.8	30.8	2.20	2.26	2.63
1981-91	23.9	25.6	29.1	27.4	31.3	27.4	29.6	2.14	2.28	2.55
1991-01	21.5	25.8	28.2	27.6	28.5	28.1	29.7	1.95	2.30	2.49
2001-11	17.7	20.2	21.9	17.6	25.2	21.4	22.8	1.63	1.84	1.98
1901-1951	51.5	29.2	27.2	26.2	39.3	2.5	39.3	0.83	0.51	0.48
1951-2011	235.3	231.5	296.2	276.0	300.9	317.1	301.9	2.02	2.00	2.29
1901-2011	407.9	328.3	404	374.4	458.4	327.7	459.8	1.48	1.32	1.47

Source: Authors' calculations based on 2001 and 2011 population census data

Table 4
Share of population in different districts of the Moradabad Division, 1901-2011

Census Years	Moradabad Division	Districts under Moradabad Division			
		Bijnor	Moradabad	Rampur	Jyotiba Phule Nagar
1901	100	31	34.1	21.8	13.1
1911	100.0	30.8	34.8	20.9	13.4
1921	100.0	30.8	35.9	19.5	13.8
1931	100.0	32.2	35.6	18.5	13.7
1941	100.0	31.6	36.8	17.1	14.5
1951	100.0	30.7	37.3	17.6	14.4
1961	100.0	30.6	36.9	18.2	14.3
1971	100.0	30.8	36.3	18.7	14.2
1981	100.0	30.8	36.1	18.8	14.3
1991	100.0	30.4	36.7	18.6	14.3
2001	100.0	30.2	36.8	18.6	14.4
2011	100.0	29.2	37.8	18.5	14.6

Source: Authors' calculations based on 2001 and 2011 population census data

Table 5

Vital statistics in different districts of the Moradabad Division, Uttar Pradesh, 2010-13

State/Division/ District	Crude Birth Rate (CBR)									Total Fertility Rate (TFR)		
	Total			Rural			Urban					
	2010-11	2011-12	2012-13	2010-11	2011-12	2012-13	2010-11	2011-12	2012-13	2010-11	2011-12	2012-13
Uttar Pradesh	25.5	25	24.8	26.9	26.4	26.4	20.6	20	19.6	3.6	3.6	3.3
Moradabad division	25.6	25.3	25.0	26.7	26.5	26.2	22.7	22.1	21.9	3.7	3.7	3.5
Districts												
Bijnor	24.5	24.0	23.8	25.4	24.5	24.3	21.5	22.3	22.2	3.5	3.5	3.2
Moradabad	25.8	25.4	25.2	27.1	27.2	26.9	23.4	21.8	21.7	3.8	3.8	3.6
Rampur	25.6	25.3	24.9	27.1	27.1	26.8	21.2	20.2	19.8	3.7	3.7	3.5
Jyotiba Phule Nagar	26.5	26.4	26.0	27.1	27.1	26.7	24.5	24.1	23.7	3.7	3.7	3.5

Source: Computed by authors from Annual Health Survey 2010-11, 2011-12 & 2012-13 Fact Sheets for Uttar Pradesh

Table 6

Vital statistics in different districts of the Moradabad Division, Uttar Pradesh, 2010-13

State/Division/	Total			Rural			Urban		
District	2010-11	2010-12	2012-13	2010-11	2010-12	2012-13	2010-11	2010-12	2012-13
Crude death rate									
Uttar Pradesh	8.6	8.4	8.3	9.1	8.9	8.8	7.3	6.9	6.7
Moradabad Division	8.3	8.4	8.2	8.5	8.6	8.5	8.5	7.5	7.4
Districts									
Bijnor	7.9	7.8	7.7	8.3	8.3	8.3	6.3	6.2	5.8
Moradabad	8.0	8.2	8.1	8.3	8.5	8.3	7.8	7.7	7.6
Rampur	9.2	9.3	9.1	9.4	9.5	9.4	10.8	8.5	8.3
Jyotiba Phule Nagar	8.0	8.1	7.9	8.0	8.2	8.0	9.5	7.7	7.7
Infant mortality rate									
Uttar Pradesh	71	70	68	74	73	72	54	53	51
Moradabad Division	64	66	65	67	69	68	54	52	52
Districts									
Bijnor	62	60	62	65	63	64		47	51
Moradabad	65	65	64	63	63	63	67	69	65
Rampur	64	64	60	71	71	67	40	36	35
Jyotiba Phule Nagar	66	73	72	69	78	77	55	57	55

Source: Computed by authors from Annual Health Survey 2010-11, 2011-12 & 2012-13 Fact Sheets for Uttar Pradesh

Table 7

Birth rate, death rate and infant mortality rate by NSS natural division, 2010-2013

Regions/State	Estimated vital rates											
	2010			2011			2012			2013		
	CBR	CDR	IMR	CBR	CDR	IMR	CBR	CDR	IMR	CBR	CDR	IMR
Central	26.3	9.7	79	25.9	9.5	72	25.3	9.4	68	25	9.3	65
Eastern	29.3	8.3	59	28.6	8.2	56	28.4	8	50	28.0	7.8	48
Western	30.7	8.3	63	30.4	7.9	59	29.9	7.8	56	29.7	7.8	53
Southern	25.4	8.1	75	25.1	7.8	72	24.9	7.9	66	24.7	7.8	62
Uttar Pradesh	29.2	8.5	64	28.8	8.3	60	28.4	8.1	56	28.1	8.1	53

Source: Sample Registration System

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Self-reported Health of Family Care Givers and Health of Old Care Receivers in Urban Delhi

Dolly Kumari
Hemkhothang Lhungdim

Introduction

Aging of population is no longer a matter of concern for the developed countries. It has emerged as one of the biggest issue for the developing countries in the last few years. It is anticipated that, by 2050, developing countries will be home of almost 82 percent of the world's old population - population aged at least 60 years - whereas only 16 percent will be residing in the developed countries (Bellamy, 1999). Globally, approximately 809 million (11 percent) people in 2006 were at least 60 years old while 500 million (8 percent) were at least 65 years old. It is project that at least 65 years old population will increase by 140 percent in 2030 in the developing countries (Dobriansky et al, 2007). Increasing life expectancy is a crowning achievement and some countries are experiencing more than a doubling of the average life expectancy. People, in these countries, are living comparatively healthier lives (WHO, 2011). However, this achievement in longevity presents a challenge to the individual, the family, the society and the global community (UNFPA, 2012). With the increases in average income levels, the overall welfare of the older population is improving in the Asian countries but traditional family based system of care of the elders is now eroding gradually (Mason, 1992). Living arrangements of the old people is one of the most important predictors of the health status of the old (Agrawal, 2012; Sen and Moon, 2007). Family sources of support can be important determinants of physical health of the old people. Individuals having low social support have been found to have age related increase in the blood pressure and vice-versa (Uchino et al, 1996). Satisfaction with the emotional support received is one of the key determinants of better self-perceived health among the old (White et al, 2009). Social support also influences the neurochemical phenomenon in the body and mating behaviour indicates that social behaviour triggers hormonal changes. It has also been reported in a number of studies that useful role of the old people in the society can also lead towards healthier life of the old people.

Literature Review

India is home of approximately 17 percent of the world population. After 1981, the pace of population growth is slowing down in the country. Many states of India have achieved the replacement level fertility, although national fertility level continues to be above the replacement level. More than 100 million or 8 percent of India's population is at least 60 years old and it is projected that by the year 2050, 20 percent or 323 million of India's population will be at least 60 years old (Martine and Marshall, 2007). India's demographic structure is expected to change from young to aging population in the coming four decades (James, 2011). Family care giving to the old people is very common in the Indian society. In most of the families, the first and the third generation used to live together and family members give care to the needed family member such as children, old or/and disabled because they feel that it is their responsibility.

Empirical studies have shown that family members providing care to the old in the family may suffer from negative health consequences (Schulz et al, 1995; Neal et al, 1997; Pinquart and Sörensen, 2011; Vitaliano et al, 2003). Old people living with a nuclear family are more likely to fell ill than the old people co-residing with a joint family. Wealthier, urban educated old people are less likely to fell ill than their rural, uneducated counterparts (Sen and Moon, 2007; Agrawal, 2012). A study carried out in North India concluded that 88.9 percent of the sample population reported some kind of health problem according to their own perception while only 43.5 percent sought treatment. This proportion was higher in urban (58 percent) as compared to rural (19 percent) old people (Joshi et al, 2003).

Several studies have highlighted that care givers to the old in the family bear large opportunity costs because of care responsibilities (Van Houtven et al, 2013). It has been found that informal care may have adverse effects on multiple dimensions of the health of the care givers (Pinquart and Sörensen, 2003; Vitaliano et al, 2003) whereas family support to the old in the family is positively related to their overall health and well being (Alam and Tyagi, 2006; Bloom et al, 2010; Devi and Murugesan, 2006). Burden of care giving is a multidimensional construct comprising of anxiety (stress burden), changes in the relationship between care receiver and care giver (relationship burden), and time contravention (objective burden).

There are ample data related to the old people and issues concerning them in India (UNFPA 2012; WHO, 2013; Arokiasami et al, 2013) but very little research has been carried out on the issues related to informal care giving, specially to the old people. Old people living with the family are reported to have better health in terms of short term illnesses and selected chronic diseases than old people who live alone (Sen and Moon, 2007; Agarwal, 2012). However, a study done in urban Bangalore found that old people living in institutions reported better QOL than those who were living with the family (Roopa and Lakshmidevi, 2011). There are a few small studies that have been done on inter generational support to the old people in different parts of India but most of these studies focussed only on the living arrangements of the old people and their health

outcomes but there are very few studies on inter generational support and health outcomes of both old people and their family caregivers (Pal and Palacios, 2006).

Data and Methods

The present study is based on the primary data collected during November 2014 through January 2015 in three different randomly selected municipal wards of Delhi, India. Data were collected from the old people (65 years and above) as care receivers and members of their family who were in the age group 18-60 years as care giver who were residing together with the old people at the time of survey. Three municipal wards of Delhi - ward No.74, ward No. 118 and ward No.150 - were randomly selected from the West Delhi district, because the West Delhi district has highest proportion of the urban population (99.75 percent) and it accounts for more than 15 percent of the population of Delhi. Additionally, the proportion of the old population (65 years and above) residing in the urban area is the highest (5.3 percent) in West Delhi according to the 2011 population census. The sample for the survey was collected by using a stratified random sampling approach after purposely selecting West Delhi. At the first stage of sample selection, three municipal wards were selected and in the second stage, the households were selected. Only those households were included in the study which fulfilled the selection criteria. The minimum eligibility criterion for the selection of household was the presence of at least one old person aged at least 65 years in the household along with any other family member. If there are more than one eligible members in the household, then only one, the oldest one, was selected for the survey. In case of care givers, the primary care giver was interviewed after ascertaining from the care receiver that the person concerned was the primary care giver. If the primary care giver was not available then the second care giver was interviewed. The survey covered 530 old people with at least 65 years of age as care receivers and 530 persons aged 18-60 years as care givers. Both care receivers and care givers were interviewed separately at the same time on the basis of structured and semi-structured interview schedules that were developed and pre-tested for the purpose.

Variables Description

Different socio-economic and demographic characteristics of the respondents such as age, gender, education, current working status, household economic status, caste, religion etc are used as independent variables in the present analysis. The household characteristics such as size of the household and household standard of living have also been included in the analysis. The household size is categorised into three categories on the basis of the total members in the household whereas household standard of living is measured through the household wealth index. Another variable that is used in the analysis is the relationship between the care receiver and the care giver. This variable has 6 categories 1) male care receiver receiving care from children and others; 2) female care receiver

receiving care from children and others; 3) male care receiver receiving care from the spouse and others; 4) female care receiver receiving care from the spouse; 5) male care receiver receiving care from child-in-law; and 6) female care receiver receiving care from child-in-law.

Four types of care giving activities - personal care, household care, social and emotional care, and financial care - have been used in the present analysis. Personal care includes bathing, dressing, help in going to toilet and moving around the house. Household care includes cooking food, washing clothes and giving medication to the care receiver. Social and emotional care includes social or emotional support at the time of the need. Finally, financial support is related to the purchase of medicines and other necessities of the old care receivers, etc.

The dependent variable for the analysis is the self-reported health problem. Respondents were asked to rate their overall health during the last 30 days on the five point scale - very good, good, moderate, bad and very bad. The very good and good response is combined into good self-reported health in the present analysis. On the other hand, moderate, bad and very bad response is combined into bad self-reported health.

Results

Table 1 present the socio-demographic characteristics of care receivers and care givers. Mean age of care receivers and caregivers was (69.90±0.236) and (41.26±0.495) years respectively. Mean size of the surveyed household was (5.34±0.082). Among the care receivers, 53.58 percent were not educated while the mean years of schooling was (1.739±0.0433) years. On the other hand, 13.77 percent of the care givers were not educated and the mean years of schooling for care givers was (7.36±0.208) years. More than half of the care receivers never worked while 26 percent of them were working. On the other hand, 45 percent of the care givers were 36-50 years of age and more than 73 percent were females. Majority of the care givers were educated and 85 percent were working at the time of the survey. More than 91 percent of the households surveyed were Hindu households. About 36 percent of the household were rich; 31 percent were middle income households; and 33 percent were poor. Around 52 percent of the households surveyed in the present study had 2 to 4 members while 14 percent had more than 6 members.

Table 2 presents results of the binary logistic regression analysis of the self-reported bad health outcomes of care givers as the dependent variable. The odds of reporting bad health outcomes are found to be lower in females as compared to males but substantially higher in SC/ST as compared to other social classes. Similarly, the odds of reporting bad health outcomes are found to be lower in care givers belonging to large households as compared to small households. On the other hand, the odds of reporting bad health outcomes are found to be lower in those care givers who were not providing

physical and financial support to care receivers in the family as compared to those care givers who were providing physical and financial support to care receivers.

Table 3 presents results of the binary regression analysis for care receivers. The odds of reporting bad health outcomes are higher in care receivers aged 70 years and above than in care receivers less than 70 years of age and in females as compared to males. Similarly, the odds of reporting bad health outcomes are found to be higher in single and widow care receivers as compared to care receivers who were currently married. The odds of reporting bad health outcomes are however lower in uneducated care receivers than educated care receiver whereas care receivers belonging to OBCs and SC/ST are more likely to report bad health outcomes than care receivers belonging to other caste groups. Like the care givers, care receivers belonging to large households are less likely to report bad health outcomes as compared to care receivers belonging to small households. Similarly, care receivers belonging to the richest and rich households are less likely to report bad health outcomes than their poor counterparts. Interestingly, care receivers who received care from their daughter-in-law are more likely to report bad health outcomes than those who received care from other members of the family. On the other hand, care receivers who received care for more than 3 hours daily on average are less likely to report bad health outcome than those who received care for less than 3 hours a day. The analysis also shows that female care receivers are more likely to report bad health outcomes than male care receivers. Interestingly care receivers not receiving financial care are less likely to report bad health outcomes than those who receive financial care.

Discussions and Conclusions

It is well known that there is a substantial difference between subjective health assessment as measured through self-reported health outcomes than professional health assessment. The present analysis shows that relationship of the care receivers with the care givers matters in case of subjective health assessment. Old care givers and care receivers are significantly more likely to report bad health outcomes as compared to young care givers and care receivers. The analysis also shows that female care receivers are more likely to report bad health outcomes as compared to males. This is a general phenomena as women are more likely to report bad health outcomes than men. Caste and economic status of the household have also been found to be important predictors for reporting bad health outcomes by both care givers and care receivers. Similarly, time spent on care giving and care receiving is another important predictor of reporting of bad health outcomes by both care givers and care receivers. These findings suggest that self reported health outcomes of care givers and care receivers varies by different care giving and receiving activities. The analysis also shows that most of the independent variables, except wealth and age, do not explain much variation in self reported health outcomes. Finally, relation with care receivers matters the mst in self reporting bad health outcomes.

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Table 1
Characteristics of the population surveyed

Particulars	Percentage	N
Care Receivers		
Age		
65-69	61.32	325
70+	38.68	205
Sex		
Male	45.28	240
Female	54.72	290
Marital status		
Currently married	43.96	233
Widow/Separated	56.04	297
Education		
Educated	53.58	284
Not educated	46.42	246
Current work status		
Currently not working	26.42	140
Working	22.26	118
Never worked	51.32	272
Relation to care giver		
Children	18.3	97
Spouse/ Partner	21.32	113
Daughter/Son in law	56.23	298
Others	4.15	22
Care Givers		
Age		
18-35	33.77	179
36-50	45.47	241
51-60	20.75	110
Sex		
Male	26.42	140
Female	73.58	390
Marital status		
Currently married	70.75	375
Widow/ Single	29.25	155
Education		
6+	52.08	276
1-5	34.15	181
No education	13.77	73
Working status		
Not working	85.09	451
Working	14.91	79

Particulars	Percentage	N
Household Characteristics		
Religion		
Hindu	91.51	485
Non Hindu	8.49	45
Household wealth		
Rich	36.23	192
Middle	31.13	165
Poor	32.64	173
Household size		
2-4	52.08	276
5	34.15	181
6+	13.77	73
Total	100	530

Source: Author's calculations

Table 2
Odds ratios of reporting bad self-reported health for care givers

	Self-reported health	
	Odds Ratio	CI (95%)
Age group		
18-35	1	
36-50	1.208	[0.525-2.780]
51-60	2.197	[0.602-8.021]
Gender		
Male		
Female	0.313*	[0.127-0.773]
Marital status		
Currently married	1.000	
Widow/ Single	0.629	[0.277-1.428]
Level of education		
6 years and above	1.000	
1 to 5 years	0.551	[0.215-1.416]
No education	1.672	[0.578-4.837]
Caste		
Others		
OBC	0.480	[0.151-1.532]
SC/ST	2.867*	[1.113-7.382]
Religion		
Hindu	1.000	
Non Hindu	2.022	[0.823-4.968]
Household size		
2 to 4	1.000	
5	1.310	[0.526-3.261]
6 and more	0.894	[0.347-2.305]
Household economic status		
Poorest		
Poor	1.111	[0.382-3.226]
Middle	2.356	[0.846-6.558]
Rich	2.220	[0.681-7.241]
Richest	1.086	[0.237-4.977]
Relationship with care receiver		
Spouse	1.000	
Parent	0.368	[0.055-2.474]
Parent in law	1.886	[0.359-9.912]
Others	1.000	

	Self-reported health	
	Odds Ratio	CI (95%)
Time spent on care giving activity		
0 to 1 hour	1.000	
2 hours	1.028	[0.451-2.343]
3 hours and more	0.639	[0.191-2.144]
Physical care		
Yes	1.000	
No	0.291*	[0.091-0.925]
Emotional care		
Yes	1.000	
No	2.292	[0.526-9.996]
Financial support		
Yes	1.000	
No	0.122*	[0.023-0.639]

Notes: +p<0.1; *p<0.05; **p<0.01; *** p<0.001
Source: Author's calculations

Table 3
Odds ratios of reporting bad self-reported health for care receivers

	Self-reported health	
	Odds Ratio	CI (95%)
Age group		
65 to 69 years		
70 years and above	1.497+	[0.942-2.377]
Gender		
Male		
Female	1.856*	[1.128-3.053]
Marital status		
Currently married		
Widow/ Single	1.040	[0.628-1.722]
Level of education		
Educated		
Not educated	0.617*	[0.389-0.979]
Caste		
Others		
OBC	1.778*	[1.023-3.089]
SC/ST	1.895+	[0.984-3.653]
Religion		
Hindu		
Non-Hindu	1.465	[0.803-2.671]
Household size		
2 to 4		
5	0.599+	[0.338-1.062]
6 and more	0.807	[0.460-1.414]
Household economic status		
Poorest		
Poor	1.130	[0.623-2.050]
Middle	0.831	[0.446-1.550]
Rich	0.504+	[0.254-1.002]
Richest	0.178***	[0.068-0.463]
Relationship with care		
Children		
Spouse	0.578	[0.224-1.494]
DS in law	3.429***	[1.864-6.307]
Others	4.317	[0.675-27.614]

	Self-reported health	
	Odds Ratio	CI (95%)
Getting time for care receiving activity		
0 to 1 hour		
2 hours	0.707	[0.432-1.158]
3 hours and more	0.436*	[0.209-0.912]
Physical care		
Yes		
No	0.487**	[0.285-0.831]
Emotional care		
Yes		
No	1.439	[0.579-3.577]
Financial support		
Yes		
No	0.742	[0.275-2.005]

Notes: +p<0.1; *p<0.05; **p<0.01; *** p<0.001
Source: Author's calculations

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Fertility Transition in India: Emerging Significance of Infertility and Childlessness

Koyel Sarkar

Background

Fertility or the production of a live birth is an important factor in the value of marriage as an institution and the role played by couples towards genesis in most societies. However, unwanted childlessness can play a very distressing role among population even in high fertility societies. Childlessness as a result of infertility can occur out of a gamut of factors that obstructs fertilisation of the sperm with the ovum. This inability of fertilisation is primarily a result of biological dysfunction but it can be triggered by a whole lot of other indirect lifestyle causes. Infertility is therefore a dysfunction of the human anatomy that results in unwanted childlessness. It is however important to note that, although infertility results in childlessness, yet, every childless woman may not be considered infertile because of voluntary childlessness. Apart from a social stigma, infertility has important demographic and health implications (Jejeebhoy, 1998). High level of infertility has a dampening effect on overall fertility and hence on the rate of population growth. The developing countries primarily focus on fertility reduction to control population growth. As a result, infertility which has serious biological and social consequences has been given little importance in population policies and programmes till date.

According to the Demographic and Health Surveys (DHS) which are the only source of macro-level data on infertility or childlessness, the level of infertility and childlessness remains relatively rare with infertility rate and rate of childlessness ranging between 1-10 percent among women aged 25-49 years. On the other hand, the percentage of women experiencing secondary infertility, or an inability to produce a live birth after at least one previous live birth, ranges from 9-38 percent (Rutstein and Shah, 2004) which is often the highest in the centrally located African countries. However, estimated rates can vary from region to region and even within the same country. According to the Reproductive Health Outlook (2002), as many as 8 to 12 percent

couples in the world are infertile or face problems in conceiving. Infertility and childlessness is more common in central and southern Africa due to high prevalence of HIV, AIDS and STDs (Larsen, 1995; Odile, 1983; Abate and Philip, 1986; Okonofua et al, 1997). Recent trends have also shown growing importance of voluntary infertility specially, in the developed societies where couples choose not to have a child (Rutstein and Shah, 2004).

India faces "double burden" of infertility related childlessness and high fertility (Aishwarya and Moli, 2012). Studies suggest that infertility often leads to separation, divorce and violence (Bhuiya and Chowdhury, 1997; Nahar, 1999). However, very little effort has been devoted to investigating infertility issues due to limited resources, lack of sufficient data, policies aimed at reducing fertility and controlling population growth, and the cost of modern infertility treatment (Dhont et al, 2010). There are however few studies in India that have estimated the rate of childlessness in the country (Unisa and Ganguly, 2010).

The present study aims at analysing trends in infertility and childlessness, both spatial and temporal in India. A complimentary analysis of infertility and childlessness has been attempted on the basis of regional trends and associated socio-economic factors. Treatment seeking behaviour has also been studied. An ever married woman aged 15-49 years is classified as childless in the present study if she is married for more than two years, has not used any contraceptive method but has not conceived even once. The study is important because, although, infertility and childlessness is a contemporary phenomenon in the Indian context, yet, lack of sufficient literature alone underlines the importance of the study. The incidence of infertility and the prevalence of childlessness in India is an important health concern which is often ignored by the policy makers. Lack of infertility clinics or department in government hospitals seem to support the class divide in infertility treatment facilities. At the same time, there has been no comparative study on the incidence of infertility and the prevalence of childlessness across different geopolitical regions or states of the country.

Data Source and Methodology

The study is based on the secondary data available from different sources. Data from India's 1981, 1991, 2001 sand 2011 population census have been used to study childlessness trends. All ever-married women aged 15-49 with zero parity have been considered 'childless' while zero parity women with at least 40 years of age have been classified as completely childless as they have assumed to have completed their fertility. For detailed socioeconomic analysis of childlessness, the data available from the India Human Development Survey (IHDS), 2011-12 have been used. The IHDS is a nationally representative, multi-topic survey which covered 41,554 households from 1503 villages and 971 urban areas of the country and is conducted by the National Council of Applied Economic Research (NCAER) in collaboration with the University of Maryland. Another

source of data for the present analysis is the District Level Household and Facility Survey 2007-08 (DLHS 3) which has been conducted by the Indian Institute for Population Sciences (IIPS) and which provides for the first time, data on infertility and infertility treatment seeking behaviour. DLHS 3 covered 7,20,320 households from 611 districts of India and surveyed 6,43,944 ever married women aged 15-49 years; 5,48,780 currently married women aged 15-44 years; and 1,66,260 unmarried women aged 15-24 years. Data available through DLHS 3 have been used to estimate infertility prevalence in India and in its constituent states and in analysing infertility treatment seeking behaviour.

Results and Discussion

Levels and Trends in Infertility. The DLHS 3 data suggest that as large as 8.3 percent of ever-married women or estimated 53 thousand women aged 15 to 49 years in India are suffering from infertility. The heaviest burden of infertility is borne by women in the central region (26 percent), followed by the eastern region (25 percent) and the southern region (15 percent) of the country (Table 2). The incidence of infertility is estimated to be the highest in West Bengal (14 percent) followed by Bihar (12 percent), Andhra Pradesh (11 percent), and Uttar Pradesh and Kerala (10 percent). By contrast, the incidence of infertility is the lowest in Meghalaya (2.3 percent) followed by Arunachal Pradesh (3 percent) and Assam (4 percent) all located in the north-eastern part of the country. The incidence of infertility is relatively low in the western region of the country.

The age-specific infertility rates, however, show very interesting pattern. All regions of the country except the eastern and central regions have the heaviest burden of infertility in the older ages of the reproductive period - ages above 25 years but eastern and central states experience the heaviest burden in younger ages of the reproductive period - around 20 years. The patriarchal setup in these states results in early childbearing as there is huge pressure on women to produce children. As a result, the incidence of infertility also gets recognised at an early age. For completed fertility, however, the situation is different. States with the lowest infertility level, have the highest proportion of infertile women in 45-49 year age group. The proportion of ever infertile women in the age group 45-49 years is the highest in the north-eastern states (11.90 percent), followed by southern states (11.50 percent) and northern states (10.70 percent).

The bulk of infertility is mostly confined within the 5 years of marriage as the burden to reproduce is the greatest during this period. Even though clinical research shows that husband and wife share equally the cause for infertility (40 percent each), Indian data show that wife related causes are as large as 53 percent while only 7 percent causes are related to the husband. Available data also suggest that only about 60 percent of the infertile women conceived after treatment.

Levels and Trends in Childlessness. Data available from the population census in India suggest that childlessness in India has increased manifold during the last 30 years and most of this increase is confined to the urban areas. The states of Andhra Pradesh, Tamil Nadu,

Bihar, Madhya Pradesh, Rajasthan, Haryana have high levels of childlessness in both rural and urban areas since the 1980s. In the urban areas, childlessness has increased substantially in majority of the states, although the rate of childlessness decreased in Rajasthan, Madhya Pradesh, Gujarat and Haryana with Rajasthan showing a major drop between 1981 and 2011. These are also states which recorded a decrease in childlessness in the rural areas. The decrease in the rate of childlessness in the rural areas is more pronounced than the decrease in the urban areas. On the other hand, increase in the rate of childlessness has been very high in Karnataka (18 points), Uttar Pradesh (11 points), West Bengal (11 points) and Maharashtra (12 points).

Table 4 shows that the level of childlessness in the urban areas is higher than that in rural areas in all age groups and childlessness has increased in the younger age groups with the increase being more pronounced in the urban areas. On the other hand, the level of childlessness has remained almost constant in women aged 35-39 years and 45-49 years in both rural and urban areas of the country.

The age specific childlessness rates depict a different picture. Childlessness rates decrease from age group 15-19 years to 45 to 49 years for every state. This is due to the high prevalence of premature sterility among women at younger ages. The childlessness rate also decreases with the maturity of the women's fertility anatomy. Therefore women aged 45-49 years are the most appropriate to study childlessness levels as fertility of these women is almost complete. The analysis suggests that in women with completed fertility, childlessness is high in north-eastern, southern and eastern states of the country. The childlessness rate in women with completed fertility is less than the national average in the northern states because the patriarchal structure of the society in this region requires large number of children so that there is huge burden of childbearing. Women's identity and status in this region is largely defined by her ability to produce children which results in childbearing in any condition and health issues are side-lined. In the south and north-eastern regions of the country, on the other hand, women empowerment and women work participation rate is very high. This results in voluntary childlessness which is difficult to separate from involuntary childlessness because of the lack of data. The childlessness in these regions can also be attributed to the late age at marriage and other modern lifestyle causes.

Socio-Economic Characteristics of Infertile and Childless Women. The distribution of infertile and childless women in India shows similarities and dissimilarities by different socio-economic characteristics. Majority of the infertile and childless women reside in the rural areas, belong to Hindu religion and are of general castes. A strong class pattern may be seen among the childless women which shows that most of the women with no child belong to the poor and middle wealth quintiles group. This distribution is however absent among the infertile women. Highest prevalence of infertility and childlessness is seen among women who had their marriage (including Gauna) at an early age - before 25 years of age. Women with highest level of education show the lowest prevalence of infertility and childlessness. Working women also show low prevalence of infertility and childlessness.

In order to explore further the effect of background socioeconomic variables on infertility and childlessness, regression analysis has been carried out separately for different geopolitical regions of the country. The analysis shows that wealth index, age at gauna and working status of the woman significantly and positively affects the incidence of infertility in all regions whereas the incidence of infertility decreases with the increase in woman's education in every region. Women residing in urban areas in north, east and north-eastern regions tend to suffer more from infertility than women in rural areas. On the other hand, Christians and others religions show higher prevalence of infertility than Hindus whereas incidence of infertility is high in Muslims in Jharkhand, West Bengal, Uttar Pradesh and Bihar. Women belonging to Scheduled Castes show high prevalence of infertility in every region except southern region where Scheduled Tribes show high prevalence.

Treatment Seeking Behaviour of Infertile Women. The data available from DLHS 3 indicate that as much as 20 percent of the infertile women did not seek any advice or treatment related to infertility (Table 6). Among different states, the proportion of infertile couples seeking treatment for infertility is very close to 100 percent in some states such as Punjab (95 percent), Haryana (89 percent), Delhi (93 percent), West Bengal (87 percent) and Kerala (85 percent). The concern however lies in Chhattisgarh (37 percent) and Andhra Pradesh (31 percent) despite the fact that incidence of infertility is very high in these states.

Table 7 presents the results of logistic regression analysis of the treatment seeking behaviour of infertile women. The analysis shows that treatment seeking tendencies increase with the increase in the wealth index and the level of education. Women marrying during 20-30 years of age seem to be more concerned with treatment seeking than women marrying at younger and older ages. Women marrying at an early age usually think that they have more time for treatment while women marrying at old ages mostly give up the hope or tend to be voluntarily childless. Hindu women seem least likely to go for treatment of infertility than women of other religions. Islam is argued to be a pronatalist religion and so any issue with infertility in this religion seems to be seriously important. Similarly, women belonging to Scheduled Castes are more likely to go for treatment than women of other castes.

Summary and Conclusions

With the decrease in fertility in India, there is a visible and significant increase in the levels of childlessness. Almost one in every 11 women in India appears to be ever-infertile. Within the country, central, eastern and southern regions show relatively higher incidence of infertility and higher prevalence of childlessness. Infertility and childlessness are common among young women in central and eastern regions but among older women in southern and north-eastern regions of the country. Childlessness is high among younger women in the western region while infertility is high among older women

in the eastern region. The prevalence of childlessness appears to have increased in every age group over the last three decades with major increase in the young age groups. Women in the urban areas show comparatively higher increase in childlessness rates over the last three decades in all age groups as compared to rural areas. Moreover, background social and economic characteristics of women have a strong bearing on both incidence of infertility and prevalence of childlessness in all regions of the country. It appears that infertility is a health issue which is more common among progressive but less educated women. Women belonging to poorer sections of the society usually do not go for treatment of infertility because of cost considerations.

The present analysis emphasises that issues related to infertility and childlessness demand attention at the policy and programme level given the fact that both incidence of infertility and prevalence of childlessness is increasing in the country in an environment of fertility transition. There is a need to treat infertility not just a matter of health concerns but also as an issue of social welfare. Lack of accurate data, however, remains a big hindrance for infertility studies in India.

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Table 1
Regional Groups:

Regions	States and Union Territories
Northern States	Jammu and Kashmir, Uttarakhand, Himachal Pradesh, Haryana, Punjab, Chandigarh, Delhi
Western States	Rajasthan, Gujarat, Maharashtra, Goa, Daman and Diu, Dadra and Nagar Haveli
Eastern States	West Bengal, Odisha, Jharkhand
Central States	Madhya Pradesh, Uttar Pradesh, Bihar, Chhattisgarh
North-eastern States	Meghalaya, Nagaland, Manipur, Arunachal Pradesh, Mizoram, Assam, Tripura
Southern States	Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Puducherry

Table 2
Age-specific regional distribution of ever married women, having infertility problems in India

Region	Ever Infertile	Never Infertile	15-19	20-24	25-29	30-34	35-39	40-44	45-49
North	14.1	13.9	2.8	14.9	19.9	19.0	17.9	14.8	10.7
West	12.6	16.8	6.9	17.7	18.7	17.8	16.7	13.0	9.2
East	25.4	18.8	8.5	18.5	19.8	17.5	15.4	11.8	8.5
Central	26.4	23.6	7.8	19.1	19.1	17.3	15.4	12.2	9.1
North-East	6.3	12.0	3.6	14.1	21.2	17.7	18.8	12.8	11.9
South	15.2	14.9	4.4	15.7	19.4	17.5	17.4	14.1	11.5

Source: Computed from DLHS 3, 2007-08

Table 3
General marital childlessness rate for major states of India

States	Rural				Urban				Change 1981-2011	
	1981	1991	2001	2011	1981	1991	2001	2011	Rural	Urban
Andhra Pradesh	18.9	18.9	17.2	15.7	18.2	17.5	22.4	21.4	-3.2	3.1
Karnataka	2.9	14.8	15.3	16.9	2.7	16.1	18.1	14.2	14.1	11.5
Kerala	10.2	14.1	14.9	13.4	9.9	13.6	15.9	18.3	3.2	8.4
Tamil Nadu	15.5	15.8	18.7	15.9	15.9	13.7	21.3	17.3	0.4	1.4
Bihar	18.4	25.6	20.3	16.8	17.0	22.2	17.8	15.7	-1.6	-1.3
Madhya Pradesh	20.8	20.6	16.4	14.2	17.6	19.0	15.1	15.9	-6.6	-1.7
Rajasthan	24.0	21.2	18.2	16.9	20.6	17.8	15.8	19.9	-7.1	-0.7
Uttar Pradesh	10.8	25.7	19.7	17.3	8.3	22.8	19.1	18.2	6.5	9.9
Gujarat	20.6	19.3	16.4	15.9	18.5	17.1	17.2	18.9	-4.7	0.4
Maharashtra	9.3	10.1	14.0	15.1	6.5	9.5	15.1	15.1	5.8	8.6
Haryana	20.4	16.7	12.7	12.1	15.8	13.4	12.5	16.1	-8.3	0.3
Punjab	12.7	13.5	13.7	13.7	13.9	13.6	15.6	14.0	1.0	0.2
Himachal Pradesh	9.0	13.3	11.5	11.7	7.7	11.2	12.2	17.2	2.6	9.5
Orissa	15.0	19.5	14.6	15.8	13.0	17.1	14.5	17.6	0.8	4.7
West Bengal	9.5	15.7	12.8	12.8	6.4	16.2	16.9	17.9	3.3	11.5
India	14.6	19.4	16.8	15.6	12.1	16.2	17.3	20.5	1.0	8.5

Source: Computed from Census of India, 1981, 1991, 2001 and 2011

Table 4
Age specific marital childlessness rates in India

Year	Age group						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
	Combined (Rural and Urban)						
1981	51.50	21.41	8.25	4.91	3.86	4.05	4.00
1991	66.03	28.93	12.92	9.01	7.63	7.86	7.70
2001	70.28	31.74	13.38	7.84	6.30	6.16	6.14
2011	70.18	34.66	16.07	9.47	7.28	6.82	6.74
Change 1981-2011	18.68	13.25	7.82	4.56	3.42	2.77	2.74
	Rural						
1981	52.56	21.72	8.28	4.92	3.85	4.01	3.95
1991	67.11	29.22	12.89	9.03	7.69	7.93	7.75
2001	70.21	30.46	12.07	7.13	5.79	5.74	5.80
2011	69.82	32.66	13.62	8.10	6.39	6.13	6.15
	17.26	10.94	5.34	3.18	2.54	2.12	2.20
	Urban						
1981	46.19	20.33	8.16	4.87	3.89	4.22	4.18
1991	60.69	27.98	12.99	8.93	7.45	7.63	7.54
2001	70.59	35.61	16.63	9.60	7.47	7.15	7.05
2011	71.35	39.80	21.10	12.20	9.04	8.18	7.88
Change 1981-2011	25.16	19.47	12.94	7.33	5.15	3.96	3.70

Source: Computed from Census of India, 1981, 1991, 2001 2011

Table 5
Logistic regression for ever-infertile women (2007-08)

Variables		North	West	East	Central	North-East	South
Place of residence	Rural ®						
	Urban	1.087**	1.009	1.903*	0.954	1.187**	0.998
Wealth index quintiles	Poorest ®						
	Poor	1.373	1.122	1.115*	1.033	1.236*	1.046
	Middle	1.194	1.347*	1.059	1.021	1.212	1.194
	Rich	1.195	1.392**	1.022	1.106	1.141	1.340*
	Richest	1.292**	1.288	1.873*	1.173**	1.007	1.378**
Religion	Hindu ®						
	Muslim	0.914	1.123	1.094*	0.861**	1.037	1.176***
	Christian	1.040	1.630**	0.920	0.616	1.074	1.191**
	Others	1.036	1.273**	0.978	1.214	0.831*	1.014
Caste	SC ®						
	ST	1.029	1.025	0.921	0.913	0.552***	1.181*
	Others	1.003	0.998	0.907**	1.084	0.843*	1.001

Variables		North	West	East	Central	North-East	South
Education	Illiterate ®						
	Primary	0.670	0.622**	0.654***	0.712**	0.693*	0.795
	Secondary	0.489***	0.587*	0.548***	0.540***	0.721	0.701
	Higher	0.396***	0.492**	0.485***	0.445***	0.580**	0.620*
Age at marriage (Gauna)	< 18 ®						
	19-25	0.887***	0.995	0.834***	0.840***	1.061	1.006
	26-30	1.110	1.747***	1.154	1.188	1.983***	1.602***
	> 30	2.953***	4.213***	3.895***	2.017	3.894***	3.718***
Work status	Yes ®						
	No	1.045	0.858*	0.857**	0.796***	0.896	0.787***

Note: ***P<0.01; **P<0.05; *P<0.1
® Denotes Reference Category
Source: Author's calculations

Table 6
Treatment seeking behaviour for ever-infertile women, 2007-08

States	Advice or Treatment Sought			
	Yes		No	
	Number	%	Number	%
Jammu & Kashmir	1102	84.0	210	16.0
Himachal Pradesh	404	82.3	87	17.7
Punjab	1756	95.0	92	5.0
Chandigarh	41	80.4	10	19.6
Uttarakhand	440	67.7	210	32.3
Haryana	2111	88.7	270	11.3
Delhi	650	93.0	49	7.0
Rajasthan	1621	82.8	336	17.2
Uttar Pradesh	7265	83.9	1396	16.1
Bihar	4721	82.9	976	17.1
Sikkim	223	67.4	108	32.6
Arunachal Pradesh	331	77.0	99	23.0
Manipur	455	69.3	202	30.7
Mizoram	285	76.4	88	23.6
Tripura	209	78.3	58	21.7
Meghalaya	124	76.5	38	23.5
Assam	1060	73.9	375	26.1
West Bengal	2696	87.6	380	12.4
Jharkhand	1811	72.3	693	27.7
Odisha	1372	64.8	744	35.2
Chhattisgarh	1292	63.0	760	37.0
Madhya Pradesh	2385	74.5	817	25.5
Gujarat	1248	81.8	278	18.2
Daman & Diu	131	88.5	17	11.5
Dadra & Nagar Haveli	40	76.9	12	23.1
Maharashtra	2117	76.1	664	23.9
Andhra Pradesh	1617	68.7	738	31.3
Karnataka	1608	76.9	467	22.3
Goa	161	85.2	28	14.8

States	Advice or Treatment Sought			
	Yes		No	
	Number	%	Number	%
Lakshadweep	133	81.1	31	18.9
Kerala	1109	85.4	189	14.6
Tamil Nadu	1308	73.9	461	26.1
Pondicherry	219	90.1	24	9.9
Andaman & Nicobar Islands	49	80.3	12	19.7
India	42094	79.4	10919	20.6

Source: Computed from DLHS 3 (2007-08)

Table 7
Logistic regression of ever married women seeking treatment for infertility to basic background variables in India, 2007-08.

Background variables		Exp (B)
Place of residence	Rural ®	1
	Urban	1.093
Wealth Index	Poorest ®	1
	Poor	1.164
	Moderate	1.688***
	Rich	1.808
	Richest	2.362
Religion	Hindu ®	1
	Muslim	1.532***
	Christian	2.048***
	Others	2.097***
Caste	SC ®	1
	ST	0.556***
	General	0.800**
Education level	Illiterate ®	1
	Primary	1.297
	Secondary	1.608*
	Higher	2.218**
Age at marriage (gauna)	<20 years ®	1
	20-30 years	1.266**
	>30 years	1.937
Age	<20 years ®	1
	21-25 Years	1.092
	25-30 Years	1.031
	30-35 Years	0.680**
	35-40 Years	0.499**
Occupational status	Yes ®	1
	No	0.977

Note: ***P<0.01; **P<0.05; *P<0.1
® Denotes Reference Category
Source: Author's calculations

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Disability Issues and Concerns in India
An Imperative Call for Action

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Introduction

Disability can be defined as long-term impairment leading to social and economic disadvantages, denial of rights, and limited opportunities to play an equal part in the life of the community (DFID, 2000; Isaac et al, 2010), although the concept of disability remains difficult to define. At the simplest level, the term disability usually describes a condition of physical or mental impairment that limits a person's participation in social and economic activities. In the recent disability theory, a person's experience of impairment is increasingly understood as moderated by cultural and social expectations and the idea of what is 'normal' are seen as constructed (Kudlick, 2003; Wendell, 1996; WHO, 2015; Buckingham, 2011). The most acceptable and dynamic definition of disability is provided by the UN Convention on Rights of Persons with Disabilities which states that persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in the society on an equal basis with others (Kacker, 2013). In the Indian Constitution, disability has not been defined exactly but the Constitution says that no citizen shall suffer any disability on the ground of his religious belonging, gender, race, caste, sex, place of birth or any of them in regard to their access to public places, shops and the use of wells, tanks, etc. The Constitution has, however, described the following social groups as those for whom special legislation may be made without discriminating with the rest of the people of India. These are women, children and those belonging to socially and educationally backward classes. The Constitution makers, however, did not find it necessary to identify other social groups such as the aged or the disabled for whom separate legislation could be made (Lone and Kumar, 2013). There are around 400 million disabled persons in the developing world. It is estimated that at least 10 percent of the developing world's population is disabled in one way or the other. The majority of them are poor which makes them more vulnerable to disability. Disabled persons are also not

a homogenous group. There are different types of disabilities, with different requirements. The problems, needs and the help required by persons with disabilities are different from each other. However, in spite of several international and national pronouncements, the rights of the disabled has remained only on the paper (Chaudhuri, 2006).

This paper discusses issues related to understanding disability, its types and extent in India. Until 2001 population census and NSS 58th round which was carried out in 2002, there were no good data on disability in India. Although, India has a long experience of policies and programmes related to meeting the development and welfare needs of disabled people, yet the experience is that the country has failed to operationalise and practice these policies and implement these programmes at the level where they are needed the most.

Disability is understood differently by different people. The culture, prejudice and environment have a great bearing on the meaning of disability. The words 'handicapped', 'disabled', 'differently abled', 'retarded' have various meanings and carry the potential for prejudicial stereotypes, discrimination and abuse. Disability may relate to body or mind or both. Moreover, disability can be of a short term duration or of long term nature. Some disabilities may be of permanent nature (Kacker, 2013). Disabilities that a person may have may be classified into the following broad categories:

Locomotor Disability is defined as a person's inability to perform distinctive activities associated with moving both himself and the objects from place to place. This disability results from musculoskeletal and/or nervous system problems. Some common conditions giving rise to locomotor disability could be poliomyelitis, cerebral palsy, autism, amputation, and injuries of spine, head, soft tissues, fractures, muscular dystrophies, etc.

Visual Disability or blindness refers to a person's inability to see either fully or partially. A visually disabled person is known to be suffering from visual impairment. A person with low vision or poor eyesight is one who continues to have the problems even after going through medically approved corrective measures, although the person may carry out his or her tasks with appropriate assisted devices.

Mental Illness can include both mental ill health and mental retardation. Mental retardation is defined as a state of arrested or incomplete development of the mind which is specially characterised by impairment of skills visible during the development period which contributes to the overall level of intelligence, i.e. cognitive language, and motor and social abilities, etc. Mental ill health, on the other hand, includes schizophrenia, anxiety disorder, depressive disorder or any other problem which is caused due to series of chemical changes in the brain.

Speech and Hearing Disability refers to a condition wherein the person is incapable of either speaking clearly or hearing any sound. Speech disability or speech impediment is a type of communication disorder where 'normal' speech is disrupted. This can mean stuttering of lips, etc. A person who is unable to speak due to a speech disorder is considered to be mute.

Learning Disability is a disorder which affects the basic psychological processes of understanding or using written or spoken language. This disorder affects development of language, speech, and reading and associated communication skills needed for social interaction. Conditions such as brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia are examples of learning disabilities.

Disability in India

According to the 2011 population, there were more than 26.81 million disabled persons in India which gives a disability rate of 2.21 percent. The disability rate is estimated to be marginally higher in the rural areas (2.24 percent) as compared to the urban areas (2.17 percent). Similarly, the disability rate is found to be higher in males (2.40 percent) compared to females (2.01 percent). Females in the urban areas have the lowest disability rate (1.98 percent) whereas males in the rural areas have the highest disability rate (2.43 percent). However, the residence differentials in the disability rate have not been found to be substantial. On the other hand, the disability sex ratio defined as the ratio of female disabled persons to male disabled persons is quite low as compared to the population sex ratio. This shows that the incidence of disability is relatively higher in males than in females.

Table 1 provides the breakup of the disabled persons by the type of disability. Among the disabled persons identified at the 2011 population census, the proportion of disabled persons with movement disability is the highest (20.28 percent) whereas the proportion of disabled persons with mental illness of any kind is the lowest (2.70 percent). One reason for very low proportion of disabled persons with mental illness is that the diagnosis of mental illness is possible only medically. The proportion of persons with speech disability and the proportion of persons with hearing disability have also been found to be quite substantial in the country. The data available through the 2011 population census also suggest that around 8 percent of the disabled persons in the country have multiple disabilities. The disability sex ratio varies by the type of disability. It is the lowest in persons with movement disability but the highest in persons with vision disability.

The low proportion of the population reporting mental illness at the time of the population census may be due to the subjective of the perception of the people about mental illness. Many people who are actually mentally ill clinically or medically may not be knowing that they are ill and therefore they might have not reported any illness at the time of the population census.

The age specific disability rates in the total population and in different sub-groups of the population are given in table 2. The disability rate increases monotonically with the increase in age in the total population as well as in all population subgroups so that the disability rate is the highest in persons at least 80 years old for all types of disabilities whereas the disability rate is the lowest in the youngest population - children below five years of age.

Issues and Concerns of Disabled Persons

Children with Disabilities. A study conducted by the World Bank has found that children with disability are five times more likely to be out of school than children belonging to Scheduled Castes or Scheduled Tribes. Moreover, when children with disability do attend school they rarely progress beyond the primary level, leading ultimately to lower employment opportunities and long-term income poverty. Illiteracy levels are high across all categories of disabled persons, and extremely so for children with visual, multiple and mental disabilities. The unreliability of data on the educational participation of children with disabilities is marked- both in terms of estimates in the school going age group and in terms of the numbers actually attending school (Singal and Jeffery, 2009). According to the United Nations, India has been able to decrease its number of out-of-school children by nearly 16 million between 2000 and 2012, driving the progress in South Asia, but still 1.4 million children in the country are out of school. The report points out that while India has made significant improvement in primary education enrolment, the figures for children with disabilities are staggering. Out of 2.9 million children with disabilities in India, 990,000 children aged 6 to 14 years (34 percent) are out of school. These percentages are even higher among children with intellectual disabilities (48 percent), speech impairments (36 percent) and multiple disabilities (59 percent) (PTI, 2015).

Youth with Disability. It is generally argued that while attention is focussed on young people's potential contribution to social transformation (both positive and negative), young people with disabilities remain alienated from the mainstream debates. Consistently across the globe and especially in the developing countries, policies and programmes for young people overlook needs of those with disabilities while efforts aimed at people with disabilities tend to focus on either children or adults. Thus, the unique social, psychological and physiological concerns of young people with disabilities generally go unaddressed. Young people with disabilities are among the most needy and the most overlooked of all the world's children (UNICEF, 1999) and are subject to double marginalisation - overlooked in the policies focussed on youth and overlooked in the policies addressing issues related to people with disabilities. The disability rate among young adults is increasing primary due to accidents on the road and/or at work. One problem with dealing with young people aged 12-24 years is that the Indian Census uses different age categories in its presentation of data. The range of estimates in India, and their varied origins, makes it difficult to say very much with assurance about people with disabilities in general, or young people with disabilities in particular. Despite many uncertainties that remain about the lack of reliable data and inadequate research on young people with disabilities, one needs to consider what is known about their lives and the opportunities available to them in three areas - learning, work, and social participation (Singal and Jeffery, 2009). Such a focus will allow a critical examination and also hold true to the belief, that transition goals for young people with disabilities should be the same as those without disability in their age groups (McGinty and Fish, 1992). The revised National Youth Policy (NYP) gives central recognition to the contributions that youth can,

and should, make to the growth and well-being of society, with major emphasis upon youth empowerment. It reaffirms the widely held understanding about the fluidity of the concept of youth but fails to prioritise youth groups such as youth with disabilities (Singal and Jain, 2012).

Women with Disability. Women in India have been struggling to get their rights and women with disability are toiling far behind. In general, sex ratio among people with disabilities shows that they are skewed towards men. Inter-disability analysis reflects that there are more men with orthopaedic disability and visual impairment whereas mental health issues are skewed towards women. The rural-urban disaggregated data show that urban sex ratios are masculine in nature. There is a primary requirement for making programmatic provisions for addressing the concerns of women with disabilities. Also, framing a national level programme for women with disabilities without taking into account other disparities such as class, caste and region will fall short of achieving the desired goal. Women with disabilities are the most disadvantaged with regard to their employment status. They cannot meet any of the requirements both on the grounds of their physical impairment and on account of their lack of access to basic education. Women with disabilities, in general, are at a disadvantageous position when it comes to education. They face multiple layers of barriers in accessing education. First, mainstream schools are often not equipped to address the needs of girls with disabilities. Second, children with disabilities need schools with special aides and trained human resources to address their needs. Policy makers and civil society organisations need to acknowledge that women with disabilities suffer on both accounts, being women and being disabled. Government programmes either take women as a homogenous group or disabled as another group. Programmes especially for the disabled women, cutting across all identities are not available (Chaudhuri, 2013). Disabled women have in general been silenced within the society, denied their rights and equal economic and social opportunities due to prejudice, stigma and poverty. They are commonly perceived as asexual, which means that they are denied the possibility of close relationship or marriage. It is assumed that they are incapable of handling the maternal role and hence forced to undergo sterilisation too often (Price, 2011). However, women with disabilities reported significantly longer duration of physical and sexual abuse when compared with women without disabilities (Badjena, 2014). India's women's movement has focussed on a number of issues including poverty, caste, and employment, dowry and *sati*, population control, female feticide, sexuality, domestic violence, etc. Its agenda has however not included disability in general. If women with disabilities do not physically measure up to able-bodied standards, neither does society expect them to do so. In many cases, they are not expected to adopt roles of the wife and the mother. Women with disabilities do not, however, quietly acquiesce to this (Daruwalla et al, 2013).

Elderly with Disabilities. Socioeconomic and medical progress has resulted in a rapid growth of the elderly population in India. It is estimated that by the year 2050, 20 percent of the Indian population will be at least 65 years of age. Among the elderly, disability is a chronic condition which raises health care cost and reduces the quality of life (Nagananda

et al, 2010). Ageing in Indian culture though considered disability, does not carry the connotation of becoming "useless mouth to be feed". The Indian value system prescribes respect, reverence and physical care for elderly from their children. With emerging changes in our social and cultural values, the elderly who are economically unproductive are sadly neglected. It is recognised that the elderly are prone to psychic disorders through vicissitudes such as social isolation, malnutrition, economic and emotional depression, etc. (Kamble et al, 2012).The link between ageing and disability is a biological fact where the risk of disability increases with the increase in age. However, with proper policy intervention, the onset of disability during the old age can be delayed. Ageing should not be treated as synonymous to disability as a large proportion of the old population lives with good health status and without any significant mental or physical decline. This link is very important particularly for countries like India where age-structure of the population is still predominantly young but the age structure of the disabled population is predominantly old. More than one-fourth of India's aged population is disabled and both age-specific disability rates and severity of disability increase with the increase in age within the old age bracket. The absence of an effective yet universal safety net for the aged population has exacerbated the problem. Traditionally, India's joint family system used to took care of the aged in the family. However, rapid urbanisation and exodus of the people, especially, working class adults from rural to urban areas have created a vicious situation. In the absence of the ability to earn, and without community support, in the form of kinsmen or the extended family, the aged people are rendered destitute within the family and the society (Pandey, 2009).

Disability Related Policies and Programmes

The concept of disability rights as a movement in India is still at a very young stage. Organisations working for the disabled population in India are in existence for many decades, yet, the concept of disability issues as disability rights was alien to them till as late as the 1990s. It was only in 1993 that the idea of 'all rights of all people with disabilities' gained currency when the Disabled Rights Group (DRG) was created. This Group is India's first cross-disability advocacy organisation (Abidi and Sharma, 2013).

India has a long experience of policy and practice directed towards addressing various issues related to disability including counting of the disabled population in the decennial population census since 1872 and establishment of special schools and institutions since the 19th century. Like many countries, India also has specific provisions for people with mental illness and mental retardation under the India Lunacy Act, 1912. The Constitution of India also acknowledges state obligations to persons with disabilities (PWD) in the Article 41 and the State List under "Relief of the Disabled and Unemployable". Subsequently, specific measures such as employment concessions were introduced during the 1960s. However, it was not until the 1980s that a policy commitment for full participation of persons with disabilities evolved in the Indian society (Lone and Kumar, 2013).

The governmental legislative framework dealing with disability may be summarised in the following Acts:

1. The Mental Health Act, 1987
2. Rehabilitation Council of India Act, 1992
3. The Persons with Disabilities (equal opportunities, protection of rights and full participation) Act 1995 (PWD Act, 1995)
4. National Trust Act, 1999 (welfare of persons with autism, cerebral palsy, mental retardation and multiple disabilities)
5. National policy for persons with disabilities, 2006
6. Right to Education Act, 2008
7. The Mental Health Care Bill, 2013

With the enactment of the Persons with Disabilities Act, 1995, the integration of students with disabilities has now become the responsibility of Ministry of Human Resource Development. The PWD Act 1995 proposed the provision of improved educational services, medical care, vocational training, employment and social security for all persons with disabilities (Mishra, 2014). This Act is considered to be a watershed in the history of the disability rights movement in India. It provides for the prevention and rehabilitation of disabled with particular focus on the education and employment for people with disabilities. There is, however, is no reference to the sexual or reproductive rights of people with disabilities.

The Mental Health Act, 1987 is regarded as the first legal document that refers to aspects of disability, although, it focuses on mental illness alone. The Act was introduced to repeal the Indian Lunacy Act 1912. The Act looks at mental illness from the perspective of the medical model only and therefore all provisions listed in the Act refer to medical practitioners, hospitals and nursing homes. The Act does not make any reference to the sexual and reproductive health and rights of people with disabilities including mentally ill people. The Act refers to the well being of the patient saying that if services provided to the mentally ill people are detrimental to the moral, mental or physical well being of the patient, the license of the service provider can be revoked. This aspect of well being can possibly be expanded to include issues of sexual and reproductive health and rights.

The Rehabilitation Council Act of India 1992 is considered to be another important legislation for the people with disabilities. The Act refers to different aspects of operations of the Rehabilitation Council of India. A review of the Act shows that there are no provisions from the perspective of sexual and reproductive health and rights or any other social aspect of the lives of people with disabilities.

The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act 1999, popularly known as the National Trust Act 1999, is also an important legislation as it came after the PWD Act 1995. The Act calls for constituting a Board which would look into the welfare of people with disabilities and aims at empowering people with disabilities to live independently and to participate as

fully as possible in the community. It talks about providing support to individuals and their families to ensure care and protection of people with disabilities. The Act can be expanded to cater sexual and reproductive health and rights.

The Mental Health Care Bill 2013 seeks to consolidate earlier legislation related to mental illness and improve the conditions in mental health care facilities in the country while ensuring the process of appeal by a person admitted to a psychiatry institution, rehabilitation, reintegration with families and community in non-medical settings. The Bill addresses the issues of mental illness and capacity to make mental health care and treatment decisions; advance directive; nominated representative; rights of persons with mental illness; duties of appropriate government; central and state mental health authorities; mental health establishments; mental health review commission; admission, treatment and discharge. The Bill also consolidates the law regarding the responsibilities of other agencies, restriction to discharge functions by professionals not covered by professional offences and penalties.

India is also a signatory to United Nations Convention on the Rights of the Persons with Disabilities (UNCRPD) 2008. This convention is a landmark convention which, for the first time in the history, talks about the concerns and issues of people with disabilities at the global level. The convention is unique in the way that it came into force with the active participation of people with disabilities. UNCRPD recognises that disability should be seen as a collection of hindrances to participation in society, a product of the interaction between people with impairments and attitudinal, and environmental barriers. This model locates disability in relation to structures rather than individuals (Daruwalla er al, 2013).

The foregoing discussions suggest that India has moved from charity to welfare and finally to rights-based approach to address issues related to persons with disabilities. The rights-based approach emphasises that the society has to change in order to mainstream persons with disabilities and provide them equal opportunities. In essence, this perspective means viewing people with disabilities as subjects and not as objects. The primary responsibility for ensuring respect for the rights of persons with disabilities rests with the government. The government has taken various steps to provide equal opportunities to persons with disabilities and has taken various initiatives in this direction. However, the services are still not reaching the persons with disabilities. They are often excluded from the mainstream, denied of their rights; face various forms and experience segregation and isolation because of physical and social barriers. Despite progress in terms of legislation over the past decade, violations of the rights of the persons with disabilities have not been systematically addressed (Hemlata, 2011). Although, the Constitution of India guarantees equality of all citizens, persons with disabilities have been, in reality, facing stigma, discrimination and neglect due to socio-psychological and cultural reasons. Disability when compounded with discrimination doubles the quantum of disability. There is a wide spread underestimation of the abilities and potential of persons with disabilities due to general public perception and prejudices which has created a vicious cycle of under achievement. This, in turn, results in inferiority complex among the people with disparity which further harms their growth (Kacker, 2013). It has been found that more than 88 percent of the

people with disabilities have not received any type or aid or help or support from either the government or outside the government. On the other hand, only 1 percent of the disabled people received education through the government and this proportion is lower in rural (0.7 percent) than in urban (2.1 percent) areas. The available evidence also suggests that some states in the country are doing better than others to meet needs of persons with disabilities (Singh, 2013).

There is a need to look at disability issues in India from an interdisciplinary perspective. However, most of the research related to persons with disabilities have followed the medical approach. There is also lack of research portraying the feelings and experiences of people with disabilities in their own voice. Most of the Indian research falls in the category of the medical model of disability (Chander, 2008). There is an urgent need to study social and cultural aspects of disability through Indian perspective. Promoting interdisciplinary approach in researches related to disabilities and various ethnographic researches would help in developing a holistic understanding of disability. It will also be beneficial for deeper epistemological underpinning in disability studies within the Indian context (Rajeshwari and Saxena, 2014). The PWD Act 1995 covers virtually all disability related issues but is silent on the discrimination and violence faced by women with disabilities that differentiate them from men with disabilities. To address this lacuna, the government has formed a committee which has drafted a new disability law that is called the Rights of Persons with Disabilities Bill 2013 (Badjena, 2014).

Conclusions

Disability is a complex condition which reflects the interaction between the appearance of a person's body and the appearance of the society in which he or she lives. Disability is difficult to define since it differs in types, forms and intensity. Understanding disability involves understanding these differences. The disability rate is the lowest in the young population but the highest among the old. The incidence of disability in women is comparatively lower than that in men. Rural-urban differentials in the incidence of disability are however not substantial.

The present analysis suggests that issues of disabled youth, disabled women and disabled old should not be neglected in any policy discourse. Equal opportunity and full participation of the disabled should be ensured. Many policies and programmes have been adopted and acknowledged in India but these policies and programmes have not been properly implemented so that services are not reaching to the persons with disabilities. They are often excluded from the mainstream, denied of their human rights; face various forms of discrimination ranging from denial of educational opportunities to segregation and isolation because of the imposition of physical and social barriers. These policies and programmes should percolate to the grass root levels of the society but somehow it fails to do so. There is a need to change the attitude of the society towards the disability and disabled persons. They should not be looked upon with pity as they are much more

capable of doing things. One should not underestimate the abilities and potential of persons with disabilities. They need equal opportunity and full participation in the society.

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Table 1
Disabled population in India by type of disability, 2011

Particulars	Number	Percentage	Sex ratio
Total population	1210854977	100	
Total disabled population	26814994	2.21	789
Type of disability			
In seeing	5033431	18.77	907
In speech	5072914	18.92	894
In hearing	1998692	7.45	780
In movement	5436826	20.28	613
Mental retardation	1505964	5.62	729
Mental illness	722880	2.70	739
Others	4927589	18.38	806
Multiple disabilities	2116698	7.89	820

Remarks: Sex ratio is defined as the ratio of females to males.
Source: Census of India 2011

Table 2

Age, residence, sex and type specific disability rates (percent) in India, 2011.

Age	All types	Seeing	Hearing	Speech	Movement	Mental Retardation	Mental illness	Others	Multiple disabilities
Combined population both sexes									
Total	2.21	0.42	0.42	0.17	0.45	0.12	0.06	0.41	0.17
0-4	1.14	0.25	0.28	0.03	0.10	0.04	0.01	0.37	0.07
5-9	1.54	0.28	0.32	0.17	0.17	0.11	0.02	0.33	0.15
10-19	1.82	0.31	0.34	0.17	0.28	0.16	0.04	0.35	0.16
20-29	1.97	0.29	0.35	0.17	0.44	0.14	0.06	0.38	0.13
30-39	2.09	0.32	0.38	0.18	0.47	0.14	0.08	0.41	0.12
40-49	2.31	0.40	0.42	0.19	0.50	0.13	0.10	0.44	0.12
50-59	2.83	0.59	0.51	0.19	0.68	0.11	0.10	0.49	0.16
60-69	4.15	1.04	0.77	0.20	1.06	0.09	0.09	0.56	0.34
70-79	6.22	1.64	1.21	0.20	1.59	0.08	0.09	0.62	0.81
80+	8.41	1.99	1.66	0.20	2.00	0.09	0.09	0.68	1.70
Rural population both sexes									
Total	2.24	0.42	0.41	0.16	0.48	0.12	0.06	0.39	0.19
0-4	1.09	0.23	0.26	0.03	0.11	0.04	0.01	0.35	0.07
5-9	1.51	0.27	0.31	0.17	0.18	0.11	0.02	0.32	0.15
10-19	1.81	0.29	0.33	0.17	0.31	0.16	0.04	0.34	0.17
20-29	1.96	0.27	0.32	0.16	0.49	0.14	0.06	0.37	0.14
30-39	2.09	0.31	0.36	0.17	0.51	0.14	0.09	0.40	0.12
40-49	2.33	0.40	0.41	0.18	0.54	0.13	0.10	0.44	0.13

Age	All types	Seeing	Hearing	Speech	Movement	Mental Retardation	Mental illness	Others	Multiple disabilities
50-59	2.91	0.62	0.52	0.18	0.73	0.11	0.10	0.48	0.18
60-69	4.40	1.15	0.81	0.18	1.14	0.09	0.09	0.56	0.38
70-79	6.80	1.86	1.29	0.18	1.74	0.08	0.09	0.63	0.94
80+	9.31	2.28	1.76	0.18	2.23	0.08	0.09	0.69	2.00
Urban population both sexes									
Total	2.17	0.41	0.45	0.18	0.37	0.13	0.06	0.43	0.14
0-4	1.29	0.29	0.33	0.03	0.08	0.05	0.01	0.42	0.07
5-9	1.62	0.31	0.36	0.17	0.14	0.11	0.02	0.36	0.14
10-19	1.86	0.34	0.39	0.18	0.22	0.17	0.04	0.38	0.15
20-29	1.99	0.33	0.40	0.18	0.34	0.15	0.05	0.41	0.12
30-39	2.11	0.35	0.42	0.20	0.39	0.14	0.08	0.43	0.10
40-49	2.28	0.41	0.45	0.21	0.43	0.12	0.10	0.46	0.11
50-59	2.66	0.53	0.50	0.22	0.57	0.10	0.09	0.50	0.13
60-69	3.53	0.79	0.67	0.23	0.87	0.09	0.09	0.56	0.23
70-79	4.80	1.09	1.00	0.23	1.22	0.08	0.09	0.59	0.48
80+	6.32	1.31	1.44	0.23	1.47	0.10	0.10	0.67	1.00
Combined population males									
Total	2.40	0.42	0.43	0.18	0.54	0.14	0.07	0.44	0.19
0-4	1.18	0.25	0.28	0.03	0.12	0.05	0.01	0.37	0.08
5-9	1.63	0.29	0.32	0.18	0.19	0.12	0.02	0.34	0.17
10-19	1.96	0.32	0.35	0.19	0.33	0.18	0.04	0.37	0.18
20-29	2.22	0.31	0.37	0.18	0.55	0.17	0.07	0.42	0.15

Age	All types	Seeing	Hearing	Speech	Movement	Mental Retardation	Mental illness	Others	Multiple disabilities
30-39	2.41	0.35	0.40	0.20	0.61	0.16	0.10	0.46	0.14
40-49	2.66	0.44	0.45	0.21	0.66	0.15	0.11	0.50	0.14
50-59	3.16	0.61	0.53	0.21	0.86	0.12	0.10	0.54	0.18
60-69	4.41	1.01	0.78	0.22	1.26	0.10	0.09	0.62	0.34
70-79	6.26	1.54	1.21	0.22	1.72	0.08	0.08	0.66	0.74
80+	8.23	1.89	1.71	0.22	2.02	0.09	0.08	0.72	1.50
Rural population males									
Total	2.43	0.43	0.42	0.17	0.59	0.14	0.07	0.43	0.20
0-4	1.13	0.23	0.26	0.03	0.13	0.04	0.01	0.35	0.08
5-9	1.61	0.28	0.31	0.18	0.21	0.12	0.02	0.32	0.17
10-19	1.95	0.30	0.33	0.19	0.36	0.18	0.04	0.36	0.19
20-29	2.24	0.30	0.34	0.18	0.62	0.17	0.07	0.40	0.17
30-39	2.44	0.34	0.38	0.19	0.67	0.16	0.10	0.45	0.15
40-49	2.70	0.44	0.44	0.19	0.71	0.15	0.12	0.50	0.16
50-59	3.27	0.64	0.54	0.20	0.93	0.12	0.11	0.55	0.20
60-69	4.66	1.10	0.82	0.20	1.35	0.10	0.09	0.63	0.37
70-79	6.79	1.74	1.29	0.21	1.88	0.08	0.08	0.67	0.85
80+	9.04	2.15	1.79	0.20	2.25	0.09	0.08	0.73	1.75
Urban population males									
Total	2.34	0.42	0.46	0.20	0.44	0.14	0.07	0.46	0.15
0-4	1.31	0.29	0.33	0.03	0.09	0.06	0.01	0.43	0.07
5-9	1.70	0.32	0.36	0.19	0.15	0.12	0.02	0.37	0.16

Age	All types	Seeing	Hearing	Speech	Movement	Mental Retardation	Mental illness	Others	Multiple disabilities
42661	1.97	0.35	0.39	0.19	0.25	0.19	0.04	0.39	0.17
20-29	2.19	0.35	0.42	0.19	0.41	0.17	0.07	0.44	0.13
30-39	2.36	0.37	0.45	0.22	0.49	0.15	0.09	0.47	0.12
40-49	2.58	0.44	0.48	0.24	0.55	0.14	0.11	0.50	0.12
50-59	2.95	0.55	0.52	0.25	0.72	0.11	0.10	0.54	0.15
60-69	3.83	0.79	0.68	0.26	1.05	0.10	0.09	0.61	0.25
70-79	4.92	1.06	1.02	0.26	1.32	0.09	0.09	0.64	0.46
80+	6.21	1.25	1.49	0.26	1.45	0.10	0.09	0.71	0.87
Combined population females									
Total	2.01	0.41	0.41	0.15	0.35	0.11	0.05	0.37	0.16
0-4	1.11	0.24	0.28	0.03	0.09	0.04	0.01	0.36	0.06
5-9	1.44	0.28	0.32	0.15	0.14	0.09	0.02	0.32	0.13
10-19	1.67	0.29	0.34	0.16	0.23	0.14	0.04	0.34	0.14
20-29	1.70	0.27	0.33	0.16	0.32	0.12	0.05	0.35	0.11
30-39	1.77	0.29	0.35	0.16	0.32	0.12	0.07	0.36	0.10
40-49	1.94	0.37	0.39	0.17	0.34	0.11	0.09	0.38	0.10
50-59	2.47	0.57	0.49	0.17	0.49	0.09	0.09	0.43	0.14
60-69	3.89	1.08	0.76	0.17	0.87	0.08	0.09	0.51	0.34
70-79	6.19	1.73	1.20	0.17	1.47	0.08	0.09	0.57	0.88
80+	8.57	2.08	1.63	0.18	1.98	0.09	0.10	0.65	1.88
Rural population females									
Total	2.03	0.41	0.40	0.14	0.38	0.11	0.05	0.36	0.18

Age	All types	Seeing	Hearing	Speech	Movement	Mental Retardation	Mental illness	Others	Multiple disabilities
42460	1.06	0.23	0.26	0.03	0.10	0.04	0.01	0.34	0.06
5-9	1.41	0.27	0.30	0.15	0.15	0.09	0.02	0.31	0.13
10-19	1.65	0.28	0.32	0.15	0.25	0.14	0.04	0.32	0.14
20-29	1.66	0.25	0.30	0.15	0.35	0.12	0.05	0.33	0.12
30-39	1.73	0.27	0.33	0.15	0.34	0.12	0.07	0.35	0.10
40-49	1.94	0.36	0.38	0.16	0.36	0.11	0.09	0.37	0.11
50-59	2.54	0.60	0.50	0.16	0.53	0.09	0.09	0.42	0.16
60-69	4.16	1.19	0.80	0.16	0.94	0.08	0.09	0.51	0.38
70-79	6.81	1.98	1.29	0.16	1.61	0.08	0.09	0.58	1.03
80+	9.55	2.40	1.73	0.16	2.21	0.08	0.09	0.66	2.22
Urban population females									
Total	1.98	0.39	0.43	0.17	0.29	0.11	0.05	0.40	0.13
0-4	1.26	0.29	0.34	0.03	0.07	0.05	0.01	0.41	0.06
5-9	1.54	0.31	0.36	0.16	0.11	0.10	0.02	0.35	0.12
10-19	1.74	0.33	0.39	0.17	0.18	0.15	0.03	0.37	0.13
20-29	1.79	0.31	0.39	0.17	0.27	0.12	0.04	0.39	0.10
30-39	1.84	0.32	0.39	0.18	0.29	0.12	0.06	0.39	0.09
40-49	1.95	0.37	0.41	0.19	0.29	0.11	0.08	0.41	0.09
50-59	2.34	0.51	0.48	0.20	0.41	0.09	0.09	0.45	0.11
60-69	3.23	0.79	0.66	0.20	0.69	0.08	0.09	0.50	0.22
70-79	4.67	1.13	0.99	0.20	1.11	0.08	0.10	0.55	0.51
80+	6.40	1.36	1.39	0.21	1.49	0.10	0.11	0.63	1.11

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Gynecological Morbidity in India: Level, Patterns and Determinants

Archana Poonia

Introduction

Reproductive morbidity is any morbidity or dysfunction of the reproductive tract or any morbidity which is a consequence of reproductive behaviour including pregnancy, contraceptive use, abortion, childbirth or sexual behaviour and consisting of the sexual health of an individual, the condition of the environment where the reproduction takes place, human and environment. It can be subdivided into three categories:

- Obstetric or maternal morbidity,
- Contraceptive morbidity, and
- Gynecological morbidity

The gynecological morbidity can be further sub-divided into urinary and reproductive tract infections, hormone disorders, infertility, cancer of the cervix, injuries, sexual dysfunction, menopausal symptoms, etc. Addressing gynecological morbidity is a complex process as women either do not consider it as a significant health problem or are hesitant to talk about it. Reproductive tract infections (RTIs) are generally seen as a 'silent' epidemic because the symptoms are not easily recognisable. Shame, stigma and embarrassment associated with RTIs are the main stumbling blocks against the identification of these diseases and their treatment (Oomman, 2000).Women's reproductive and sexual health had been a neglected area of international research for decades (Campbel, 1999). It gained momentum only after the International Conference on Population and Development (ICPD) 1994 which was held at Cairo, Egypt. Reproductive morbidity affects not only the normal reproductive maturation and functioning of women but also challenges their overall physical, social and psychological development. Reproductive morbidity is also an important guide to understand the position of women in the household and in the community. Reproductive health problems are the leading causes of women's ill health (World Bank, 1993).

In view of the above considerations, the present study attempts to analyse the level and the pattern of gynecological morbidity among married and unmarried women in districts of India. The study also attempts to understand the relationship between the background social and economic characteristics of women and the level of gynecological morbidity. Finally, the study attempts to identify main determinants of gynecological morbidity in four states of the country - Madhya Pradesh, Jharkhand, Bihar and West Bengal - where the prevalence of reproductive morbidity is found to be amongst the highest in the country.

Data Source and Methodology

The analysis is based on the data available through the District Level Household and Facility Survey 2007-08 (DLHS 3) conducted by the International Institute for Population Sciences, Mumbai for the Government of India, Ministry of Health and Family Welfare. In addition, data available through the 2011 population census have also been used in the present analysis.

The methodology used in the present analysis involves descriptive analysis such as frequency distribution. In addition, spatial mapping has been used in the analysis to find out regional patterns of the prevalence of gynecological morbidity and correlation analysis to identify the determinants of gynecological morbidity using the stepwise regression technique.

Literature Review

Almost one-third of the ever-married women in all north Indian states report at least one reproductive health problem whereas this percentage is comparatively low in the south Indian states (Datta and Guha, 2005). Reproductive morbidity is determined by background characteristics of the woman, intermediate factors such as childbearing pattern, use of health services, and health-related behaviour and risk elements such as malnutrition, susceptibility, and infection (Younis et al, 1994). Reproductive morbidity is not just an outcome of biological factors but is also aggravated by women's poverty, powerlessness and lack of control over resources. Factors like illiteracy and associated ignorance among women, gender discrimination and poor social status of women in the family and the society complicate the problem further and reduce reporting of women with gynecological problems leading to the delay in treatment which ultimately increases the prevalence (Gaash et al, 2005). The treatment seeking behaviour of women having gynecological morbidity remains far from satisfactory in India. It is well known that social and cultural taboos and inhibitions, cost of treatment, inaccessibility to the health facility, non-availability of gynecological services in health institutions, social stigma and the poor status of women in the family and the society affect the treatment seeking behaviour of women suffering with one or the other type of gynecological morbidity.

Findings

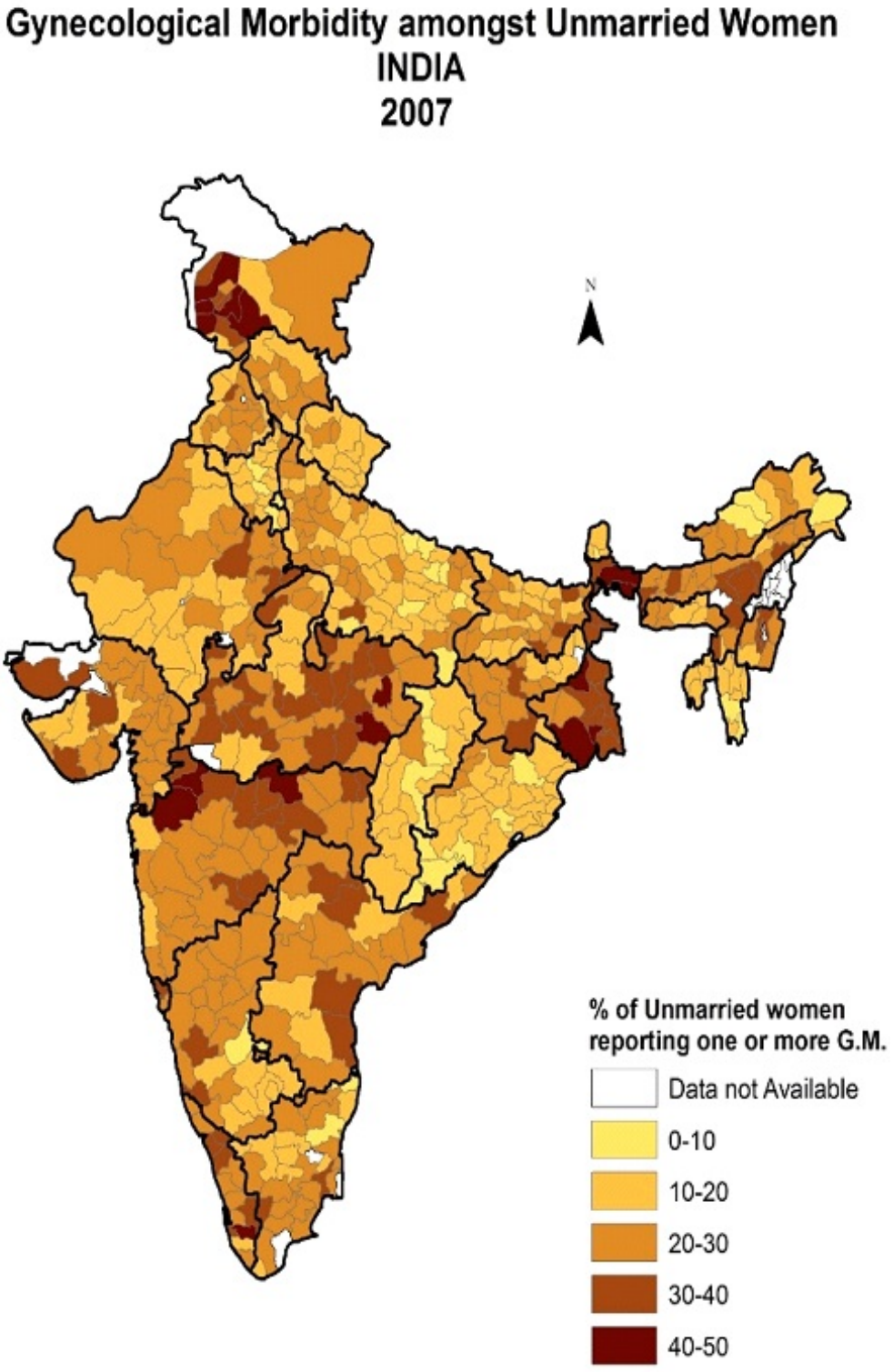
The level and pattern of gynecological morbidity among married women at the district level have been shown in terms of menstruation related problems, reproductive tract infections (RTI) and other gynecological problems. Gynecological morbidity among unmarried women at district level has also been analysed in the context of menstruation related problems only.

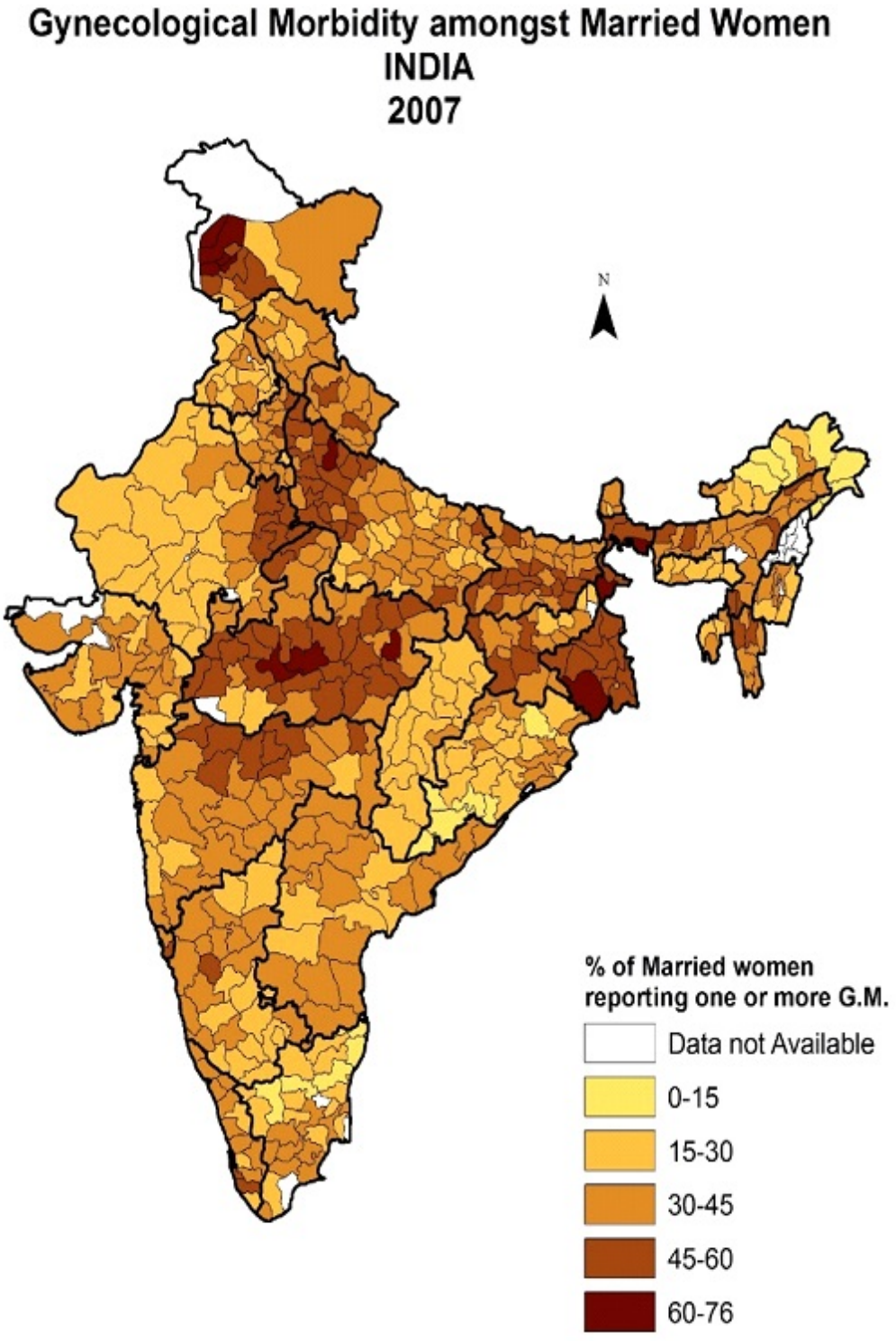
Gynecological Morbidity in Unmarried Women. According to the DLHS 3, the prevalence of gynecological morbidity in unmarried Indian women is estimated to be 50 percent. Gynecological morbidity has been found to be above the national average in Jammu and Kashmir, Assam, West Bengal, Madhya Pradesh, Uttar Pradesh, Bihar, and Jharkhand whereas the prevalence has been found to be below the national average in Pondicherry, Lakshadweep, Chhattisgarh, Chandigarh, Punjab, Arunachal Pradesh, Karnataka, Kerala and Orissa. In Madhya Pradesh, district Umaria located in the eastern part of the state, Shajapur and Sehore located in the western part of the state and Raisen located in the central part of the state show very high prevalence of gynecological morbidity. In districts of Jharkhand, except for a few eastern districts of Sahibganj, Godda, Pakur, Dumka and Devghar, the prevalence of gynecological morbidity ranges between 30-50 percent. In West Singhbhum, Ramgarh and Hazaribagh districts of the state the prevalence of gynecological morbidity ranges between 40-50 percent.

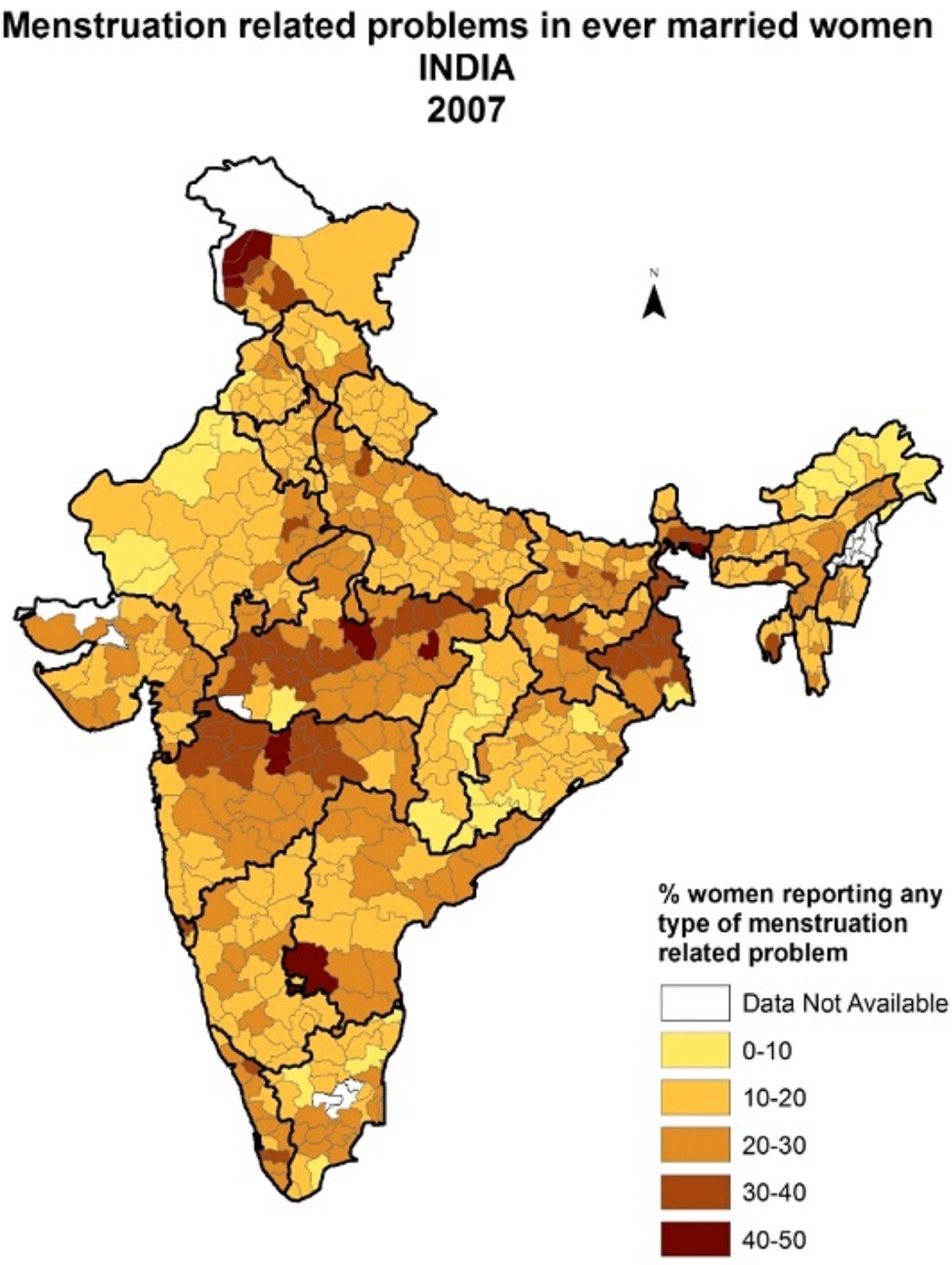
In Bihar, the prevalence of gynecological morbidity ranges between 20-30 percent in almost half of the districts. In the remaining districts, the prevalence ranges between 10-20 percent. The prevalence of gynecological morbidity has also been found to be high in most of the districts of West Bengal except in Puruliya and Bankura where the prevalence of gynecological morbidity is estimated to range between 20-30 percent. It has also been observed that unmarried women are two times more likely to suffer from menstruation related problems than married ones.

Gynecological Morbidity in Married Women. In Madhya Pradesh, districts situated along the Narmada river show relatively higher prevalence of gynecological morbidity among married women. Reproductive morbidity among married women is found to be very high in Raisen, Sehore and Umaria districts. In Bihar, districts located near the Ganga basin show higher prevalence of gynecological morbidity whereas all districts of West Bengal show consistently high prevalence of gynecological morbidity. In Jharkhand, except for few eastern districts of Sahibganj, Godda, Giridih and Devghar the prevalence of gynecological morbidity ranges between 15-30 percent.

In Uttar Pradesh, the prevalence of gynecological morbidity is estimated to be at least 60 percent in districts located in the north-western part of the state - Saharanpur, Bijnor, Muzaffarnagar, Meerut, Ghaziabad and Etah. On the other hand, the prevalence of gynecological morbidity ranges between 15-30 per cent in districts located in the central part of the state - Lucknow, Unnao, Kanpur - and in district Jhansi which is located in the south-west corner of the state.


Gynecological Morbidity amongst Unmarried Women
INDIA
2007
N
% of Unmarried women reporting one or more G.M.
Data not Available
0-10
10-20
20-30
30-40
40-50


Gynecological Morbidity amongst Married Women
INDIA
2007
N
% of Married women
reporting one or more G.M.
Data not Available
0-15
15-30
30-45
45-60
60-76



One reason behind relatively higher prevalence of gynecological morbidity in north India is the problem of vaginal discharge. Almost one-third of the ever-married women in all the north Indian states reported vaginal discharge as a gynecological problem at at the time of DLHS 3. By contrast, this proportion is estimated to be relatively low in the south Indian states except Andhra Pradesh (Datta and Guha, 2005) so that gynecological morbidity is relatively low in southern India.

Menstruation Related Problems in Ever Married Women. In Madhya Pradesh, districts situated along the river Narmada show relatively higher prevalence of menstruation related problems among ever married women as compared to other districts of the state. In West Bengal, prevalence of menstruation related problems is found to be high in Purulia, Bankura, Birbhum, Murshidabad, Maldaha, Dakshin Dinajpur, Uttar Dinajpur and Cooch Behar districts. In Jharkhand, the north-south corridor covering Hazaribagh, Ranchi and Simdega districts also show very high prevalence of menstruation related problems in ever married women. Prevalence of menstruation related problems has also been found to be high in the Kachchh region and in western districts of Gujarat. In Jammu and Kashmir, prevalence of menstruation related problems appear to be quite common in Barmula, Punch, Rajouri, Doda and Anantnag districts which are located in the western part of the state.

The analysis of the data available through DLHS 3 suggests that there are sharp regional and spatial differences in the level and pattern of gynecological morbidity in the country. The districts along the central axis running from western Madhya Pradesh to West Bengal in the east have been found to be having consistently high gynecological morbidity. In north India, districts of Rajasthan, Haryana and Western Uttar Pradesh which constitute a geographical continuity have been found to be having high prevalence of gynecological morbidity.

Determinants of Gynecological Morbidity. Akl at el (2011) has found significant association of gynecological morbidity with age, education and duration of marriage of the woman. On the other hand, Parikh et al (2003) found significant association with the education of the woman. In a survey conducted by the Centre for Operations Research and Training (CORT) in Bhopal, Sagar and Vidisha districts of Madhya Pradesh, the prevalence of gynecological morbidity was found to high because of factors like lack of sanitation facilities, low level of literacy, low work participation rate, etc. Factors such as heredity, environmental conditions, body stature, socio-economic status, nutritional and health status, family size, level of education, and psychological well being, etc. have also been found to be associated with gynecological morbidity (Ayatollahi, Dawlatabadi and Ayatollahi, 1999).

In order to analyse various socio-economic and demographic factors associated with gynecological morbidity, four states Madhya Pradesh, Bihar, Jharkhand and West Bengal were selected as the prevalence of gynecological morbidity in most of the districts of these states is found to be quite high. Three gynecological disorders were taken up for correlation analysis - abnormal vaginal discharge, menstruation related problems during 3 months prior to the survey and other gynecological problems. Results of the analysis are presented in table 1 for abnormal vaginal discharge; in table 2 for menstruation related problems; and in table 3 for other gynecological problems. The problem of abnormal vaginal discharge in women is found to be associated positively with the availability of latrine and electricity in the house and male literacy. On the other hand, the prevalence of abnormal vaginal discharge has been found to be statistically significantly negatively associated with the proportion of Scheduled Castes population in the district.

The prevalence of menstruation related problems, on the other hand, has been found to be statistically significantly associated positively with female and male literacy and with the proportion of Scheduled Castes population in the district. However, the prevalence of menstruation related problems has been found to statistically significantly negatively associated with household level variables such as presence of latrine and electricity in the house, bathing facilities in the house, etc.

Finally the prevalence of other gynecological problems has been found to be associated positively with the proportion of Scheduled Castes population. This implies that Scheduled caste women are more vulnerable towards all gynecological problems than other social classes. The prevalence of other gynecological problems has also been found to be associated positively with the female literacy rate but negatively with different household level variables.

Conclusions

There are sharp regional and spatial differences in the level and pattern of gynecological morbidity in India. The prevalence of gynecological morbidity is generally found to be higher in married women compared to unmarried women in all regions of the country. The analysis also indicates relatively high prevalence of gynecological morbidity in districts along the central axis running from western Madhya Pradesh to West Bengal. Moreover, a number of socioeconomic and demographic variables have been found to influencing the prevalence of such gynecological morbidity as abnormal vaginal discharge and menstruation related problems in the country.

Study Limitations

Perhaps, the most important limitation of the present study is the limitation of the data. Data related to gynecological morbidity are difficult to obtain because these data are sensitive as women do not want to share their reproduction related problems. Another limitation of the study is that self-reporting of any disease is essentially subjective as it is influenced by the knowledge, awareness, exposure, vulnerability and socio-economic characteristics of the respondents.

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Table 1
Simple zero order correlation coefficient of the prevalence of abnormal vaginal discharge with selected social and economic variable

Social and economic variables	Correlation coefficient
Proportion of households having lighting facility	-0.162
Proportion of households having electricity and latrine near the premise	-0.255**
Proportion of households having drinking water facility within and near the premise	-0.070
Proportion of households having bathing facility within the premise	-0.211*
Proportion of households having none of the household assets	0.169
Proportion of Scheduled Castes population	0.314**
Proportion of Scheduled Tribes population	-0.170
Female literacy rate	0.162
Male literacy rate	0.223*
Female work rate participation	-0.064

Remarks: ** $p<0.01$; * $p<0.05$
Source: Author's calculations

Table 2
Simple zero order correlation coefficient of the prevalence of menstruation problems during last three months with selected social and economic variables

Social and economic variables	Correlation coefficient
Proportion of households having lighting facility	-0.335**
Proportion of households having electricity and latrine near the premise	-0.297**
Proportion of households having drinking water facility within and near the premise	-0.198*
Proportion of household having safe/covered drinking water	-0.143
Proportion of households having bathing facility within the premise	-0.027
Proportion of households having none of the household assets	-0.061
Proportion of Scheduled Castes population	0.387**
Proportion of Scheduled Tribes population	-0.097*
Female literacy rate	0.364**
Male literacy rate	0.203*
Female work rate participation	-0.063

Remarks: ** $p<0.01$; * $p<0.05$
Source: Author's calculations

Table 3
Simple zero order correlation coefficient of the prevalence of other gynecological problems with selected social and economic variable

Social and economic variables	Correlation coefficient
Proportion of households having lighting facility	-0.155
Proportion of households having electricity and latrine near the premise	-.308**
Proportion of households having drinking water facility within and near the premise	-0.089
Proportion of household having safe/covered drinking water	-0.032
Proportion of household having safe/covered drinking water	-0.041
Proportion of household having drinking water facility away from home	0.089
Proportion of households having bathing facility within the premise	-0.190*
Proportion of households having none of the household assets	0.191*
Proportion of Scheduled Castes population	0.205*
Proportion of Scheduled Tribes population	-0.033
Female literacy rate	0.212*
Male literacy rate	0.262**
Female work rate participation	-0.001

Remarks: ** $p<0.01$; * $p<0.05$
Source: Author's calculations

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Determinants of Maternity Care Services Utilisation by Married Adolescent Women: A Comparative Study in India

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B. P. Singh

Introduction

Maternity care services (ante natal, natal and post natal) play important role during pregnancy and child birth thereby affecting mortality directly and indirectly. Considering the importance of the issue, United Nations had focussed on improving maternal health in the Millennium Development Goals and targeted to reduce maternal mortality ratio (MMR) by 75 percent during 1990-2015 . At the global level, however, use of maternity care services varies widely depending upon a host of social, economic, cultural and other factors and there is a large poor-rich inequality in maternity care in the developing countries (Houweling et al, 2007). Pregnancy during adolescence is a significant problem globally with the incidence of adolescent pregnancy very high in the developing countries (WHO, 2004). Adolescent or teenage pregnancy increases the risk of adverse birth outcomes that is independent of important known confounders like low socioeconomic status, inadequate prenatal care and inadequate weight gain during pregnancy (Chen et al, 2007). Pregnancy prevention strategies and improvement in healthcare interventions are crucial to reduce adverse pregnancy outcomes among adolescent women in low- and middle-income countries (Ganchimeg et al, 2014). The perspective of maternal healthcare for adolescent women is crucial because early sexual activity and childbearing accelerates the risk of maternal as well as child death. Several socioeconomic and cultural factors affect the utilisation of maternal healthcare services among adolescent women in rural India (Singh et al, 2012). Adolescent women need guidance and support so that they can recognise their role as a parent, are able to set specific and attainable reproductive goals for the future, and can seek necessary resources that support their efforts towards realisation of these goals (DeVito, 2010). The available evidence suggests that adolescent married women are more likely to have severe delivery complications than other women leading to relatively higher morbidity and mortality among them.

In an effort to improve the provision of health care services in the rural areas, the Government of India had launched the National Rural Health Mission (NRHM) in 2005. Under the Mission, Janani Suraksha Yojana (JSY) was been launched to safeguard health of women. This Yojana may be viewed as a conditional cash transfer scheme to promote institutional deliveries thereby reducing the risk of death associated with the complications of pregnancy and delivery. It is envisaged in the Yojana that promotion of institutional deliveries will particularly contribute to reducing maternal and neonatal mortality in women having low socioeconomic status (Lim, 2010).

Considering the proximate determinants framework of maternal mortality proposed by Thaddeus and Maine (1994), the present study analyses the effect of selected socioeconomic and demographic factors on the outcome of the pregnancy in four states of India - West Bengal, Uttar Pradesh, Gujarat and Tamil Nadu. West Bengal is located in the eastern part of the country whereas Uttar Pradesh is located in the northern part. On the other hand Gujarat is located in the western part while Tamil Nadu is located in the southern part of the country. The paper also analyses the effect of age-difference on the use of maternal care services in the present study.

Data

The data for the purpose of present study have been taken from the National Family Health Survey 2005-06 (NFHS 3). The National Family Health Survey Programme was launched by the Government of India, Ministry of Health and Family Welfare in the early 1990s and is implemented by the International Institute for Population Sciences. Since its inception in the early 1990s, three rounds of nationally representative survey have been carried out and the fourth round is currently under progress. During the third round of the survey, more than 230 thousand women in the age group 15-49 years were surveyed covering all states and Union Territories of the country. The survey provided estimates of selected indicators reflecting the state of maternal and child health in the country and for its constituent states and Union Territories along with the basic social, demographic and economic characteristics of the population surveyed. Detailed description of the NFHS 3 is given elsewhere (IIPS and Macro International, 2007).

Methodology

The paper uses bivariate and multivariate analytical tools to analyse factors influencing the use of maternal and child health care services by married adolescents and young adults. The effect of age difference between husband and wife on the use of maternal healthcare services has also been studied in this paper. Three components of maternal health care services - ante natal care, natal care and postnatal care - have been covered in the present analysis which is restricted to only those women who gave births during the last five years preceding the survey. The dependent variables used in the

analysis are: 1) full antenatal care; 2) safe delivery; and 3) post natal care. A woman is categorised as receiving full ante natal care during her last pregnancy if she has taken IFA (Iron and Folic Acid) tablets or syrup for at least 90 days, has undergone at least three examinations during the antenatal period and received either a booster dose or two doses of tetvac injection. Safe delivery, on the other hand, means either institutional delivery or delivery outside the institution assisted by a trained health personnel. Finally, the post natal care implies care received from a trained health personnel during 48 hours after the delivery.

The bivariate analysis involved calculation of simple zero order correlation coefficient between dependent and independent variables. The chi-square test was applied to statistically test the significance of the association between the dependent and the independent variables. We also performed binary logistic regression analysis to quantify the effect of different social, economic and demographic variables on the use of different maternal health care services. The dependent variables used in the regression analysis are dichotomous variables. In case of antenatal care, the dependent variable is the full ante natal care (ANC). This variable has value 1 if the woman has received full antenatal care during her previous delivery, otherwise the variable takes the value 0. In case of natal care, the dependent variable is the safe delivery (SDL). If the last delivery of the woman was safe then this variable takes the value 1 others it takes the value 0. Finally, for the post natal care, the dependent variable in care after delivery (PNC) which takes the value 1 if the delivery is followed by a post natal visit and 0 otherwise. The independent variables used in the regression analysis include education of the woman, her place of residence, religion and caste, her occupation and the standard of living of the household measured in terms of the household wealth index. Finally, type of household autonomy has also been included as one of the independent variables used in the regression analysis. The frequency distribution of all variable used in the regression analysis is given in Table 1.

Results

In case of the utilisation of antenatal care, the effect of the education of the woman and the household wealth index is found to be statistically signification (Table 2). In Uttar Pradesh and Gujarat, the likelihood of receiving full antenatal care is statistically significantly higher in women having primary education as compared to uneducated women. In West Bengal and Tamil Nadu, however, this difference is not statistically significant. On the other hand, the likelihood of receiving full antenatal care in women having at least higher secondary education is statistically significantly higher than in uneducated women in Uttar Pradesh, West Bengal and Gujarat but not in Tamil Nadu. Similarly, women belonging to rich households have statistically significantly higher probability of receiving full ante natal care as compared to poor families in Uttar Pradesh, West Bengal and Gujarat but not in Tamil Nadu whereas women belonging to middle income households have statistically significantly higher probability of receiving full ante natal care as compared to poor families in West Bengal only. The table also suggests that

the probability of receiving full ante natal care in Hindu women is statistically significantly higher than the probability of receiving full antenatal care in other religions in West Bengal only and not in other states.

In case of the natal or delivery care, the likelihood of having a safe delivery is found to be statistically significantly higher in women from rich households as compared to women from poor households in all the four states (Table 3). However, in middle income households, this probability is found to be statistically significantly higher in Uttar Pradesh and Tamil Nadu only and not in West Bengal and Gujarat. In Uttar Pradesh, this probability is statistically significantly higher in women belonging to upper castes and other backwards classes compared to women belonging to Scheduled Castes and Scheduled Tribes; in women having education at least up to higher secondary level compared to uneducated women; and in women belonging to joint family compared to women belonging to nuclear families. In West Bengal, women educated at least up to primary level, women living in urban areas and Hindu women have relatively higher probability of having safe delivery compared to uneducated women, women living in rural areas and women belonging to other religions respectively. In Gujarat, this probability is statistically significantly higher in working women and women belonging to other backward classes only. Finally, in Tamil Nadu, only urban women have statistically significantly higher probability of having safe delivery as compared to rural women. More or less a very similar situation prevails in the four states in case of post natal care also (Table 4).

Finally, we also tried to analyse the effect of the age gap between the age of husband and wife on the utilisation of maternal health care services. The analysis shows that the age gap between husband and wife has not been found to be statistically significantly associated either with the use of ante natal care services or natal services or post natal care services in all the four states included in the present analysis.

Conclusions

The present analysis shows that social and economic determinants of the utilisation of maternal health care services by married adolescent women varies widely not only across the four states of the country included in the present analysis but also in terms of the type of maternal health care services. This means that a state-specific and service-specific approach should be adopted for universalisation of the utilisation of maternal health care services by the adolescent married women.

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Table 1
Characteristics of women surveyed in different states.

Variables	Covariates	Uttar Pradesh	West Bengal	Gujarat	Tamil Nadu
Residence	Rural	70.00	66.63	65.79	48.10
	Urban	30.00	33.37	34.21	51.90
Education	No Education	53.92	29.98	36.12	15.23
	Primary	13.37	25.57	16.51	18.04
	Secondary & above	32.71	44.45	47.37	66.73
Work status	Not working	79.16	76.47	60.29	73.55
	Working	20.84	23.53	39.71	26.45
Religion	Hindu	77.77	66.86	88.28	89.38
	Others	22.23	33.14	11.72	10.62
Caste	SC & ST	26.87	31.79	26.32	33.67
	OBC	51.99	4.41	43.78	64.93
	Other	21.14	63.80	29.90	1.40
Family type	Nuclear	26.14	36.88	30.14	53.71
	Joint	73.86	63.12	69.86	46.29
Living	Poor	44.82	50.34	27.98	21.24
	Middle	20.42	19.23	22.97	34.47
	Rich	34.76	30.43	49.05	44.29
ANC	No	74.58	40.36	43.90	9.62
	Yes	25.42	59.64	56.10	90.38
Safe delivery	No	75.62	48.55	42.75	7.95
	Yes	24.38	51.45	57.25	92.05
PNC	No	72.41	39.28	39.07	6.90
	Yes	27.59	60.72	60.93	93.10
	N	1660	830	407	478

Source: Authors' calculations

Table 2
Results of the regression of ANC on selected social, economic and demographic variables - odds ratios.

Variables		Uttar Pradesh	West Bengal	Gujarat	Tamil Nadu
Education	No education				
	Primary	1.702*	1.356	2.240*	1.701
	Secondary & above	2.578*	2.025*	3.580*	1.835
Work status	Not working				
	Working	1.045	1.204	0.850	1.242
Residence	Rural				
	Urban	1.168	1.353	1.310	1.872
Religion	Hindu				
	Other	0.893	0.65*	0.780	0.692
Social class	SC/ST				
	OBC	1.172	0.532	1.330	1.475
	Other	1.338	1.070	0.720	1.000
Family type	Nuclear				
	Joint	0.922	1.107	0.860	1.475
Living	Poor				
	Middle	1.211	1.919*	1.670	0.972
	Rich	2.731*	2.633*	3.920*	1.389

Source: Authors' calculations

Table 3
Results of the regression of SDL on selected social, economic and demographic variables - odds ratios.

Variables		Uttar Pradesh	West Bengal	Gujarat	Tamil Nadu
Education	No education				
	Primary	1.218	1.872*	1.22	0.736
	Secondary & above	2.193*	3.769*	1.41	0.635
Work status	Not working				
	Working	1.326	0.846	0.510*	0.488
Residence	Rural				
	Urban	1.305	3.414*	1.580	2.416*
Religion	Hindu				
	Other	0.637*	0.255*	0.690	0.87
Social class	SC/ST				
	OBC	1.521*	0.810	1.990*	1.984
	Other	1.869*	1.096	1.110	1.000
Family type	Nuclear				
	Joint	1.793*	1.212	1.200	1.124
Living	Poor				
	Middle	1.614*	1.426	0.640	2.339*
	Rich	3.662*	6.216*	2.600*	2.950*

Source: Authors' calculations

Table 4
Results of the regression of PNC on selected social, economic and demographic variables - odds ratios.

Variables		Uttar Pradesh	West Bengal	Gujarat	Tamil Nadu
Education	No education				
	Primary	1.156	1.884*	0.95	0.542
	Secondary & above	2.157*	3.228*	1.43	0.58
Work status	Not working				
	Working	1.189	0.973	0.490*	0.421*
Residence	Rural				
	Urban	1.294	2.364*	1.630	2.497*
Religion	Hindu				
	Other	0.708*	0.501*	0.880	0.772
Social class	SC/ST				
	OBC	1.405*	0.652	1.540	1.91
	Other	1.697*	0.932	1.250	1
Family type	Nuclear				
	Joint	1.837*	1.085	1.230	1.209
Living	Poor				
	Middle	1.553*	1.991*	0.580	1.692
	Rich	3.163*	5.556*	1.790	2.447

Source: Authors' calculations

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Female Work Force in Moradabad Division of Uttar Pradesh: A Geographical Analysis

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Introduction

Changes in the size, composition and distribution of population are closely associated with the demographic structure of the work force. The size of the work force depends upon a range of demographic, social and economic factors. It is generally the product of the total population base, but the age structure and the demographic regime are equally important determinants. Demographically, the birth rate, the age structure, the life expectancy, the migration behaviour and the average size of the family are important. Numerous other social and economic factors also influence the size and structure of the work force. Socially, levels of literacy and education, status of women in the society, age at marriage and general health status of the population are significant. Economically, the type of economy, availability of employment opportunities and levels of income are vital.

Indian economy is predominantly agricultural. The primary sector of the economy contributes about one third of the total economic output and employs more than half of the total work force. However, agriculture is understandably not able to absorb a significant number of additional workers. However, with modernisation, urbanisation and industrial development picking up, there is likely to be a shift in the occupational structure of the Indian work force. Economists have generally relied on aggregate, state level data, on the employment and unemployment released by the National Sample Survey Organisation (NSSO) to analyse trends and patterns of work force in the country. Some recent studies show that there is no healthy impact of liberalisation on the growth of employment particularly in the rural sectors (Sundaram, 2001; Chaddha and Sahu, 2002). Papola (2004) has observed that despite liberalisation, the overall growth rate in employment has slowed down in 1990s compared to the 1980s. There are however very few below state level studies on employment in India.

The present study attempts to analyse the size and structure of female work force in Moradabad Division of Uttar Pradesh on the basis of the data available through 2001 and 2011 population census. Earlier studies on work participation rates based on the census data show that work participation rates based on census data are significantly lower than that based on the data available through the comparable rounds of the National Sample Survey (NSS). This has led to the conclusion that population census undercounts the workforce especially in case of women (Sinha, 1982). The data available through the 2011 population census provide an opportunity to evaluate the female work participation rate estimated from the data available through the population census at the local level.

Data available through the population census suggest that the growth of workers at national, state and regional levels has not matched the growth of population. This has resulted in the increase in the dependency ratio and the number of unemployed or under employed people. While each person in the population is a consumer of the goods and services, only a specific sub-group of population usually participates in productive activities. It is obvious that very young and very old as well as physically and mentally incapacitated persons do not usually participate in productive activities. It is, therefore, accepted that only those who can produce goods and services constitute the manpower of any nation. The economically active population is that part of manpower which actually takes part, or tries to take part, in the productive activities. The labour force of any country or state or region is comprised of persons who can work and choose to do so while the work force consists of only those persons who are actually engaged in some productive activity either fully or partially.

Literature Review

Demographic and non-demographic factors appear to be important in any analysis of the labour force changes. The rate of population growth directly affects the work participation rate. On the other hand, the initial efforts to develop an economy, expansion of school enrolment, improved health and welfare services, increased urbanisation may be accompanied by declining trend in work participation rate and increase in the unemployment rates (Rayappa and Erpenshade, 1975). Moreover, census or labour force surveys in different countries across the globe highlight relatively low labour force participation rates for women as compared to men. There is also significant variation in the female work participation rate across countries, states within country and regions within state.

Dubey et al (2004) has analysed changes in the participation of women in the labour force in rural areas during the last two decades based on 38th and 55th rounds of the National Sample Survey. They found that more than 95 percent of women are were engaged as manual labour and there was a decrease in the female work participation rate during the study period. They also found that with the improvement in the economic status of the population the female labour force participation rate decreases. The authors

emphasised the importance of education and the level of economic development in increasing the female work participation rate which was highly desirable for equity and balanced economic development. Sundaram and Tendulkar (2004) reported that the worker-population ratios are lower for males but higher for females in poor household despite higher child-women ratio and dependency burden. The low proportion of regular wage/salary earning workers remained unchanged for the rural working poor. The only change was the rise in the share of manual workers at the cost of self-employed during the 1990s.

Several of the findings mentioned above are by and large acceptable. However, explanations for the trend and pattern of work participation rates are not easy to put forward due to the diversity of the situation as well as because of the fact that the work participation rate is influenced by market and non-market factors such as poverty and prevailing norms of work by gender, age and social status in different parts of India. It is therefore important to analyse the size and structure of the work force at the local level as analysis at the macro level may hide variations in work participation rate that persist at the local level.

Study Area

The present paper focusses on the Moradabad Division of Uttar Pradesh - the most populous state of the Republic of India. The Moradabad Division is located in the north-western part of the state which is relatively the most developed region of the state. The Division had 4 districts, 20 sub-districts (Tahsils), 36 Community Development (CD) Blocks, 62 towns (46 statutory towns and 16 census towns) and 7063 villages at the time of the 2011 census. The population of the Division, enumerated at the time of 2011 Census was 12.6 million out of which 6.6 million were males while 6.0 million were females. The population of the Division was 6.3 percent of the population of the state at the 2011 population census. The increase in the population of the Division between 2001 and 2011 was around 6.8 percent of the increase in the population of the state during this period.

Objectives

The objective of the present paper is to analyse the size and structure of female work force in Moradabad Division of Uttar Pradesh and in the districts and Community Development (CD) Blocks of the Division. Another objective of the present paper is to analyse the change in the occupational structure of the female population in the Division, districts and CD Blocks of the Division during the period 2001-2011. The change in the occupational structure of female workers, it may be pointed out, reflects the transition in the social and economic production system. As such, changes in the female workforce reflects the transition in the social and economic production system.

Methodology

The analysis is based on the data available through 2001 and 2011 population census. The terminology used in the present paper such as work, work force, worker, main worker, marginal worker, non-workers, occupational structure and work participation, etc. is the same as defined and adopted in the 2011population census. Work, in the 2011 population census, was defined as participation in any economically productive activity with or without compensation or profit during one year preceding the date of enumeration. Such participation may be physical or mental in nature. The data available through the population census have been analysed using the GIS software ArcGIS 10.0 version for windows. The geo-spatial analysis helped in locating "problem areas" or areas of potential growth.

The analysis presented in the following pages is built upon the growth rate of workers in the Division, crude work participation rate and the structure of the female force in terms of participation in primary, secondary and tertiary sectors of the economy.

Analysis and Results

Female Workers in Moradabad Division. The overall growth of female population in the Moradabad Division was 23.8 percent during 2001-2011. In the rural areas of the Division, female population increased by 21.8 percent but by 29.3 percent in the urban areas. The relatively higher growth of female population observed in the urban areas is due to rural to urban migrants in search of livelihood, education, and urban facilities. The growth of female population in the Moradabad Division has been found to be higher than that of Uttar Pradesh in both rural and urban areas (Table 1). On the other hand, female workers in the Division increased by 35.4 percent between 2001-2011 - 26.3 percent in the rural areas and 88.6 percent in the urban areas which indicates that growth of female workers been higher than the growth rate of the population in the Division. Moreover, the number of female workers increased at a higher rate in urban than in the rural areas of the Division. One reason for this observation may be better employment opportunities for females in the urban areas. In India as well as in Uttar Pradesh also, growth of female workers in the urban areas has been higher than that in the rural areas. However, the rate of increase in urban female workers in Moradabad Division has been higher than that in the state and in the country.

Workers in the 2011 population census are further categorised as main and marginal workers. Main workers are those who had worked for the major part of the year preceding the census or for at least 183 days during 12 months preceding the census. Rest of the workers are classified as marginal workers. In the Moradabad Division of Uttar Pradesh, 42.1 percent female workers were main workers at the 2011 population census while the rest were marginal workers. This proportion was 44.3 percent in Uttar Pradesh and 22.6 percent in India. On the other hand, 29.0 percent of female workers in the

Division were marginal workers. The corresponding proportion for Uttar Pradesh and India was 9.4 percent and 11.4 percent respectively. The table also shows that the number of female main workers in the Division increased more rapidly than those in the state and the country.

Female Work Participation Rate in Moradabad Division. The female work participation rate for Moradabad Division is estimated to be 10.9 percent in 2011 which is lower than that of Uttar Pradesh (16.7 percent) and India (25.5 percent) (Table 2). The crude work participation rate increased marginally in Moradabad Division and in Uttar Pradesh during 2001-11 but decreased in India. As a consequence, proportion of females in the work force increased from 15.7 percent in 2001 to 17.1 percent in 2011 in the Moradabad Division. The female work participation rate is lower in urban than that in rural areas of the district, although it showed an increasing trend in both rural and urban areas of the Division. The female work participation rate in the rural areas of the state and the country showed a decreasing trend but an increasing trend in the urban areas. The female main work participation rate and the female marginal work participation rate also showed an increasing trend in the Division during 2001-2011 in both rural and urban areas of the Division.

Occupational Distribution of Female Workers in Moradabad Division. The classification of female workers into various sectors can give an indication of the level of economic development. Industrialisation and associated development is reflected in the shift of female workers from the primary sector to the secondary and tertiary sectors of the economy. During the census, workers are classified four broad categories - cultivators, agricultural labourers, household industry workers and other workers. Cultivators and agricultural labourers are related to the primary sector of the economy; household industry workers are related to manufacturing or secondary sector; and other workers may be assumed to be related to the tertiary or the service sector of the economy.

Data available through the 2011 population census suggests that large proportion of female workers in the Moradabad Division are still engaged in the primary sector of the economy, although this proportion has decreased from 54.0 percent (34.3 percent female cultivators and 19.7 percent female agricultural labourers) in 2001 to 45.9 percent (20.9 percent female cultivators and 25.0 percent female agricultural labourers) in 2011 which suggests that the proportion of agricultural labourers in the female labour force has increased in the Division. On the other hand, the proportion of female workers engaged in manufacturing has also decreased from 17.4 percent in 2001 to 13.9 percent in 2011 but the proportion of female workers engaged in the service sector increased substantially from 28.6 percent in 2001 to 40.2 percent in 2011 (Table 3). By comparison, about 65.1 percent of the female workers in India are engaged in the primary sector of the economy in 2011 whereas this proportion is 60.6 percent for Uttar Pradesh.

Female Workers in Districts of Moradabad Division. Table 4 shows district-wise growth of female population, female workers, female main workers, female marginal workers and female non-workers by castes for 2001 and 2011 in the districts of Moradabad Division.

The growth of female population during 2001-2011 varied between 27.5 percent in Moradabad district to 19.0 percent in Bijnor district. In case of Scheduled Castes, the growth of female population varied from 24.8 percent in Jyotiba Phule Nagar to 21.3 percent in Rampur districts. In case of Scheduled Tribes, the growth of female population varied from 650.0 percent in Jyotiba Phule Nagar to 24.8 percent in Rampur district.

As regards the growth of female workers, district Rampur recorded the highest growth of 105.3 percent followed by Bijnor (42.0 percent) and Jyotiba Phule Nagar (40.8 per cent). By contrast, growth of female workers was only about 8.1 percent in Moradabad district mainly because of the decrease in the female main workers in the district.

Female Work Participation Rate in Districts of Moradabad Division. In three of the four districts in the Division, the female work participation rate increased during 2001-2011. Moradabad is the only district where the female work participation rate decreased during 2001-2011 (Table 5). The increase in the female work participation rate was the highest in district Rampur (4.6 percent), followed by Jyotiba Phule Nagar (1.8 percent) and Bijnor (1.5 percent). The female main work participation rate also decreased in Moradabad district whereas the female marginal work participation rate decreased in all but one district. District Rampur is the only district where the female marginal work participation rate increased during 2001-11.

Occupational Distribution of Female Workers in Districts of Moradabad Division. Table 6 gives the distribution of female workers by occupation in the districts of the Division along with the change in this distribution during 2001-11. The proportion of female workers in the primary sector decreased in all the four districts ranging from 12.7 percentage points in district Bijnor to 4.9 percentage points in Jyotiba Phule Nagar. The proportion of female workers engaged in the primary sector in 2011 ranged from 56.1 percent in district Jyotiba Phule Nagar to 42.1 percent in district Bijnor. Moreover, the proportion of female cultivators decreased in all districts but the proportion of female marginal workers increased in all districts. The decreasing trend in the proportion of female workers engaged in the primary sector may be visualised in both rural and urban areas of all the districts of the Division.

On the other hand, the proportion female workers engaged in the secondary sector decreased in Bijnor and Jyotiba Phule Nagar districts but increased in Moradabad and Rampur districts. In district Bijnor, the proportion of female workers engaged in the secondary sector decreased in the rural areas whereas this proportion decreased in the urban areas in Rampur and Jyotiba Phule Nagar districts. By contrast, the proportion of female workers in the tertiary sector increased in all districts of the Division as well as in both rural and urban areas of all the districts.

Female Work Participation Rates in CD Blocks. Table 7 presents the female work participation rates by CD blocks of Moradabad Division. The female work participation rate varies from a maximum of 23.3 percent in Gangeshwari CD block to a minimum of 7.3 percent in Kiratpur and Najibabad CD blocks in 2011. In 13 out of 36 CD blocks, the

female work participation rate decreased during 2001-11 with the highest decrease of 13.3 percentage points in Sambhal CD block whereas in Gangeshwari CD block, the female work participation rate increased by 14.0 percentage points. In the rural areas of the Division, the female work participation rate decreased in 17 out of 36 CD blocks during 2001-11 with the largest decrease in Bahjoi CD block (14.9 percentage points) and the smallest decrease in Najibabad CD block (0.4 percentage points). Out of the 19 CD blocks where the female work participation rate increased during 2001-2011, the decrease has been the most rapid in Gangeshwari CD block (11.7 percentage points) but the least rapid in Nehtaur and Kiratpur CD blocks (0.7 percentage points). In the urban areas, on the other hand, female work participation rate varied from 14.3 percent in Noorpur CD block to 4.0 percent in Bahjoi CD block in 2011. In 5 CD blocks, the female work participation rate decreased in the urban areas with the most rapid decrease observed in Amroha (3.0 percentage points) while the decrease was the slowest in Chamraua CD block (0.3 percentage points). On the other hand, the increase in the female work participation rate in the urban areas was the most rapid in Bhagatpur and Tanda CD blocks (9.4 percentage points) but the slowest in Shahabad CD block (0.2 percentage points).

Occupational Distribution of Female Workers in CD Blocks. The CD block-wise distribution of female workers engaged in primary, secondary and tertiary activities is presented in table 8. The proportion of female workers engaged in the primary sector varied from a minimum of 14.0 percent in Moradabad CD block to a maximum of 79.1 percent in Gangeshwari CD Block of Jyotiba Phule Nagar district in 2011. There were 20 CD blocks in the Division where the proportion of female workers engaged in primary sector was less than 50 percent; in 12 CD blocks, this proportion ranged between 50 and 60 percent whereas in only one CD block (Gangeswari), this proportion exceeded 75 percent. On the other hand, this proportion increased in seven CD-blocks only between 2001-2011 only.

The proportion of female workers engaged in secondary sector of the economy, on the other hand raged from a minimum of 5.1 percent in Hasanpur CD block to a maximum of 30.7 percent in Saidnagar CD block in 2011. In 15 CD blocks, this proportion was less than 10.0 percent and in 24 CD blocks, this proportion has decreased between 2001-2011 with the decrease being the largest in CD block Amroha (22.5 percentage points) but the slowest in Joya (0.1 percentage points).

Finally, the proportion of female workers engaged in the tertiary sector of the economy varied from a minimum of 15.1 in Gangeshwari CD block to a maximum of 76.7 percent in Moradabad CD block. This proportion was more than 50 percent in 5 CD blocks – Allahpur (53.0 percent), Noorpur (54.9 percent), Najibabad, Mohammedpur and Deomal (55.0 percent) and Moradabad (76.7 percent). Moreover, this proportion decreased in only 2 CD blocks of the Division during 2001-2011. These CD blocks are Bahjoi and Bilari. In the remaining CD blocks, this proportion increased with the increase being the most rapid in Amroha CD block (29.6 percentage points) but the slowest in Kundarki Dingpur CD block (0.6 percentage points). The increase in the female work participation rate during 2001-2011 has also been found to be quite rapid in Noorpur CD

block (24.9 percentage points) and Najibabad CD block (22.8 percentage points). On the other hand, there has been hardly any increase in the proportion of female workers in Asmauli (1.0 percentage point) and Shahabad (1.2 percentage points) CD blocks during 2001-11. These variations suggest that the structure of the economy varies widely across the CD blocks of the Division.

Conclusions

To sum up, a shift of female workers from the primary to the secondary and tertiary sectors of the economy is very much visible in the Moradabad Division of Uttar Pradesh and in all of its constituent districts as is revealed through the data available from 2001 and 2011 population census. The shift to the tertiary sector has however been quite substantial. However, despite this shift in the structure of the female work force, the work opportunities for females in the Division still remain confined to the primary sector of the economy, although the proportion of female workers engaged in the primary sector is decreasing over time. The analysis also reveals that the opportunities of the productive participation of females vary widely across the CD blocks of the Division. These variations have implications for the growth and economic development of the Division.

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Table 1

Decadal change in female population and female workers by residence and caste, 2001-2011, Moradabad Division, Uttar Pradesh and India.

Area/ Variables	Decadal change 2001-2011 (Percent)							
	Female Population		Female Workers		Female Main Workers		Female Marginal Workers	
	Absolute	%	Absolute	%	Absolute	%	Absolute	%
Moradabad Division								
Total	1156659	23.8	172034	35.4	99394	42.1	72640	29.0
Rural	772665	21.8	109242	26.3	59495	31.9	49747	21.7
Urban	383994	29.3	62792	88.6	39899	81.3	22893	104.8
Scheduled Castes	188440	22.8	29434	30.3	17356	39.7	12078	22.6
Scheduled Tribes	583	41.0	307	157.4	73	155.3	234	158.1
Uttar Pradesh								
Total	16699279	21.2	2965687	22.8	2215804	44.3	749883	9.4
Rural	11823414	18.9	1692834	14.2	1458785	34.2	234049	3.1
Urban	4875865	30.2	1272853	116.0	757019	103.5	515834	141.2
Scheduled Castes	3035094	18.2	348741	9.9	329081	26.1	19660	0.9
Scheduled Tribes	501061	961.2	133652	851.9	48935	677.7	84717	1000.4
India								
Total	90994174	18.3	22657133	17.8	16439891	22.6	6217242	11.4
Rural	44942840	12.5	10717550	9.6	7629256	12.7	3088294	6.1
Urban	46051334	34.0	11939583	74.1	8810635	69.0	3128948	93.9
Scheduled Castes	17295981	21.5	4010898	16.9	2864246	21.9	1146652	10.8
Scheduled Tribes	10185800	24.4	3874312	20.7	1907849	19.2	1966463	22.5

Source: Authors' calculations

Table 2
Female work participation rates 2001 and 2011, Moradabad Division, Uttar Pradesh and India.

Area	Crude female work participation rate (%)						Percentage change in crude female work participation rate, 2001-11		
	Moradabad Division		Uttar Pradesh		India				
	2001	2011	2001	2011	2001	2011	Moradabad Division	Uttar Pradesh	India
All									
Marginal	5.2	5.4	10.2	9.2	11.0	10.3	0.2	-1	-0.6
Main	4.8	5.6	6.4	7.6	14.7	15.2	0.7	1.2	0.5
Total	10.0	10.9	16.5	16.7	25.6	25.5	0.9	0.2	-0.1
Rural									
Marginal	6.4	6.4	12.2	10.6	14.1	13.3	0.0	-1.6	-0.8
Main	5.3	5.7	6.8	7.7	16.6	16.7	0.4	0.9	0.04
Total	11.7	12.1	19.0	18.3	30.8	30.0	0.4	-0.8	-0.8
Urban									
Marginal	1.7	2.6	2.3	4.2	2.5	3.6	1.0	1.9	1.1
Main	3.7	5.3	4.5	7.1	9.4	11.9	1.5	2.6	2.5
Total	5.4	7.9	6.8	11.3	11.9	15.4	2.5	4.5	3.6

Source: Authors' calculations

Table 3

Distribution of workers by primary, secondary and tertiary occupations by sex and residence 2001-2011, Moradabad Division, Uttar Pradesh, India.

Occupation/ Residence	India				Uttar Pradesh				Moradabad Division			
	2001		2011		2001		2011		2001		2011	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Primary Occupation (Cultivators and Agricultural Labourers)												
Total	51.9	71.8	49.9	65.1	62.8	75.7	58.8	60.6	60.0	54.0	54.7	45.9
Rural	69.5	80.1	69.6	77.3	76.3	81.4	73.0	69.3	76.2	61.5	71.3	55.1
Urban	6.0	14.7	7.3	12.1	8.9	13.5	11.5	10.9	13.6	9.7	13.5	9.7
Cultivators												
Total	31.1	32.9	24.9	24.0	42.7	36.1	31.1	22.2	38.1	34.3	28.1	20.9
Rural	42.0	37.1	35.2	28.8	52.2	38.9	39.2	25.5	49.3	39.5	37.7	25.5
Urban	2.5	4.1	2.7	3.1	4.4	5.0	4.2	3.2	5.7	4.2	4.1	2.6
Agricultural Labourers												
Total	20.8	38.9	24.9	41.1	20.1	39.6	27.7	38.4	22	19.7	26.6	25
Rural	27.5	43.0	34.4	48.5	24.0	42.5	33.8	43.8	26.9	22.1	33.5	29.6
Urban	3.4	10.7	4.6	9.0	4.6	8.5	7.4	7.7	7.8	5.5	9.4	7.1
Secondary Occupation (Household Industry Workers)												
Total	3.2	6.5	2.9	5.7	4.7	8.3	4.7	9.7	4.2	17.4	4.3	13.9
Rural	3.0	5.5	2.6	5.0	4.1	6.9	3.9	8.8	3.1	13.6	3.4	13.1
Urban	3.6	12.8	3.7	8.8	7.4	23.8	7.5	14.8	7.3	39.5	6.4	17

Occupation/ Residence	India				Uttar Pradesh				Moradabad Division			
	2001		2011		2001		2011		2001		2011	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Tertiary Occupation (Other Workers)												
Total	44.9	21.7	47.2	29.2	32.5	16.0	36.5	29.7	35.8	28.6	41.0	40.2
Rural	27.5	14.4	27.8	17.7	19.6	11.7	23.1	21.9	20.7	24.8	25.3	31.8
Urban	90.4	72.5	89	79.1	83.7	62.7	81.0	74.3	79.2	50.8	80.1	73.4

Source: Authors' calculations

Table 4

Decadal change in female population and female workers by caste in districts of Moradabad Division, 2001-2011

Female population/ Workers/Non-workers by caste	Decadal change (2001-2011)							
	Bijnor		Moradabad		Rampur		Jyotiba Phule Nagar	
	Absolute	%	Absolute	%	Absolute	%	Absolute	%
Total	2,81,787	19.0	4,89,974	27.5	2,11,966	23.6	1,72,932	24.6
Workers	49,289	42.0	16,717	8.1	65,439	105.3	40,589	40.8
Main workers	41,126	84.1	-2,321	-2.0	32,909	112.6	27,680	70.4
Marginal workers	8,163	11.9	19,038	21.3	32,530	98.9	12,909	21.5
Non-workers	2,32,498	17.1	4,73,257	30.1	1,46,527	17.5	1,32,343	21.9
Scheduled Castes	66,416	21.6	66,540	23.8	25,431	21.3	30,053	24.8
Workers	13,826	46.6	-1,692	-4.2	9,065	94.0	8,235	47.9
Main workers	11,496	109.2	-3,761	-16.1	3,942	96.6	5,679	98.8
Marginal workers	2,330	12.2	2,069	12.0	5,123	92.0	2,556	22.4
Non-workers	52,590	19.0	68,232	28.5	16,366	14.9	21,818	21.0
Scheduled Tribes	322	28.0	166	116.9	30	24.8	65	650.0
Workers	184	29.6	98	142.0	60	117.6	42	600.0
Main workers	41	117.1	18	900.0	8	80.0	6	
Marginal workers	218	147.3	9		3		4	
Non-workers	63	6.5	139	99.3	19	17.1	55	550.0

Source: Authors' calculations

Table 5

Female work participation rate by work status in districts of the Moradabad Division, 2001-2011.

Worker status	Distribution of population by work status								Decadal change during (Percent)			
	Bijnor		Moradabad		Rampur		Jyotiba Phule Nagar		Bijnor	Moradabad	Rampur	Jyotiba Phule Nagar
	2001	2011	2001	2011	2001	2011	2001	2011				
Male Population												
Workers	46.4	48.0	47.9	47.7	47.1	49.8	47.6	47.6	1.5	-0.3	2.7	0
Main	39.9	39.0	43.1	39.5	41.8	41.0	43.2	40.1	-0.9	-3.6	-0.8	-3.1
Marginal	6.5	8.9	4.9	8.2	5.3	8.8	4.4	7.5	2.4	3.3	3.5	3.1
Non-workers	53.6	52.0	52.1	52.3	52.9	50.2	52.4	52.4	-1.5	0.3	-2.7	0.0
Female Population												
Workers	7.9	9.5	11.7	9.9	6.9	11.5	14.1	16.0	1.5	-1.8	4.6	1.8
Main	3.3	5.1	6.7	5.1	3.2	5.6	5.6	7.6	1.8	-1.5	2.3	2.1
Marginal	4.6	4.3	5.0	4.8	3.7	5.9	8.5	8.3	-0.3	-0.2	2.2	-0.2
Non-Workers	92.1	90.5	88.3	90.1	93.1	88.5	85.9	84.0	-1.5	1.8	-4.6	-1.8

Source: Authors' calculations

Table 6

Percentage distribution of female workers by occupation and residence in districts of the Moradabad Division, 2001-2011.

Districts	Percentage distribution of female workers by occupation						Decadal change (%)		
	2001			2011					
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Primary Occupation									
Bijnor	54.8	62.9	14.7	42.1	48.9	10.8	-12.7	-14.0	-3.9
Moradabad	53.5	63.1	10.5	42.3	54.5	9.2	-11.2	-8.6	-1.3
Rampur	52.4	64.8	13.8	45.9	53.7	11.0	-6.5	-11	-2.9
Jyotiba Phule Nagar	61.0	72.5	10.1	56.1	64.3	7.8	-4.9	-8.2	-2.3
Cultivation									
Bijnor	26.6	29.4	4.0	15.6	18.4	2.6	-11.1	-11.0	-1.5
Moradabad	35.3	39.6	5.0	19.1	25.1	2.9	-16.2	-14.5	-2.1
Rampur	27.7	35.2	4.0	18.7	22.4	2.3	-9.0	-12.8	-1.7
Jyotiba Phule Nagar	45.5	54.3	3.2	31.9	37.0	2.2	-13.6	-17.3	-1
Agriculture									
Bijnor	27.2	29.6	8.0	29.0	35.1	10.6	1.8	5.6	2.6
Moradabad	16.1	17.6	6.1	24.0	32.4	7.7	7.9	14.9	1.6
Rampur	23.3	29.2	4.6	32.1	39.0	12.5	8.8	9.8	7.9
Jyotiba Phule Nagar	15.9	18.5	3.7	21.4	25.5	8.9	5.4	7.1	5.1
Secondary Occupation									
Bijnor	4.3	4.4	4.0	3.6	3.5	4.2	-0.7	-0.9	0.1
Moradabad	3.8	2.8	6.2	4.8	3.8	6.7	1.0	1.0	0.5
Rampur	4.4	2.3	10.9	4.8	3.2	9.2	0.4	0.9	-1.7
Jyotiba Phule Nagar	4.6	2.2	12.1	3.4	2.5	5.8	-1.2	0.3	-6.3

Districts	Percentage distribution of female workers by occupation						Decadal change (%)		
	2001			2011					
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Tertiary Occupation									
Bijnor	27.9	23.4	65.0	46.4	39.5	78.4	18.5	16.1	13.5
Moradabad	35.2	31.2	63.3	43.8	31.8	76.5	8.6	0.6	13.2
Rampur	25.5	19.8	43.7	34.4	28.1	62.5	8.9	8.3	18.8
Jyotiba Phule Nagar	17.7	15.7	27.4	32.3	26.1	69.3	14.6	10.4	41.9

Source: Authors' calculations

Table 7
Female work participation rate in Community Development Blocks of Moradabad Division, 2001-2011.

District	Community Development Block	Female work participation rate						Decadal change (%), 2001-2011		
		2001			2011					
		Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Bijnor	Najibabad	6.4	7.9	3.0	7.3	7.5	7.1	0.9	-0.4	4.1
Bijnor	Kiratpur	6.5	7.6	3.4	7.3	8.4	4.2	0.8	0.7	0.8
Bijnor	Mohammedpur Deomal	7.6	8.2	3.0	10.3	10.9	7.3	2.6	2.7	4.3
Bijnor	Haldaur	8.9	11.8	4.5	9.1	10.5	4.6	0.2	-1.3	0.1
Bijnor	Kotwali	7.0	8.3	2.8	11.9	14.0	5.9	4.8	5.7	3.0
Bijnor	Afzalgarh	10.4	11.4	2.6	9.3	9.8	4.7	-1.1	-1.5	2.1
Bijnor	Nehtaur	9.6	11.3	2.9	10.8	12.0	6.1	1.2	0.7	3.2
Bijnor	Allahpur	5.5	6.8	2.8	8.3	8.9	7.1	2.7	2.1	4.3
Bijnor	Budhanpur Seohara	9.6	12.0	4.2	9.1	10.8	5.5	-0.5	-1.2	1.2
Bijnor	Jalilpur	10.0	12.0	3.7	10.1	11.0	7.5	0.1	-1.0	3.9
Bijnor	Noorpur	7.5	7.7	6.2	10.2	9.6	14.3	2.7	1.9	8.0
Moradabad	Thakurdwara	3.7	3.8	2.8	9.9	10.5	7.0	6.2	6.7	4.2
Moradabad	Dilari	14.9	14.9		8.3	8.3		-6.7	-6.7	
Moradabad	Chhajlet	19.1	19.1	19.1	13.5	13.4	13.9	-5.6	-5.7	-5.2
Moradabad	Bhagatpur Tanda	6.9	7.3	3.5	9.8	9.4	12.9	2.9	2.1	9.4
Moradabad	Moradabad	5.8	11.2	4.2	9.1	9.8	9.0	3.3	-1.4	4.8
Moradabad	Munda Pandey	9.2	9.2		7.9	7.9		-1.3	-1.3	0.0
Moradabad	Kundarki Dingpur	5.5	5.7	3.2	8.5	8.8	5.2	3.0	3.0	2.0
Moradabad	Bilari	14.5	15.1	6.9	11.7	12.0	10.6	-2.8	-3.1	3.7
Moradabad	Baniyakhera	12.7	13.4	3.1	8.8	10.0	6.2	-3.9	-3.4	3.1

District	Community Development Block	Female work participation rate						Decadal change (%), 2001-2011		
		2001			2011					
		Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Moradabad	Asmauli	15.4	22.2		11.6	11.6		-3.8	-10.5	
Moradabad	Sambhal	22.3	23.0	4.7	9.0	13.2	4.1	-13.3	-9.8	-0.6
Moradabad	Panwasa	23.0	22.3		13.6	13.6		-9.4	-8.7	0.0
Moradabad	Bahjoi	14.2	28.1	5.7	11.6	13.2	4.0	-2.6	-14.9	-1.7
Rampur	Suar	5.1	5.1	3.0	9.2	9.7	6.9	4.1	4.7	3.9
Rampur	Bilaspur	7.7	9.6	3.7	10.7	12.0	6.5	3.0	2.4	2.8
Rampur	Saidnagar	5.7	6.3	8.2	11.5	14.8	9.2	5.8	8.4	1.0
Rampur	Chamraua	7.6	6.6		11.8	12.1	7.9	4.2	5.5	
Rampur	Milak	10.0	5.6	4.0	11.1	11.4	7.9	1.1	5.7	3.9
Rampur	Shahabad	5.8	10.0	7.6	15.7	16.7	7.9	9.9	6.7	0.2
JP Nagar	Dhanaura	18.3	13.2	6.8	13.5	15.5	6.9	-4.8	2.3	0.1
JP Nagar	Amroha	13.8	20.1	14.3	16.0	21.0	11.3	2.2	0.9	-3.0
JP Nagar	Joya	16.5	18.5	7.2	14.1	14.6	5.7	-2.4	-3.9	-1.6
JP Nagar	Gajraula	9.1	9.3	3.5	13.8	15.3	8.9	4.7	6.0	5.5
JP Nagar	Hasanpur	14.8	17.5	4.0	16.6	20.8	6.1	1.7	3.3	2.1
JP Nagar	Gangeshwari	9.3	11.6		23.3	23.3		14.0	11.7	

Source: Authors' calculations

Table 8
Distribution of female workers by occupation in Community Development Blocks of Moradabad Division, 2001-2011.

Community Development Block	2001			2011			Decadal change (%) 2001-2011		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Najibabad	54.1	13.7	32.2	37.3	7.7	55.0	-16.8	-6.0	22.8
Kiratpur	61.9	10.0	28.0	43.6	9.6	46.8	-18.3	-0.4	18.8
Mohammedpur Deomal	50.9	9.9	39.2	37.4	7.5	55.0	-13.4	-2.4	15.8
Haldaur	63.8	11.9	24.3	46.6	7.8	45.6	-17.2	-4.1	21.3
Kotwali	59.0	14.8	26.2	56.2	9.5	34.3	-2.8	-5.3	8.1
Afzalgarh	65.7	14.6	19.7	50.9	10.0	39.1	-14.8	-4.6	19.4
Nehtaur	42.5	24.4	33.1	42.0	11.9	46.1	-0.5	-12.5	13
Allahpur	43.8	20.2	36.0	33.7	13.3	53.0	-10.1	-6.9	17
Budhanpur Seohara	41.0	37.5	21.5	30.6	25.2	44.2	-10.4	-12.3	22.7
Jalilpur	62.9	16.2	20.9	48.2	9.1	42.7	-14.6	-7.2	21.8
Noorpur	40.9	29.1	30.0	26.4	18.7	54.9	-14.5	-10.4	24.9
Thakurdwara	53.6	25.8	20.6	40.8	28.2	31.1	-12.8	2.4	10.5
Dilari	72.6	8.5	18.9	49.7	24.5	25.8	-22.9	16.0	6.9
Chhajlet	52.3	20.5	27.2	36.8	23.2	40.0	-15.5	2.7	12.8
Bhagatpur Tanda	60.2	17.9	21.9	42.3	27.6	30.1	-18.0	9.8	8.2
Moradabad	19.9	15.6	64.4	14.0	9.3	76.7	-5.9	-6.3	12.3
Munda Pandey	56.3	8.9	34.8	49.4	14.0	36.6	-6.9	5.1	1.7
Kundarki Dingpur	52.4	15.1	32.5	54.5	12.4	33.1	2.1	-2.7	0.6
Bilari	40.3	19.4	40.3	51.4	18.7	30.0	11.1	-0.8	-10.3
Baniyakhera	42.7	15.4	41.9	44.6	8.4	47.1	1.9	-7.1	5.2
Asmauli	58.5	16.8	24.7	59.1	15.2	25.7	0.6	-1.6	1.0

Community	2001			2011			Decadal change (%) 2001-2011		
Development Block	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Sambhal	55.2	11.8	33.0	55.3	5.5	39.2	0.1	-6.3	6.2
Panwasa	69.1	6.1	24.8	60.7	6.6	32.7	-8.4	0.5	8.0
Bahjoi	43.9	5.3	50.8	56.4	8.4	35.2	12.5	3.1	-15.6
Suar	68.6	13.7	17.8	50.2	16.4	33.4	-18.4	2.7	15.7
Bilaspur	65.9	7.6	26.5	55.4	10.0	34.6	-10.5	2.4	8.1
Saidnagar	22.3	43.7	34.0	22.0	30.7	47.3	-0.3	-13.0	13.3
Chamraua	44.9	38.5	16.7	48.5	19.0	32.5	3.7	-19.5	15.8
Milak	64.5	9.6	25.9	54.8	16.4	28.8	-9.7	6.8	3
Shahabad	58.2	18.2	23.6	57.0	18.2	24.8	-1.2	0.0	1.2
Dhanaura	68.4	15.1	16.5	65.8	9.2	25.0	-2.6	-5.8	8.5
Amroha	37.6	42.4	20.0	30.5	19.9	49.6	-7.1	-22.5	29.6
Joya	64.5	14.7	20.8	48.0	14.5	37.5	-16.5	-0.1	16.6
Gajraula	77.7	4.2	18.1	55.7	9.7	34.6	-22	5.5	16.5
Hasanpur	80.1	6.3	13.7	72.1	5.1	22.9	-8.0	-1.2	9.2
Gangeshwari	86.8	6.7	6.4	79.1	5.8	15.1	-7.8	-0.9	8.7

Source: Authors' calculations