

# POPULATION GEOGRAPHY

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Department of Geography, Panjab University, Chandigarh-160014

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## From the Editor's Desk

Association with *Population Geography* as its editor is an honour. It is a privilege to be so at a stage of enhanced visibility through its digital version, a revamped website, all back volumes uploaded for access, and many more. Although its reputation as a serious journal was never questioned, the makeover was the need of the hour. More than four decades into the service of academics, *Population Geography* owes it to its team's sustained hard work, commitment and care, and community support.

It seems only the other day when its new website was launched on April 01, 2022. Spearheading the project, the then editor, Professor Surya Kant, worked with a missionary zeal. However, the Almighty perhaps had some other plans for him. The geographic community, family and friends bid him adieu amidst pouring rain on March 20, 2023. Indeed, it appeared like a cyclone had made a 'landfall'.

*Population Geography* journal has provided a platform for housing articles understanding both the local and global contexts of the complex relationship between multiple population expressions and transformations. Therefore, the formal association with this journal as its editor comes with a huge responsibility to invest in its space and generate diverse ideas focused on many crucial issues of national and international importance.

Let the spaces in *Population Geography* be creative in their essence, critical in their articulation and exhibit transformative thinking. The critical insights can emerge from various standpoints depending on the location of those holding on to these perspectives. Its digital version will be important in offering a forum to mobilise transformative ideas.

I earnestly appeal to everyone to participate in *Population Geography's* endeavour to voice people's concerns across the planet.

This particular issue dwells in diverse themes spread across different areas. We thank the reviewers for their immense support and interjections in fine-tuning the articles.

**Nina Singh**

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# Family Planning Differentials Among Caste Groups in Bihar, India

Dewaram Abhiman Nagdeve<sup>1</sup> and Prashant Bhimrao Dongardive

**To cite this article:** Nagdeve, D. A., & Dongardive, P. B. (2023). Family planning differentials among caste groups in Bihar, India. *Population Geography*, 45(1), 1-16.

**Abstract:** The paper aims to study the family planning differentials among caste groups in Bihar, along with their socioeconomic and demographic characteristics. The data has been analysed from the National Family Health Survey (NFHS 5) conducted during 2019-2021 in India. The data analysis used bivariate and logistic regression analyses to observe the association between family planning use and socioeconomic and demographic characteristics. The analysis reveals that the knowledge of any family planning method and any modern family planning method is universal among all caste groups in Bihar. However, contraceptive use is lower among the women of Schedule Caste/Schedule Tribe and other backward classes than in Other Castes. Female sterilisation is the most used family planning method, followed by IUDs, condoms and pills among all the caste groups. Contraceptive use is much higher among women with four or more surviving children than women with two or more sons and women with two or more daughters. The use of any family planning method and any modern method significantly increases with the age of the women, marital duration, education and household wealth index in Bihar. It indicates that the differences in contraceptive use between caste groups will disappear with the improvement of socioeconomic status.

**Keywords:** family planning, differentials, caste groups, India

India initiated a family welfare program in 1951 to accelerate social and economic development by controlling fertility and reducing population growth (Jain, 1989; Chutia & Barman, 2020; Kumar & Joshi, 2008). The objectives of the family welfare program are to have only the expected number of children and to achieve proper spacing between two successive births (Dabral & Malik, 2004). The family planning program in India has undergone various changes in terms of policy, but many

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goals still need to be achieved (Healey, 2014; Khan & Malik, 2004). Women continue to have unplanned pregnancies and lack contraceptive use and choices among adolescent men and women (Santhya, 2003). However, past studies have found that contraception is one of the most important proximate determinants of fertility (Bongaarts et al., 1984; Wubalen et al., 2003; Dash & Nagdeve, 2020). Family planning is one of the best solutions to control population growth. It helps reduce fertility and is useful in spacing and limiting the number of children. It also improves maternal and child health and empowers women (Singh et al., 2014).

The acceptance of contraceptives still varies among different castes and religious groups. The individual, family and community-level factors are responsible for such variation channelled by the social, economic and cultural milieu of Indian society (Parek & Rao, 1984; Bhuyan, 1991; Prateek & Saurabh, 2012; Gogoi et al., 2017). The successful small family size norm depends on the couple's usual family ideas, their psychological acceptance of family limitations, knowledge of family planning methods, availability and accessibility of contraceptives, cost of family planning and an environment favourable to family planning (IIPS, 2021). Contraceptive use varies by education, religion, caste and wealth among currently married women in Bihar. Contraceptive use among currently married women aged 15-49 increased from 37 per cent in 1992-93 to 43 per cent in 1998-99; it further increased to 56 per cent in 2005-06 and decreased to 51 per cent in 2015-16 and again increased to 56 per cent in 2019-21 in India. Similarly, the use of modern contraceptives among married women aged 15-49 years increased from 22 to 29 per cent between 1992-93 and 2005-06, but it decreased to 23 per cent in 2015-16, and it again increased to 44 per cent in 2019-21 in Bihar. An increase in contraceptive use is not uniform across caste groups, and considerable family planning uses differentials exist among caste groups in Bihar. Contraceptive use has been much lower in the case of Scheduled Caste (SC) and Scheduled Tribe (ST) women than that of Other Backward Class (OBC) and Other Caste (OC) women. According to the National Family Health Survey (NFHS-5), conducted in 2019-2021, any modern method of family planning is 4.6 per cent lower among ST women and 1.3 per cent lower among SC women than among OBC (56.7%) women. Any modern method of family planning is 4.4 per cent lower among ST women and 0.2 per cent lower among OBC women than 45.2 per cent among SC women (Nagdeve, 2010).

Fertility has declined in most states and achieved below replacement level fertility, but Bihar has the highest TFR of 2.98 children per woman. Bihar ranks the twelfth largest state in India in terms of area, with a total area of 94,163 square kilometres. The population of Bihar is increasing rapidly, and it is the third most populous state in the country after Uttar Pradesh and Maharashtra having a population of 104 million. Bihar is one of the eight socioeconomically backward states in India. Bihar, Jharkhand, Chhattisgarh, Madhya Pradesh, Odisha, Rajasthan,



Uttaranchal and Uttar Pradesh, known as the Empowered Action Group (EAG) states. The population of Bihar increased from 52 million in 1981 to 104 million in 2011. Out of every 100 persons in India, nine are from Bihar. The population of Bihar doubled between 1981 and 2011, an increase of 52 million in Bihar for 30 years. The population growth in Bihar varies from decade to decade. The decadal growth of the population in Bihar has increased from 24.23 per cent in 1981 to 25.33 per cent in 2011. The literacy rate in Bihar has increased from 32.1 per cent in 1981 to 61.8 per cent in 2011. According to the 2011 census, literacy among males is 71.20 per cent, whereas female literacy is 46.40 per cent in Bihar.

The sex ratio in Bihar has increased from 933 females in 1981 to 940 females per 1000 males in 2011. The population density in Bihar increased from 402 persons per square kilometre in 1981 to 1102 persons per square kilometre in 2011. The percentage of the urban population in Bihar has declined from 12 per cent in 1981 to 11 per cent in 2011. Further, Bihar is a poor state with high fertility, high-unmet need, high maternal and child mortality, low literacy, and low life expectancy is a great challenge for the government and policymakers. Unplanned pregnancies are relatively common in Bihar, and their socioeconomic characteristics have influenced family planning use by couples. There are few studies on family planning differentials in Bihar, but there is no study on family planning differentials among caste groups in Bihar. Therefore, the present paper has studied the family planning differentials among caste groups in Bihar, along with their socioeconomic and demographic characteristics.

Taking a cue from the above statements, the present study examines family planning differentials among caste groups in Bihar in the light of the following research questions:

1. Whether the impact of caste factors, including customs, traditions and beliefs, on the use of family planning across religions in India?
2. Is the role played by the caste in the use of family planning more than that of socioeconomic factors? and
3. Within socioeconomic factors, is it the educational level of females in child-bearing age groups or the living standard of the households to which such women belong that plays a more significant role in family planning?

## **Materials and Methods**

### **Data and Methods**

The data have been used from the National Family Health Survey (NFHS-5), an ongoing sociodemographic health survey conducted by International Institute for Population Sciences, Mumbai and has now completed five rounds. NFHS-5 is a large-scale multi-round survey conducted in a representative sample of households

throughout India. The survey provides national and state information on fertility, infant and child mortality and the practice of family planning. Individual consent and all the ethical protocols have been obtained before the set of questions on family planning. Data has been conducted in all 38 districts of Bihar from 9 July 2019 to 2 February 2020 from a representative sample of 35,834 households and 42,483 women aged 15-49 years. The household and women's response rate was 97 and 96.6 per cent, respectively. The details of the study design, sampling frame and sample implementation have been provided in the NFHS report (IIPS, 2021). The NFHS-5 provides information on four caste groups, i.e., Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Class (OBC) and those who do not belong to SC, ST and OBC and are reported as "Other Castes". For further analysis, four caste groups have been grouped into three categories of caste groups (SC/ST, OBC and Other Castes). Of 31,755 currently married women aged 15-49, 9,159 are SC/ST, 17,804 belong to OBC, and 4,792 are Other Castes (OC).

### **Techniques of Analysis**

The data analysis used bivariate and logistic regression analysis to observe the association between family planning and socioeconomic and demographic characteristics. The socioeconomic and demographic variables used are the age group, age at the consummation of the marriage, marital duration, place of residence, women's education and household wealth index.

## **Discussion, Analysis and Findings**

### **Knowledge of Family Planning Methods Among Caste Groups in Bihar**

The lack of knowledge of various family planning methods is one of the obstacles to promoting the use of contraceptive methods among couples. Table 1 reveals that the knowledge of any family planning method, including any modern one, is universal in Bihar, and it does not vary much among caste groups. Female sterilisation is the most known method, followed by Pills, IUDs, Male Sterilisation, Condoms and Injectables among all the caste groups. Overall, 99% of currently married women know about female sterilisation, and 87% know about male sterilisation. There is little difference in knowledge of female sterilisation among caste groups, but male sterilisation varies from the lowest to 84 per cent among SC/ST women, followed by 88 per cent among OBC women and the highest to 88.3 per cent among other caste women. The table also shows differentials in the knowledge of spacing methods such as Pills, IUDs and Condoms among caste groups. The best-known spacing methods are Pills (95%), Injectable (94%), Condoms (88%), and IUDs (87.7%). There is a large difference in the knowledge of spacing methods among women of caste groups. The lowest 86 per cent of women among SC/ST, 89 per cent of women among OBC, compared to the highest 92 per cent of women among other castes know

condoms. The modern spacing methods, Pills and IUD, are known by 94 and 85 per cent of SC/ST women and 95 and 89 per cent of OBC women, whereas the corresponding figures for other castes women are 95 and 91 per cent, respectively. The knowledge of these spacing methods is lower than sterilisation. More than 87 per cent of women in Bihar are aware of traditional family planning methods, including withdrawal methods, herbals, rhythm or periodic abstinence and another Indian system of medicine for contraception. This proportion varies among caste groups from the lowest 85 per cent of women among SC/ST, 87 per cent of women among OC, to the highest 89 per cent of women among OBC.

**Table 1**

*Percentage of Currently Married Women Who Know any Family Planning Method by Specific Method Among Caste Groups in Bihar, 2019-21*

Methods	Scheduled Castes/ Scheduled Tribes	Other Backward Castes	Other Castes	Total
Any method	99.5	99.8	99.3	99.6
Any modern method	99.5	99.8	99.3	99.6
Female sterilisation	99.1	99.4	98.7	99.2
Male sterilisation	84.4	87.6	88.3	86.7
Pill	93.9	95.1	95.4	94.7
IUD	85.0	88.5	90.8	87.7
Injectables	92.6	94.5	94.8	93.9
Condom	85.9	88.5	91.9	88.2
Any traditional method	84.6	88.9	87.4	87.3
Rhythm/periodic abstinence	77.5	81.6	79.4	79.8
Withdrawal	73.9	80.2	79.8	78.2
Total number of women	9159	17804	4792	31755

### **Current Use of Family Planning Methods Among Caste Groups in Bihar**

The current use of family planning methods for currently married women among caste groups in Bihar has presented in Table 2. About 56 per cent of currently married women are using any family planning method. Current contraceptive use is the highest among women with OBC (57%), followed by 55% of women with OC and SC/ST. The current use of any modern method is relatively low (44%) in Bihar. It varies from the lowest 42 per cent of women among OC to each 45 per cent of women among SC/ST and OBC. Female sterilisation is the most used family planning method, followed by a Condom, IUD/Loop/Copper T and Pills among all the caste groups. About 35 per cent of currently married women and negligible (0.01%) men have been sterilised in Bihar, with little variation among caste groups. Among all the users of sterilisation methods among caste groups, 36 per cent of women prefer female sterilisation among SC/ST, followed by 35 per cent of women among OBC and the lowest 30 per cent of OC women. Still, it is not the case for male sterilisation.

There are differentials in the current use of spacing methods such as Condoms, Pill and IUD/Loop/Copper T among caste groups. The more used spacing methods are Condoms (4%), Pills (1.5%) and IUD/Loop/Copper T (0.6%). However, the results show marginal differentials in the current spacing methods among caste groups. The use of spacing methods remains low compared to female sterilisation among all caste groups. Eleven per cent of women are using traditional methods, which varies from the lowest 10 per cent of women among SC/ST, 11.8 per cent of women among OBC, to the highest 12.1 per cent among OC.

**Table 2**

*Percentage of Currently Married Women Using any Family Planning Method Among Caste Groups in Bihar, 2019-21*

Methods	Scheduled Castes/ Scheduled Tribes	Other Backward Castes	Other Castes	Total
Any method	55.0	56.7	54.5	55.8
Any modern method	44.6	45.0	42.4	44.4
Female sterilisation	36.3	35.4	30.3	34.8
Male sterilisation	0.0	0.2	0.1	0.1
Pill	1.2	1.4	2.3	1.5
IUD	0.5	0.6	0.7	0.6
Injectables	2.2	2.7	2.3	2.5
Condom	3.1	4.0	5.4	4.0
Any traditional method	10.3	11.8	12.1	11.4
Rhythm/periodic abstinence	8.2	8.6	8.3	8.4
Withdrawal	1.7	2.4	2.7	3.0
Total number of women	9159	17804	4792	31755

### **Current Use of Family Planning by Socioeconomic and Demographic Characteristics**

After examination of the knowledge and use of family planning methods, it would be better to study differentials in the use of family planning methods by socioeconomic and demographic characteristics of currently married women among caste groups in Bihar. The percentage of currently married women using any family planning method and any modern method by socioeconomic and demographic characteristics of women among caste groups is depicted in Table 3. Fifty-six per cent and 44 per cent of currently married women in Bihar are using any family planning method and modern method, respectively. The current use of any method and modern family planning method is the highest at 57 and 45 per cent among the women of OBC as compared to 55 and 45 per cent of the women among SC/ST as compared to the lowest at 54.5 and 42.4 per cent of the women among OC respectively. The current use of any family planning method and any modern family planning method among currently married women in the 15-19 years age group is 20 and 10 per cent, and this attains a peak at older ages, i.e., 67 per cent and 59 per cent

in case of age 40 and above. Similar age patterns of contraceptive use have also been observed among women of SC/ST, OBC and OC. The current use of any family planning method and any modern method among currently married women by age at first intercourse of fewer than 18 years is higher at 59 and 49 per cent compared to 52 and 39 per cent for 18 years and above, respectively. It is the highest among the women of OBC, followed by women among OC and the lowest among women of SC/ST. The current use of any family planning method and modern method increases marital duration among all the caste groups. The current use of family planning and modern methods is higher in urban areas (62% and 47%) than in rural areas (55% and 44%). It is the highest among women of OBC than SC/ST and OC women. The current use of any family planning method and modern method is also high among illiterate women (58% and 49%), followed by women who have higher secondary education (56%) in case of any method of family planning and 39 per cent in case of women who have completed secondary education and least 52 per cent among the women who have completed secondary education in case of any method of family planning and the lowest 38 per cent in case of women who have higher secondary education in case of any modern method of family planning indicates that it is lowest among educated groups as compared to the illiterate women.

An almost similar picture has been found in the current use of any family planning method and modern methods for currently married women among all the caste groups. The current contraceptive use of any family planning and modern methods increases the family wealth index. The current contraceptive use of any family planning method has increased the prevalence rate from the lowest 52 per cent among women belonging to the household of the poor index, followed by 55 per cent for women belonging to the household of medium wealth index, to the highest 62 per cent for women belonging to the household of rich wealth index. However, the current contraceptive use of modern methods has increased the prevalence rate from the lowest 42 per cent among women belonging to the household of the poor index, followed by 44 per cent for women belonging to the household of medium wealth index to the highest 48 per cent for women belonging to the household of rich wealth index. It has further found that the current use of any family planning method and modern method is the highest among women of SC/ST than OBC and OC women in the household of medium and rich wealth index. It is the lowest among women of OC compared to OBC and SC/ST women in the case of women belonging to the household with poor wealth index.

**Table 3**

*Percentage of Currently Married Women Using any Family Planning Method and any Modern Family Planning Method by Socioeconomic and Demographic Characteristics of Women Among Caste Groups in Bihar, 2019-21*

Characteristics	SC/ST		OBC		Other		Total		Currently married women
	Any method	Modern method	Any method	Modern method	Any method	Modern method	Any method	Modern method	
Age Group									
15-19	18.0	9.4	21.0	10.0	16.8	8.3	19.5	9.6	2068
20-29	44.2	31.6	45.0	31.2	43.9	29.0	44.5	30.9	12258
30-39	70.3	60.3	69.9	58.3	64.0	51.2	68.9	57.6	10065
40 and above	66.1	59.0	68.3	59.7	63.8	55.8	66.8	58.7	7364
Age at first cohabitations									
<18	57.3	47.9	60.3	49.6	57.6	47.5	58.9	48.7	17796
18 and above	51.3	39.6	52.1	39.0	51.9	37.9	51.8	38.9	13959
Marital Duration									
<5	24.0	12.5	26.4	13.7	15.9	29.6	13.7	26.2	6388
5-9	46.2	31.9	49.3	34.3	31.8	47.9	33.1	48.0	5859
10-14	64.1	54.4	65.4	52.6	50.6	63.8	52.8	64.7	5167
15 and above	30.4	61.3	29.5	60.8	55.5	35.0	60.0	30.7	14341
Residence									
Urban	59.2	47.4	63.8	47.2	61.9	46.5	62.3	47.0	3210
Rural	54.5	44.3	55.5	44.6	52.5	41.2	54.6	43.9	28545
Women's education									
Illiterate	58.8	49.6	60.3	50.7	48.4	38.8	58.4	49.0	15340
Primary Complete	54.9	43.8	56.8	45.8	52.4	41.5	55.5	44.5	3804
Secondary Complete	46.1	34.4	52.2	38.4	58.3	46.1	52.1	39.2	10707
Higher Secondary	57.4	40.2	54.9	36.8	57.1	39.2	56.0	38.2	1904
Household wealth index									
Low	51.8	42.3	53.5	43.1	39.3	30.2	51.5	41.6	11151
Medium	56.0	46.1	55.5	45.0	48.5	38.6	54.5	44.3	11023
High	62.2	48.7	61.3	46.8	62.9	48.5	61.8	47.5	9581
Total	55.0	44.6	56.7	45.0	54.5	42.4	55.8	44.4	31755

The logistic regression analysis has been used to examine the effect of socioeconomic and demographic characteristics on the current use of any family planning method in Bihar, and the results have depicted in Table 4. The analysis revealed that any family planning method significantly increases among women of older age groups than among women aged 15-19 among all the caste groups. The probability of using any family planning method significantly decreases in case of age at first intercourse above 18 years, except for SC/ST women. In the case of marital duration, the possibility of the use of any family planning method significantly increases as marital duration increases; it increases more than two times for 5 to 9

years of marital duration, 4.6 times for 10 to 14 years of marital duration and 6.5 times for 15 and more years of marital duration. The likelihood of the use of any family planning method significantly increases 2.5 times in the case of OBC women for 5 to 9 years of marital duration. It increases five times in the case of OBC women for 10 to 14 years of marital duration and 6.5 times in the case of SC/ST women for and 15 and more years of marital duration. The likelihood of use of any family planning methods significantly decreases in rural areas among women of all the caste groups in Bihar. The chance of using any family planning method is the highest at 1.6 times among women educated in higher secondary and above, followed by women having secondary education (1.2 times) and primary education (1.038 times) compared to illiterate. A similar pattern for using any family planning method has been found among women of all the caste groups in Bihar except OBC women in the case of primary education. The possibility of using any family planning method increases among women belonging to the medium and rich wealth index household than among women belonging to the household of poor wealth index among all the caste groups in Bihar. A similar pattern has been found for the effect of socioeconomic and demographic characteristics on the current use of any modern method of family planning in Bihar (Table 5).

**Table 4**

*Results of Logistic Regression (Odds Ratio) for Current Use of any Family Planning Method by Socioeconomic and Demographic Characteristics of Women in Bihar, 2019-21*

Characteristics	Scheduled Castes/ Scheduled Tribes	Other Backward Castes	Other Castes	Total
Age Group				
15-19®				
20-29	1.570***	1.378***	1.930***	1.489***
30-39	1.818***	1.702***	2.223***	1.777***
40 and above	1.290	1.300**	1.843**	1.343***
Age at the consummation of the marriage				
<18®				
18 and above	1.015	0.941	0.883*	0.953*
Marital Duration				
<5®				
5-9	2.305***	2.455***	2.394***	2.305***
10-14	4.581***	4.880***	3.970***	4.581***
15 and above	6.464***	6.251***	4.897***	6.464***
Residence				
Urban®				
Rural	0.942	0.831***	0.970	0.885***
Women's education				
Illiterate®				
Primary Complete	1.091	0.991	1.329***	1.038
Secondary Complete	1.053	1.199***	1.659***	1.197***

Characteristics	Scheduled Castes/ Scheduled Tribes	Other Backward Castes	Other Castes	Total
Higher Secondary and above	1.500***	1.662***	1.801***	1.574***
Household wealth index				
Poor®				
Medium	1.218***	1.161***	1.384***	1.181***
Rich	1.514***	1.299***	2.164***	1.423***
Constant	0.221***	0.281***	0.105***	0.237***

Note: Dependent Variable: 0- Do not use any family planning method 1- Use any family planning method Level of significance 0.000=P<0.001, 0.00=P<0.05 and 0.0=P<0.1

**Table 5**

*Results of Logistic Regression (Odds Ratio) for Current Use of Modern Family Planning Method by Socioeconomic and Demographic Characteristics of Women in Bihar, 2019-21*

Characteristics	Scheduled Castes/Scheduled Tribes	Other Backward Castes	Other Castes	Total
Age Group				
15-19®				
20-29	1.570***	1.378***	1.941**	1.662***
30-39	1.818***	1.702***	2.250***	2.021***
40 and above	1.290	1.300**	2.266***	1.769***
Age at the consummation of the marriage				
<18®				
18 and above	1.015	0.941	0.820***	0.903***
Marital duration				
<5®				
5-9	2.305***	2.455***	2.563***	2.701***
10-14	4.581***	4.880***	4.711***	5.903***
15 and above	6.464***	6.251***	6.088***	7.594***
Residence				
Urban®				
Rural	0.942	0.831***	1.126	1.042
Women's education				
Illiterate®				
Primary Complete	1.091	0.991	1.233*	1.023
Secondary Complete	1.053	1.199***	1.554***	1.130***
Higher Secondary and above	1.500***	1.662***	1.554***	1.324***
Standard of Living Index				
Low®				
Medium	1.218***	1.161***	1.364***	1.181***
High	1.514***	1.299***	1.944***	1.292***
Constant	0.221***	0.281***	0.047***	0.089***

Note: Dependent Variable: 0- Do not use a modern family planning method 1- Use a modern family planning method  
Level of significance 0.000=P<0.001, 0.00=P<0.05 and 0.0=P<0.1



## Current Use of Family Planning Methods by Number of Surviving Children to Women

The information on current contraceptive use by the number of surviving children among caste groups has presented in Table 6. Understanding the association between the number of living children and contraceptive use among women of different caste groups is important. The table shows that contraceptive use is comparatively high among the women who have three surviving children (70% for any method and 60% for modern method) invariably of methods and caste groups in Bihar except SC/ST women where contraceptive use is comparatively high among the women who have four surviving children. The use of any family planning method is 74 per cent among the women having two sons and is higher than the women having two daughters (63%). A similar trend has been observed for any modern method, which is 65 per cent for women having two sons and is higher than the women having two daughters (52%). A similar trend has also been found among all the caste groups in Bihar.

**Table 6**

*Percentage of Currently Married Women by Current use of Family Planning Method by Total Surviving Children in Bihar, 2019-21*

Surviving Children	Scheduled Caste/ Scheduled Tribe		Other Backward Castes		Other Castes		Total		Total
	Any Method	Modern Method	Any Method	Modern Method	Any Method	Modern Method	Any Method	Modern Method	
<b>Total</b>									
0	9.8	4.6	11.8	4.9	12.1	6.0	11.2	5.0	3312
1	30.3	15.8	34.0	18.0	39.4	21.8	34.0	18.2	4295
2	55.2	39.3	59.9	44.6	65.7	50.7	59.9	44.6	7008
3	67.7	59.2	71.3	61.2	68.5	59.5	69.7	60.3	7494
4	71.2	62.9	70.7	61.0	60.1	50.3	69.4	60.2	5212
5+	68.1	59.4	65.5	54.5	53.9	42.8	64.7	54.4	4507
<b>Surviving son</b>									
0	22.1	12.2	24.1	12.0	27.3	14.6	24.0	12.4	7005
1	51.1	36.0	55.4	39.6	57.6	43.0	54.6	39.3	10408
2	73.8	65.7	74.6	66.0	70.5	61.5	73.6	65.2	10015
3	68.8	63.4	70.5	62.0	61.7	53.8	68.8	61.4	3174
4	77.6	69.7	72.7	63.5	57.1	41.8	71.9	62.3	908
5+	70.1	57.2	53.7	40.3	30.0	15.2	54.4	40.9	318
<b>Surviving daughter</b>									
0	38.3	28.7	42.9	32.6	43.7	32.5	41.7	31.5	9368
1	60.3	49.4	62.1	49.6	60.7	47.1	61.3	49.1	10868
2	63.4	53.2	63.8	52.0	62.3	50.9	63.4	52.1	6505
3	63.5	53.5	64.2	52.3	56.7	43.8	62.7	51.3	3155
4	60.5	50.3	59.6	45.0	48.9	39.1	58.4	46.0	1295
5+	58.9	44.0	54.8	40.9	43.7	33.6	54.4	40.7	637
<b>Total</b>	<b>55.0</b>	<b>44.6</b>	<b>56.7</b>	<b>45.0</b>	<b>54.5</b>	<b>42.4</b>	<b>55.8</b>	<b>44.4</b>	<b>31755</b>

## The Desire for More Children

The per cent distribution of currently married women by the desire for children according to the number of living children among caste groups in Bihar has presented in Table 7. The overall percentage for currently married women, who want no more children, is 32 per cent, varying from 30 per cent of women for SC/ST, 31 per cent of women among OBC, to 37 per cent among OC women. For currently married women, around 37 per cent cannot have another child due to the sterilisation of the husband or the wife; it varies from 33 per cent of OC women, followed by 37 per cent of women among SC/ST to the highest 38 per cent of women among OBC. Two per cent reported that they could not conceive ('declared infecund'), and this percentage varies from the lower 2 per cent each among SC/ST and OBC women to the higher 2.3 per cent among OC women. Twelve per cent of women reported that they would want a child soon, more than 14 per cent want another child later, and less than 1 per cent want another child but are undecided when. About the same proportion of SC/ST (13%), OBC (12%), and OC (10%) women reported that they wanted another child soon. However, 14% of women say they want another child later, varying from the lower 13 per cent of women among OC, followed by 14 per cent of women among OBC, to the highest 15 per cent among SC/ST. Less than 1 per cent of women want another child but are undecided about whether to have a child. This percentage is almost similar among all the caste groups in Bihar. It shows that the desire not to have a child increases quickly with the number of living children. The proportion is negligible for women who have no living children and reported that they do not want any children (due to sterilisation) among all caste groups in Bihar. However, the women who have two and three living children reported that they do not want any children (due to sterilisation) 32 and 66 per cent of women among OC, compared with 14 and 85 per cent of women among SC/ST and 20 and 80 per cent of women among OBC who have two and three living children respectively.

**Table 7**

*Percentage Distribution of Currently Married Women by a Desire for Children, According to the Number of Living Children Among Caste Groups in Bihar, 2019-21*

Desire for children	Number of living children															Total
	SC/ST					OBC					Other Castes					
	0	1	2	3+	Total	0	1	2	3+	Total	0	1	2	3+	Total	
Wants within two years	44.8	28.5	17.0	9.7	13.1	44.0	28.8	16.5	10.7	11.7	45.0	31.9	13.6	9.5	11.3	12.01
Wants after two years	24.4	42.4	20.7	12.6	14.8	28.3	45.6	18.3	7.8	14.0	25.1	49.0	14.6	11.4	13.1	14.13
Want another, undecided when	38.7	29.1	16.2	16.1	0.7	38.3	32.3	16.3	13.1	0.9	26.8	44.4	13.1	15.7	1.0	0.84
Undecided	12.2	17.4	34.4	36.1	2.3	11.5	28.1	27.3	33.2	2.7	11.0	29.8	26.5	32.7	2.9	2.59

Desire for children	Number of living children															Total
	SC/ST					OBC					Other Castes					
	0	1	2	3+	Total	0	1	2	3+	Total	0	1	2	3+	Total	
Want no more	1.2	8.9	23.9	66.0	30.3	1.5	7.6	30.2	60.7	31.0	1.1	11.2	35.9	51.7	36.5	31.66
Sterilised	0.1	1.2	13.5	85.2	37.0	0.1	0.9	19.5	79.6	37.8	0.0	1.8	32.4	65.8	32.9	36.77
Declared infecund	21.9	13.7	16.6	47.8	1.9	23.9	15.7	18.6	41.8	2.0	28.2	23.1	17.3	31.4	2.3	2
Total	10.9	13.9	18.6	56.6	100.0	10.8	13.9	22.5	52.8	100.0	10.3	17.0	28.4	44.4	100.0	100.0
Number of women	967	1204	1675	5313	9159	1863	2332	3977	9632	17804	468	751	1344	2229	4792	31755

## Conclusions

The present paper has analysed the family planning differentials in the context of socioeconomic and demographic characteristics among caste groups in Bihar. The analysis shows that family planning differentials exist among caste groups in Bihar. The knowledge of family planning and modern methods is universal and does not vary much among caste groups in Bihar. Current contraceptive use is lower among women of OC than OBC and SC/ST women. Female sterilisation is the mostly used method, followed by IUDs, Condoms and Pills among all the caste groups. There are differentials in the current use of spacing methods among caste groups. The current use of any family planning method is higher among urban women. The current use of the family planning method is much lower among young age groups and higher among older age groups. However, age, marital duration, education and household wealth index enhanced the current family planning method, but it varies among the caste groups. Contraceptive use is higher among women with three surviving children, and this proportion is higher for women with two or more sons than women with two or more daughters, invariably of methods and caste groups in Bihar. Logistic regression analysis results on the current use of any family planning method, and modern method showed differentials among caste groups. The use of any method and any modern family planning method significantly increases with the age of the women, marital duration, education and household wealth index in Bihar. This indicates that the differences in contraceptive use between caste groups will disappear with the improvement of socioeconomic status.

## Policy Implications

The illiterate women are contributing more to an increase in family planning use. Therefore, family planning methods should be accessible and affordable in rural and remote areas. Since education is important in family planning, girls' education must be encouraged. The lower use of family planning methods among SC/ST was a major problem in developing norms regarding smaller family sizes. It has been concluded from the findings that with the improvement of socioeconomic status, differentials in the use

of family planning among caste groups will decline. This would entail a more widely dispersed development program, stressing wider improvements in conditions that influence family planning. It will help narrow the differentials in family planning methods among caste groups in Bihar. Family planning policies must focus on rural and remote areas and illiterate and poor women to ensure the achievement of state-level improvements in family planning programs.

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# Implications of Age-Sex Structure and Future Requirements for the SAARC Countries: Vision 2050

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**Abstract:** The paper examines the following issues: (1) Population projection of (a) population characteristics, (b) fertility (TFR and NRR), and (c) life expectancy up to 2050; (2) Statistical analysis of population characteristics (mean age, median age, modal age, standard deviation age and skewness of age); (3) Changing the age-sex structure and demographic transition (1950-2050) of SAARC nations; (4) Demographic implications in the context of socio-economic development; and (5) Future resource requirement (Elementary school teacher, Health centre: PHCs; Food and drinking water, Clothing and Shelter). The findings are that Bhutan, India, Maldives, and Nepal will achieve the late third stage of demographic transition in the year 2050, while Afghanistan and Pakistan will enter the third stage. Except for Sri Lanka, other SAARC nations will continuously increase their working population, which has a high cash benefit to increase GDP and reduce the proportion of the BPL population. In SAARC countries, working population and GDP and BPL regression analysis have highly positive ( $r=0.68$ ) and second case, moderately negative ( $r=-0.39$ ). There will be a higher demand for education, food, safe water, proper houses, health and various other basic requirements and amenities in the coming decades, and therefore there will be stress on the resources in these countries.

**Keywords:** cohort component method, demographic transition, population projections, population resource relationship, SAARC Nations

The SAARC countries are witnessing a continuous increase in the number of people. However, the growth rate is decreasing, and the level of development of resources needs to be commensurate with the population growth rate. This situation is converting into low per capita income and lower socio-economic development.

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Planning of resources in developing regions needs a comprehensive analysis of present population characteristics, trends, and future dimensions. For the future development of any nation, several sectors may be identified, such as demographic character, level of employment, agricultural change, finance, social security, health, education, women empowerment, infrastructure, environment, rural development, urbanisation, governance, the impact of global economic scenario (Bhatt, 2001). The formulation of planning and policies of any country is almost related to human resource development; therefore, planning and future projection are required for better development of that country (Datta & Mohanty, 2005).

Normally, population characteristics, especially the age-sex structure, indicate the present status of society in the context of development. The population age structure reflects the overall scenario of the dynamic relations between the population and resources in an area. The number of children (below 14 years) and the number of adults (15-59 years) are considered the significant segments which decide the development and consumption of available resources. In the SAARC countries, most of the population is younger than in the developed nations.

Various attempts have been made to project the population by government organisations and some international agencies (UNDP, PRB) at the national and regional levels. Some studies related to population projections for India as a whole and for the states are of Kulkarni (2001), Bhat (2004), Kothari (2002), etc.

Again, it is time to emphasise population planning because it is increasing at a higher rate in most of the SAARC countries (excluding Sri Lanka). Some countries have TFR at an alarming stage (more than 3) and infant mortality at a higher level. High TFR and IMR reflect these countries' overall socio-economic scenario and adverse population–resource relationship. The diversity and type of projections are selected by the assortment of users' needs and requirements (Lutz et al., 1996). Dayson and Hanchate (2000) highlight a state-level analysis of India's population and food prospects for 2020 and conclude the real challenge related to various foodstuffs.

The present study is confined to a comprehensive planning vision of the SAARC countries for the year 2050. This study covers different aspects of the population, such as food, drinking water, clothes, residential houses, education, school teacher, health, etc.

From an economic perspective, the SAARC countries consist of a vast consumer market and have a large potential to create a boom in economic development. However, they need more technological advancement and more skill to



produce sophisticated items of international standard. Therefore, these countries are in the developing stage, and the progress in economic development is relatively low.

Consequently, a high dependency ratio prevails in these countries, indicating low per capita income and mass poverty. A growing number of people will require more food, social amenities, and other necessities in the near future, such as schools, teachers, hospitals, doctors, etc.

### **Objectives of This Study**

- To know the population dynamics and demographic transition in SAARC countries up to 2050.
- To estimate the future population and their requirements (such as water, food, clothes, shelter, number of required schools, teachers, hospitals, etc., for newborn children and future population) during the forthcoming decades, i.e., up to 2050.
- To understand and analyse the impact of demographic dividends on the economic scenario.

### **The Study Area**

SAARC countries include eight South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) for the economic and political cooperation and collaboration in this region. Three landlocked countries and three island countries with special geostrategic locations are in this group of countries. SAARC countries have only a three per cent share of the land but have a 19 per cent world population (PRB, 2015). They come under the world's low, lower middle-income group of countries except for Maldives (upper middle income) (World Bank, 2020-21). Four countries (Afghanistan, Bangladesh, Maldives and Pakistan) have Muslim populations as major religious groups; two countries (Bhutan and Sri Lanka) are the dominant Buddhist countries, while two countries (India and Nepal) have dominant Hindu populations.

Afghanistan has a rugged terrain with a low population density, and the country's economy was disturbed by the civil war 2001. Bangladesh has a flat plain with a high population density, and the economy is based on the agricultural sector. Bhutan has highly undulating highlands with hill slopes. India has a land of Himalayas, Deccan trap and Ganges – Indus Plain with one of the emerging economic hubs of the world.

Maldives is a group of low-lying coral islands with a tourist and fishery-based economy. Nepal is a country in the Himalayas, and its economy is primarily based on primary activities. Pakistan is the gift of the Indus Valley, and its economy is based

on primary activities. Sri Lanka has island topography, and its economy is primarily based on tea, coffee, coconut and rubber.

### **Projection Inputs and Methods**

This study is based on the cohort component method of population projections, which requires a detailed analysis of fertility and mortality trends to make future projections. These data are collected and analysed in this study based on different methods of computation and calculation.

- (i) Population single-year age-sex data is obtained from the Preliminary census of Afghanistan, Bangladesh census 2011 (March 15 2011), Bhutan census 2005 (May 30 2005), Census of India, 2011, Maldives census 2006 (March 21 2006), Census of Nepal 2011 (June 22 2011), Pakistan census 2017, and Census of Sri Lanka, 2012 (March 20 2012) have been used as the base year population for population estimation and projection. Total fertility rate data has been taken from survey CEB and B12, Vital Registration 2012, CEB and B12, SRS 2011, vital registration 2012, Maternity Histories 2014, Maternity Histories 2012, and Vital Registration 2010 alphabetically. UNDP data have been used to estimate future life expectancy patterns and net out-migration rates.
- (ii) Infant mortality rate data have been obtained from Maternity Histories 2011, Maternity Histories 2014, Maternity Histories 2012, vital registration (AHS, 2011-12), Maternity Histories 2009, Maternity Histories 2014, Maternity Histories 2011 and vital registration 2010 in alphabetical order. Neo-natal, infant, under-five mortality and maternal mortality ratio is the indicator of mortality which reduces the population by stopping the occurrence of death and is a component of population dynamics.
- (iii) Contraceptive prevalence rate data has been collected from UNWCU 12 (2011), DHS 2011, UNWCU 12 (2006), UNAIDS 2015, DHS 2009; DHS, 2011; DHS 2007 and UNWCU 12 (DHS) 2007 in alphabetical order. Normally, the contraceptive prevalence rate reduces fertility, which helps to stabilise the population and achieve demographic dividends.

This method makes specific assumptions about the future levels and patterns of fertility, mortality and migration and applies them to the age-sex structure of the base year population. The technique has been applied with the help of SPECTRUM population projection software (DEMPROJ, LIST and FamPlan).

In this study, middle-level variants have been used to protect the population of the SAARC countries. After population projection, the requirements of different items have also been estimated, such as water, food, cloth, shelter, health centres, schools, teachers, etc. The water requirement based on per person per day is 3 litres for males and 2.2 litres for females considered in this study ([www.mayoclinic.org/Mayo Clinic](http://www.mayoclinic.org/Mayo-Clinic)). Similarly, per person per day, foodstuffs are considered 700 gm. Shelter requirements considered two rooms (18 m<sup>2</sup>) for five persons, while per person's clothes requirement is 7 meters per year. For other requirements such as schools, teachers, health centres, etc., the Government of India norms have been applied as a standard for all SAARC Countries for comparison.

## Results and Discussion

### Population and its Characteristics in SAARC Nations

#### *Population Size and Growth*

SAARC countries have 23.55 per cent of the world's population on 3.5 per cent of the earth's land (United Nations, 2015). Out of four persons in the world, one was living in SAARC nations and covers 1.72 billion of the world population (UNDESA, Population division 2015); this population will reach 2.41 billion and would be 24.85 per cent of the world population (9.7 billion) in the year 2050. India's total population in the year 2050 will be equivalent to that of the total population of SAARC countries in 2015. During 2050, the population of Afghanistan and Pakistan will increase by 77.78 and 72.48 per cent of their 2015 population, respectively (Table 1), which indicates that population pressure on resources will be in alarming stage in these two countries. Sri Lanka is the only country which will record less than a 1 per cent increase in its population from 2015 to 2050.

**Table 1**

*Population Size (in millions) of SAARC Countries*

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
2015	32.02	158.50	0.76	1297.27	0.36	28.04	199.42	20.34
2020	36.09	168.76	0.81	1384.58	0.39	30.17	220.90	20.79
2025	40.02	178.02	0.85	1466.28	0.41	32.15	242.32	21.04
2030	43.85	185.98	0.89	1540.82	0.43	33.84	263.15	21.15
2035	47.52	192.64	0.92	1606.90	0.45	35.28	283.25	21.16
2040	50.96	198.15	0.95	1665.99	0.47	36.63	302.72	21.06
2045	54.12	202.49	0.97	1720.33	0.49	37.94	321.48	20.83
2050	56.93	205.51	0.99	1768.68	0.50	39.09	338.97	20.48

Source: Calculated by the Authors

According to our estimates, the exponential annual growth rate of the population in the SAARC countries during 2015–2050 will be 0.96. Now, population growth rates are different in SAARC countries. 2015 it varies from 2.5 in Afghanistan to 0.47 in Sri Lanka. On the other hand, this variation will reach between 0.95 and – 0.39 in 2050. Sri Lanka will achieve zero growth in 2030, while Bangladesh and Bhutan will reach this stage in 2040, and India, Nepal and Maldives will reach it in the year 2050. On the other hand, Pakistan and Afghanistan will be far from zero growth even in the year 2050 (Fig. 1).

Afghanistan's total population will increase by 77 per cent, whereas Pakistan's will increase by 72.48 per cent in the upcoming 35 years (Table 1). In 2050, Pakistan's annual population growth rate will be four times higher than Bangladesh, three times higher than Sri Lanka and Bhutan, and two times higher than India, Maldives and Nepal. Afghanistan's annual population growth rate will be the same as in Pakistan during 2050.

### ***Child Population (Below four years)***

The child population is economically dependent but needs more care for its development because it is the future of any country. The child population in Afghanistan was 4.76 million in 2015 (14.87 per cent), the highest among all the SAARC countries. Similarly, a very high child population has also been seen in Pakistan (12.91) and Maldives (10 per cent). India (9.39 per cent), Bangladesh (9.37 per cent) and Nepal (9.77 per cent) have a moderate proportion of the child population. On the other hand, Bhutan (7.89 per cent) and Sri Lanka (7.82 per cent) have the lowest proportion as they controlled their TFR among SAARC nations in the year 2015 (Table 2).

**Table 2***Child and School Age (Millions) Population of SAARC Countries*

Child and School Age Population																
Year	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	CP	SAP	CP	SAP	CP	SAP	CP	SAP	CP	SAP	CP	SAP	CP	SAP	CP	SAP
2015	4.76	9.08	14.85	30.94	.060	0.14	121.80	248.09	.036	.062	2.74	6.20	26.06	45.85	1.59	3.35
2020	5.22	9.31	15.75	29.84	.070	0.13	133.11	244.04	.037	.069	3.27	5.67	27.96	49.17	1.52	3.22
2025	5.19	9.77	15.09	30.39	.070	0.14	131.46	252.33	.032	.074	3.18	5.97	28.38	53.08	1.42	3.03
2030	5.18	10.22	14.23	30.65	.065	0.14	128.71	262.32	.029	.071	2.95	6.41	28.40	55.48	1.37	2.86
2035	5.14	10.20	13.50	29.14	.062	0.13	125.13	258.28	.028	.062	2.74	6.09	28.48	56.00	1.35	2.71
2040	5.06	10.18	13.11	27.57	.060	0.13	123.34	252.14	.030	.057	2.71	5.65	28.90	56.17	1.31	2.64
2045	4.94	10.08	12.84	26.46	.060	0.12	123.75	246.84	.031	.058	2.75	5.41	29.36	56.72	1.24	2.58
2050	4.80	9.88	12.50	25.81	.061	0.12	123.02	245.56	.031	.060	2.70	5.43	29.54	57.65	1.15	2.46

Source: Calculated by the Authors.

Note: CP-Child population, SAP-School age population.

In the year 2050, Pakistan will have the highest child population (9.06 per cent) among SAARC nations, followed by Afghanistan (8.43 per cent). Bangladesh (6.08 per cent), Bhutan (6.16 per cent), Maldives (6.20 per cent), India (6.96 per cent), and Nepal (6.91 per cent) will have a low share of the child population in 2050. Sri Lanka will have a 5.62 per cent child population in 2050, and it will be the lowest share among SAARC nations. India's proportion of child population will gain more than Bhutan and Maldives in the coming 35 years (2015 to 2050). Out of eight SAARC countries, the total child population in four countries (Afghanistan, Bhutan, India and Pakistan) will increase. In comparison, the other four countries (Bangladesh, Maldives, Nepal and Sri Lanka) will be decreased. Pakistan will add more than 5.09 million (i.e., more than the sum of Bhutan, Nepal and Sri Lanka's child population in 2015) in the next 35 years, which will create constraints for the development of this country.

### ***School Age Population (5- 14 years)***

This is also an economically dependent population and needs more attention towards enhancing mental ability and cultural development. This segment of the population, i.e., the school-age population, has high pressure in Afghanistan (28.36 per cent), Nepal (22.11 per cent) and Pakistan (21.94 per cent) in 2015.

On the other hand, three countries had moderate pressure, and two had comparatively low pressure on the school-age population in 2015 in the SAARC countries. In four SAARC countries (Afghanistan, Bhutan, India and Nepal), the school-age population will be increased by 2030 and will decline. These four countries will add another 15.8 million of the school-age population only in the upcoming 15 years, i.e., that population will be equal to the total population of Ecuador. The Maldives will have the highest child population in 2025, and then it will decline. It is interesting to mention here that in Pakistan, the school-age population will increase while in Sri Lanka's school-age population will decrease from 2015 continuously. It indicates that during 35 years (2015 to 2050), the school-age population will reduce to 1.09 million in SAARC countries, equivalent to Bhutan and Maldives's present population (1.12 million, 2015).

### ***Working Age Population and Dependency Ratio (15 to 64 years)***

Working age population indicates any region's production output and development. An increasing working-age population indicates more human resources available for the working sector. In Afghanistan, the working age population was 17.34 million (54.15%) in the year 2015, and it will reach up to 39.03 million (68.56%) in the year 2050 (Table 3), i.e., 225.09 per cent of the 2015 working population.

The working-age population will continuously grow to 2050 in four SAARC countries (Afghanistan, India, Nepal and Pakistan). The working population's absolute number will increase to 2045 in Bangladesh and Bhutan, Maldives up to 2040 and Sri Lanka up to 2025.

**Table 3***Working Age Population*

(in millions)

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
2015	17.34	104.66	0.52	852.58	0.24	17.48	118.93	13.47
2020	20.56	114.31	0.56	915.81	0.26	19.32	134.15	13.68
2025	23.88	121.72	0.59	972.38	0.28	20.86	149.45	13.75
2030	27.04	126.99	0.62	1019.35	0.30	22.04	165.53	13.63
2035	30.47	131.97	0.64	1,071.70	0.32	23.62	182.55	13.43
2040	33.65	135.53	0.66	1,115.69	0.33	24.94	198.71	13.11
2045	36.51	136.79	0.66	1,148.27	0.33	25.90	213.11	12.67
2050	39.03	136.24	0.65	1,167.39	0.33	26.45	225.47	12.29

Source: Calculated by the Authors

In 2015, the highest working-age population was in Bhutan (68.42 per cent) and the lowest in Pakistan (60.54 per cent). While in 2050, the situation will change when Afghanistan (68.56 per cent) will be the highest, and Sri Lanka (60.01 per cent) will be the lowest among SAARC nations. During this period, the dependency ratio was highest in Afghanistan (0.85, i.e., one of the highest in the world) and lowest in Bhutan (0.46), while in 2050 highest and lowest dependency ratio will be in Afghanistan (0.46) and in Sri Lanka (0.67) respectively (Fig. 2). The highly growing working population will pressure employment generation in Afghanistan.

### ***Women in Reproductive Age (15-49 years)***

Women of reproductive age (15-49) determine the future population by their reproductive capacity. Normally, a woman can biologically produce 17 children in her total reproductive period, but the reproduction rate (TFR) depends on the mean age of marriage, median age at first birth and use of contraceptive methods. It is interesting to note here that the share of women of reproductive age has decreased since 2015 in Bangladesh, India and Sri Lanka. Still, the absolute number will start decreasing from 2020 in Sri Lanka to 2040 in Bangladesh, while in India, the absolute number will increase up to 2050 continuously (Table 4).

**Table 4***Reproductive Age Women population (in per cent)*

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
2015	22.95	28.01	26.32	25.67	27.78	27.74	24.88	25.71
2020	24.27	27.80	27.16	25.53	28.21	28.07	25.04	25.20
2025	25.41	27.34	27.06	25.27	26.83	27.74	25.25	24.81
2030	26.04	26.58	25.84	24.76	27.91	26.92	25.51	23.97
2035	26.79	25.97	26.09	24.47	26.67	26.79	25.75	23.20
2040	27.24	25.23	24.21	24.08	23.40	26.24	25.68	22.55
2045	27.31	24.37	23.71	23.63	22.45	25.12	25.41	22.08
2050	27.05	23.43	22.22	23.13	22.00	23.64	25.11	21.68

Source: Calculated by the Authors.

**Table 5***Old Age Population (in per cent)*

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
2015	2.59	5.09	5.26	5.77	5.56	5.78	2.09	9.54
2020	2.74	5.24	6.17	6.62	5.13	6.30	2.14	11.40
2025	2.95	6.08	7.06	7.51	7.32	6.66	2.34	13.55
2030	3.22	7.59	7.87	8.47	6.98	7.24	2.62	15.56
2035	3.56	9.36	9.78	9.45	8.89	8.02	2.89	17.34
2040	4.06	11.08	10.53	10.49	10.64	9.06	3.17	18.99
2045	4.79	13.03	13.40	11.71	14.29	10.20	3.53	20.88
2050	5.64	15.06	17.17	13.16	18.00	11.51	4.00	22.31

Source: Calculated by the Authors.

On the other hand, in Afghanistan, the reproductive age of women will also increase continuously up to 2050. In Bhutan, Maldives and Nepal, it will peak in 2020, while in Pakistan, it will have the highest share of that age group in 2035. India will add 77 million reproductive-age women in the upcoming 35 years, which will be two times higher than the present population of Canada (36 million, PRB 2016). SAARC countries will add 120 million reproductive-age women in the upcoming 35 years, more than the present population of northern Europe (103 million).

***Old Age Population (Above 65 years)***

The share of the old age population was very low in Afghanistan (2.59 per cent), low in Pakistan (4.61), moderate in Bangladesh (5.09), Bhutan (5.26), India



(5.77), Maldives (5.56) and Nepal (5.78); while high in Sri Lanka (9.54) in the year 2015. In the upcoming 35 years, there will be a phenomenal increase in the share of the old age population in SAARC nations except Afghanistan and Pakistan. This indicates a fast-growing life expectancy in the country due to an increase in health facilities and their accessibility. This phenomenal increase indicates more requirements for old-age welfare programs in the near future. Bangladesh, Bhutan and Maldives will record a 300 per cent increase in their share of the old age population during 2015-2050.

### ***Age Structure and Demographic Transition Model***

The age structure of India's population in 2011 indicates the wide base and smallest vertex in the age pyramid, normally found in developing countries (Fig. 3). Afghanistan reached its second stage in 2000 and 2030. It will reach a late second stage in 2030 and 3<sup>rd</sup> in 2045. Bangladesh reached the second stage in 1990. After that, the transition was very fast and will reach 3<sup>rd</sup> in 2040 and late 3<sup>rd</sup> in 2050. Bhutan's demographic transition has been very fast since 2000 due to an increase in life expectancy, and it will reach the 4<sup>th</sup> stage of transition in 2050. While in the year 2050, in India, the age pyramid will be bell-shaped, which is now prevailing in developed countries (Fig. 4). India's demographic transition started the second stage in 1990-95, and in 2010-15, it reached late second stage while it will be in the 3<sup>rd</sup> stage in 2030. This stage will also continue up to 2050. The condition of Maldives has been doing extremely well since the 90s due to a very high rate of fertility decrease, and it will reach the third stage of demographic transition after 2040. Nepal is across the second stage of demographic transition after 1990 and will reach 3<sup>rd</sup> stage after 2040. Pakistan has recorded very slow progress in the demographic transition. It crossed the second stage after 2000 and will reach a late second stage in 2050 due to high fertility and low life expectancy. Sri Lanka has done the best among SAARC nations; it will be reached the 4<sup>th</sup> stage of demographic transition in 2045.

### **Statistical Analysis of Population Characteristics**

#### ***Mean Age of Population***

India's mean age (26.33 years, 2001) was very low when compared with the developed countries (42 to 45 years); however, it is growing continuously and will reach up to 37.10 years during 2050 (Table 6). Moreover, the male mean age has always been lower than the female mean age in all the SAARC nations. Only Sri

Lanka had a mean age of more than 30 in 2015, while Pakistan and Afghanistan have recorded ages of around 25. In 2050, Sri Lanka will reach their mean at 42.51 years, the highest among SAARC nations. Bhutan, Maldives, and Sri Lanka will have a mean age of more than 40, while Bangladesh, Nepal and India will have nearly 40. On the other hand, Maldives and Bhutan will be noticed the highest increase (+13 years) due to increasing life expectancy and low birth rate. In Pakistan, this increase will be lowest (only four years) due to high fertility, accumulation of a larger child population and less life expectancy (Table 6).

### ***Median Age of Population***

The highest median age was 33.71 years in Sri Lanka, followed by India (29.33), Bhutan (28.85), Maldives (28.37), Bangladesh (28.33), Nepal (27.46), and Pakistan (21.68), while Afghanistan (21.71) was on the last position in 2015. In 2050, Sri Lanka will also be in the top position. Bhutan and Maldives will reach nearer to Sri Lanka's median age. Males are younger than females due to higher mortality among males in lower age groups, and females have more survival rate.

### ***Modal Age of Population***

It is remarkable to note here that the Indian modal age was extremely low (below 4 years) in 1961, and it reached 21.68 years in 2015 and will reach up to 37.09 in the year 2050. In 2015, Sri Lanka's modal age was recorded highest (29.28 years) and lowest in Afghanistan (8.77 years) and followed by Pakistan (15.41 years). Afghanistan's modal age in 2015 was equivalent to that of India in 1970. Maldives (56.50 years) will have the highest modal age in 2050, while Sri Lanka (43.36 years) will slip down to third position (after Bhutan), and that will be equivalent to Bangladesh (43.29 years) and Nepal (43.12 years). This increase in Maldives and Bhutan in modal age indicates that the population will tend towards the middle age population from the younger population. A male and female gap is nominal in all the SAARC nations, and the female modal age is higher than the male, except in Bhutan (Table 6).

### ***Standard Deviation of Age***

The Standard Deviation (SD) of the age of the Indian population started growing fast in 1991; it reached 29.33 years in 2001 and will be 37.84 in 2050. In 2015, the lowest SD was recorded in Afghanistan (21.71) and the highest in Sri Lanka (33.71), while it will reach up to 31.30 in Afghanistan and 42.51 in Sri Lanka in 2050.

The highest increase will be recorded in the Maldives and the lowest in Pakistan. Male–female differential in SD will be minimised in all the SAARC nations (Table 6).

### ***Skewness of Age Groups***

The skewness of the population of SAARC nations also measures the asymmetry of the curve. A zero-skewed curve means that the peak of the curve in the age group of 45-50 years is at an advanced stage of development. All the SAARC country's curves are positively skewed means that the bulge of the population is towards younger size, but they varied from very high in Afghanistan (0.60) to low in Sri Lanka (0.13) in 2015. Indian population skewness was 0.40 in 2001, and it will reach 0.02 in 2050; that indicates that the population pyramid will be bell-shaped and at the stage of population stabilisation. Maldives (-0.37) and Bhutan (-0.19) will have a high negative skewed curve, which indicates towards old age population, followed by Nepal (-0.12), Bangladesh (-0.09) and Sri Lanka (-0.02) in 2050, while in Pakistan and Bangladesh, it will reach in that position after 2070 (Table-6).

### **Fertility of Population**

#### ***Total Fertility Rate (TFR)***

Fertility is one of the most important indicators of population growth. In SAARC, the the pace of fertility curbing is quite satisfactory, except in Afghanistan and Pakistan. During 2050, Bhutan, Sri Lanka and Maldives will reach the below-replacement level of fertility, while Bangladesh, India and Nepal will be very near to this stage. The speed of decline was highest in Bangladesh, where fertility declined from 6.6 children per woman in the 1970s to 2.13 in 2015. In the Maldives, the fertility transition sped up during 1990, reaching 2.07 in 2015. This high-speed decline in TFR resulted in a rapidly growing working-age population in these countries (Table 3). TFR was highest in Afghanistan (4.57) and lowest in Bhutan (1.98) among the SAARC nation in 2015 (Table 7). Due to the course of time, TFR will have the lowest in Bangladesh in 2050, which will be the outcome of increasing acceptance of modern contraceptives. Pakistan will have the highest TFR among all SAARC nations in 2050.

Among the eight SAARC countries, three countries (Bhutan, Maldives and Sri Lanka) recorded below the replacement level of fertility in the year 2015, and there will be six countries (Bhutan, Maldives, Sri Lanka, Bangladesh, India and Nepal) in 2050 in this category, except Afghanistan (2.17) and Pakistan (2.35).

**Table 7***Fertility and Modern Contraceptive Prevalence Rate*

Year	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	TFR	MCPR	TFR	MCPR	TFR	MCPR	TFR	MCPR	TFR	MCPR	TFR	MCPR	TFR	MCPR	TFR	MCPR
2015	4.57	22.82	2.13	52.42	1.98	65.85	2.39	49.4	2.07	28.51	2.17	43.95	3.68	24.47	2.06	52.93
2020	4.08	34.98	2.17	54.79	2.15	67.9	2.49	51.27	2.08	34.62	2.37	47.31	3.43	26.25	2.04	54.45
2025	3.44	44.14	2.04	56.74	2.02	69.53	2.38	52.89	1.94	38.76	2.24	49.66	3.13	30.04	1.98	55.66
2030	3	50.37	1.95	58.25	1.93	70.67	2.29	54.24	1.85	41.37	2.14	51.34	2.91	33.60	1.93	56.6
2035	2.69	54.74	1.88	59.31	1.87	71.37	2.21	55.39	1.82	42.51	2.07	52.45	2.72	33.60	1.9	57.3
2040	2.46	57.98	1.84	59.99	1.85	71.64	2.14	56.32	1.81	42.55	2.03	53.16	2.57	33.60	1.88	57.72
2045	2.29	60.49	1.82	60.33	1.85	71.61	2.09	57.08	1.83	42.11	2.01	53.46	2.44	33.60	1.86	58.02
2050	2.17	62.11	1.81	60.38	1.86	71.45	2.06	57.57	1.85	41.61	2.01	53.52	2.35	33.60	1.85	58.17

Source: Calculated by the Authors.

Note: TFR- Total Fertility Rate, MCPR-Modern contraceptive prevalence Rate.

## ***Life Expectancy***

Life expectancy is the mean number of years remaining at a given age, assuming age-specific mortality rates remain at their most recently measured levels (Shryock & Siegel, 1973). Afghanistan has the lowest life expectancy due to the civil war and post-war effects. Maldives and Sri Lanka have comparatively high life expectancy, where the first one is because of economic upliftment, and the second one is due to the socialist health policy of Sri Lanka. Due to improving health facilities in all the SAARC countries, life expectancy will continuously increase until 2050. In six countries (Bhutan, Maldives, Sri Lanka, Bangladesh, India and Nepal), life expectancy will reach above 75, which indicates the growing pressure of the old age population in these countries (Table 8).

**Table 8**

### *Life Expectancy and Net Reproduction Rate*

Year	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	LE	NRR	LE	NRR	LE	NRR	LE	NRR	LE	NRR	LE	NRR	LE	NRR	LE	NRR
2015	60.9	1.91	72.2	0.99	70.0	0.91	68.5	1.05	77.0	0.98	70.2	1.00	66.5	1.66	75.2	0.99
2020	62.5	1.74	73.9	1.02	71.6	1.00	70.0	1.11	78.2	0.99	71.9	1.11	67.3	1.63	76.1	0.98
2025	63.8	1.49	75.1	0.97	72.9	0.94	71.3	1.08	79.1	0.93	73.1	1.05	68.1	1.53	77	0.95
2030	65.1	1.32	76.0	0.92	73.9	0.91	72.5	1.05	80.0	0.89	74.3	1.01	68.8	1.43	77.8	0.93
2035	66.1	1.20	76.8	0.89	74.9	0.88	73.5	1.02	80.8	0.87	75.3	0.98	69.5	1.45	78.7	0.92
2040	67.0	1.11	77.6	0.88	75.9	0.88	74.4	1.00	81.6	0.87	76.4	0.96	70.1	1.46	79.5	0.91
2045	67.9	1.04	78.3	0.87	76.7	0.88	75.3	0.98	82.3	0.88	77.3	0.95	70.8	1.47	80.3	0.90
2050	68.5	0.99	78.9	0.87	77.4	0.89	76.1	0.96	82.9	0.89	78.0	0.95	71.3	1.48	81.0	0.90

Source: Calculated by the Authors.

Note: LE-Life Expectancy, NRR- Net Reproduction rate

## ***Net Reproduction Rate (NRR)***

The net reproduction rate measures the extent to which a cohort of newly born girls will replace their mothers under pre-determined fertility and mortality schedules (Bhende & Kanitkar, 2014). In Afghanistan, NRR was 1.91 in the year 2015, which indicates a higher number of children in the near future. If the TFR is the same, it will contribute more to population growth by increasing the number of reproductive women. However, there is a hope that in SAARC countries, NRR will come down and reach a level of nearly one, except Pakistan, in 2050 (Table 8).

## **Demographic Dividend and Development**

Demographic change implies economic development, but the sketch needs to be seen in previous studies. Demographic change has undergone a demographic

transition, i.e., from a higher child-age population with high TFR and IMR converted higher working-age population with very low TFR and IMR. This structural change from a highly dependent population to a high working population is called a demographic dividend. SAARC nations will experience a significantly faster increase in their working age share between 2015 and 2050 than between 1960 and 2005 (Bloom et al., 2011). A cross-country regression analysis of the contribution of demographic change to economic growth that takes into account an array of variables, including economic openness and the growth rate of the working-age share of the population from UN data, has been recorded in some of the studies (Bloom et al., 2011)

SAARC countries will add 120 million reproductive-age women in the upcoming 35 years, i.e., more than the total population of northern Europe (103 million). SAARC nations have huge reproductive health sector markets; therefore, the health economy should be strong to fulfil their requirement. In 2015, the dependency ratio had highest in Afghanistan (0.85, i.e., one of the highest in the world) and lowest in Bhutan (0.46) among SAARC nations. In 2050, the highest and lowest dependency ratio among SAARC nations will be in Sri Lanka (0.67) and Afghanistan (0.46), respectively. Consequently, a growing working population will pressure employment generation in Afghanistan (Table 9).

**Table 9**

*Correlation Matrix of Demographic Dividend and Development*

	GDP	Growth rate	Dependency rate	BPL	Carbon emission	Electricity	Renewable energy	Arable land
GDP	-	-0.328	-0.617	-0.758	-0.069	0.730	-0.212	0.762
Growth Rate	-0.328	-	0.779	0.427	-0.110	-0.344	-0.600	0.043
Dependency Rate	-0.617	0.779	-	0.406	-0.148	-0.596	-0.346	-0.372
BPL	-0.758	0.427	0.406	-	0.198	-0.808	-0.208	-0.361
Carbon Emission	-0.069	-0.110	-0.148	0.198	-	0.051	-0.105	-0.194
Electricity	0.730	-0.344	-0.596	-0.808	0.051	-	0.099	0.501
Renewable energy	-0.212	-0.600	-0.346	-0.208	-0.105	0.099	-	-0.527
Arable Land	0.762	0.043	-0.372	-0.361	-0.194	0.501	-0.527	-

Source: Calculated by the Authors.

Except for Sri Lanka, other SAARC nations will increase their working population continuously, and that has a high cash benefit to increase GDP and reduced proportion of BPL population (Asian country working age population and GDP and BPL regression analysis have highly positive ( $r=0.68$ ) and second case moderately negative ( $r=-0.39$ ) from PRB data). Per capita, carbon emission has increased due to the fast growth of GDP and fulfilment of the population

requirement, proven in this study. In SAARC nations, education investment must shift from elementary to higher and technical education to utilise the working population as a human resource. More health centres will be needed for the growing population, and intensive care will be needed for the growing old age population. For the bulk of the new population, huge amounts of food, drinking water, and houses will be required, which will strain the existing land and water resources.

This is a huge world economy market; either SAARC nation manufactures its own and develops its economic policy. Consequently, these countries will emerge as the world's biggest economic hub.

## **Future Requirement of Resources**

### ***Elementary School Teacher Requirements***

One of the important sustainable development goals is to fulfil a cent per cent elementary (6-14 years) school education. To fulfil this dream, SAARC nations have implemented various programs to improve the situation. India has already implemented the scheme for elementary education, i.e., “Education for all.” The government of India has also set a norm for the student-teacher ratio, i.e., 30 students per teacher in a school of elementary age. Considering this T-S ratio, there was a requirement of 11.46 million teachers for this population segment. By 2050, there will be 12.17 million children in these countries, requiring 0.71 million teachers (Table 10).

Now, the population in the age group of elementary education is almost stable, while the population in the higher education age group is increasing. Consequently, the focus will be on higher education. On the other hand, in Pakistan and Afghanistan, the school-going population will continuously increase; therefore, school teachers will be required until 2050. In Bangladesh, Sri Lanka and Nepal, the need for elementary school teachers will decrease continuously till 2050, and there will be a resource shift from elementary to higher education; this indicates human development in these countries. In India, there will be huge pressure on elementary education; therefore, teachers will be required up to 2040, and then the trend will shift towards higher education.

### ***Health Centers (PHCs)***

The health care infrastructure has developed as a three-tier system, i.e., community health centres (CHCs), primary health centres (PHCs) and sub-centre

(SCs) in India. This system is based on the population norms, 120000, 30000 and 5000, respectively. To estimate the future primary health centres' requirements, this study has followed the standard in India. SAARC nations need 57909 PHC in 2015 and will need 82527 PHC in 2050 as per the population. In the upcoming 35 years, these countries will increase 43 per cent of the 2015 requirement (Table 10).

### ***Food and Drinking Water***

There is a continuous increase in the number of people and, therefore, a continuous demand for resources also increasing; consequently, there is pressure on our resources. SAARC countries will require a one-third proportion of water by 2015.

Food requirements will also increase in the next three decades. Normally, a person needs an average of 700 grams of food per day, including all the foodstuffs in the range of cereals, pulses, vegetables, fruits, etc. Based on this estimate, SAARC countries will require 39.4 per cent of extra foodstuffs present food requirement. It is recorded that most of the SAARC nations need help to fulfil the current requirements. India will require 120.45 million tons of foodstuffs which is 36 per cent of the current requirement of this country in 2050. Afghanistan and Pakistan are two countries which will require an extra three-fourths of the present food, while Sri Lanka and Bangladesh will be at the bottom in the context of future foodstuff requirements (Table 11). SAARC nations will require 189.26 million tons of extra food by 2050.

**Table 10**

*Elementary School Teacher Requirements (According to T-S Ratio)*

Extra requirements of school teachers and primary health centres																
Year	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	RST	PHC	RST	PHC	RST	PHC	RST	PHC	RST	PHC	RST	PHC	RST	PHC	RST	PHC
2020	7,560	136	-36,653	342	-174	2	135,067	2,910	216	1	-17,529	71	129,022	785	-4,153	15
2025	22,716	267	-18,347	651	-5	1	141,484	5,633	373	2	-7,635	137	327,871	1593	-10,588	23
2030	37,736	395	-9,617	916	176	1	474,455	8,118	266	2	7,032	193	483,356	2386	-16,171	27
2035	37,408	517	-60,040	1138	-103	1	339,764	10,320	-16	3	-3,708	241	530,962	3210	-21,238	27
2040	36,613	632	-112,467	1322	-364	1	134,902	12,290	-173	4	-18,411	286	596,715	4107	-23,598	24
2045	33,078	737	-149,305	1467	-536	1	-41,584	14,102	-160	4	-26,152	330	764,393	5085	-25,613	16
2050	26,695	831	-170,946	1567	-586	1	-84,278	15,713	-72	5	-25,480	368	993,822	6122	-29,414	5

Source: Calculated by the Authors.

Note: (ERST- Extra Requirements of the School teacher, PHC- Primary Health Centre) based on the 2015 population



**Table 11***Extra Requirement of Food and Water*

Extra requirements of foodstuff (million tons) and drinking water (million litres)																
year	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	FS	DW	FS	DW	FS	DW	FS	DW	FS	DW	FS	DW	FS	DW	FS	DW
2020	1.04	9.24	2.62	22.41	0.02	0.10	22.31	190.26	0.01	0.07	0.55	4.04	9.39	92.60	0.12	0.95
2025	2.04	18.19	4.98	42.47	0.03	0.19	43.19	366.62	0.02	0.12	1.05	7.76	15.59	153.54	0.19	1.43
2030	3.02	26.90	7.02	59.42	0.04	0.25	62.23	525.28	0.02	0.17	1.49	10.86	21.67	213.29	0.21	1.57
2035	3.96	35.21	8.72	73.02	0.05	0.31	79.11	661.87	0.03	0.21	1.85	13.30	27.98	275.35	0.22	1.46
2040	4.84	42.82	10.13	83.17	0.05	0.35	94.21	774.81	0.03	0.25	2.20	15.23	34.86	342.88	0.19	1.09
2045	5.65	49.52	11.24	89.76	0.06	0.37	108.10	866.75	0.03	0.28	2.53	16.75	42.35	416.42	0.13	0.38
2050	6.36	55.20	12.01	92.74	0.06	0.39	120.45	938.33	0.04	0.30	2.83	17.77	50.30	494.45	0.04	-0.65

Source: Calculated by the Authors.

Notes: FS-Food Stuff (Million Tones), DW- Drinking Water (Million Liters)

- (i). Water requirement. (3 litres for Men) and (2 litres for Women), (ii). Foodstuff- 700 g /day/ person.
- Base year for estimation is 2015.

***Clothes and Shelter***

After water and food, cloth and shelter are the utmost items for human survival. According to the estimation made in this study, an extra 5262.17 million meters of cloth (per year) will be required in the year 2050 for the SAARC nations, which is 43.27 per cent of the current demand of the SAARC nation (Table 12).

Estimation of shelter is based on the two rooms for the five persons. Based on this standard, SAARC countries will require 300.70 million more rooms for the upcoming four decades which is 43.27 per cent more when compared with the 2015 requirement.

**Table 12***Extra Requirement of Room and Cloth*

Extra requirements of room (million) and cloth (million meters)																
Year	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
2020	1.62	28.46	4.10	71.79	0.02	0.36	34.92	611.16	0.02	0.21	0.85	14.87	14.70	257.31	0.18	3.11
2025	3.20	55.99	7.81	136.64	0.04	0.67	67.60	1183.06	0.03	0.39	1.64	28.75	24.40	427.04	0.28	4.89
2030	4.73	82.78	10.99	192.35	0.06	0.93	97.42	1704.83	0.03	0.53	2.32	40.61	33.92	593.56	0.32	5.66
2035	6.20	108.49	13.66	238.96	0.07	1.15	123.85	2167.40	0.04	0.66	2.89	50.65	43.81	766.59	0.32	5.72
2040	7.57	132.60	15.86	277.53	0.08	1.34	147.49	2581.02	0.05	0.79	3.43	60.09	54.57	954.95	0.28	5.02
2045	8.84	154.67	17.59	307.89	0.09	1.50	169.23	2961.44	0.06	0.91	3.96	69.27	66.30	1160.16	0.19	3.41
2050	9.96	174.35	18.81	329.08	0.10	1.63	188.56	3299.85	0.06	1.01	4.42	77.32	78.74	1378.01	0.05	0.93

Source: Calculated by the Authors.

Notes: A- Number of Rooms and B-Cloths

- (1) Cloth -7 meters/person per year, Shelter- 2 rooms/ 5 persons.
- (2) Base year for calculation/estimation is 2015.

## Conclusions

The analysis of population dynamics and demographic transition in SAARC nations during 1950-2050 gives interesting results. It emerged that SAARC nations will experience a significantly faster increase in their working age share between 2015 and 2050. Except for Sri Lanka, other SAARC nations will continuously increase their working population, which has a high cash benefit to increase GDP and reduce the proportion of the BPL population. Asian country working age population and GDP and BPL regression analysis have highly positive ( $r=0.68$ ) and second case, moderately negative ( $r=-0.39$ ). Sri Lanka will achieve the fourth stage of demographic transition in 2045 with zero growth. Bhutan, India, Maldives and Nepal will achieve the late third stage of demographic transition in the year 2050, while Afghanistan and Pakistan will enter the third stage.

In 2050, there will be a positive change in the age structure in Maldives, Bhutan and Sri Lanka, as they will achieve the most developed stage of the age pyramid, while in India, Bangladesh and Nepal age pyramid will be bell-shaped. Conversely, Afghanistan and Pakistan will be in the backward stage with a triangular shape of the age pyramid.

There will be a higher demand for education, food, safe water, proper houses, health and various other basic requirements and amenities, and therefore there will be stress on the resources in these countries.

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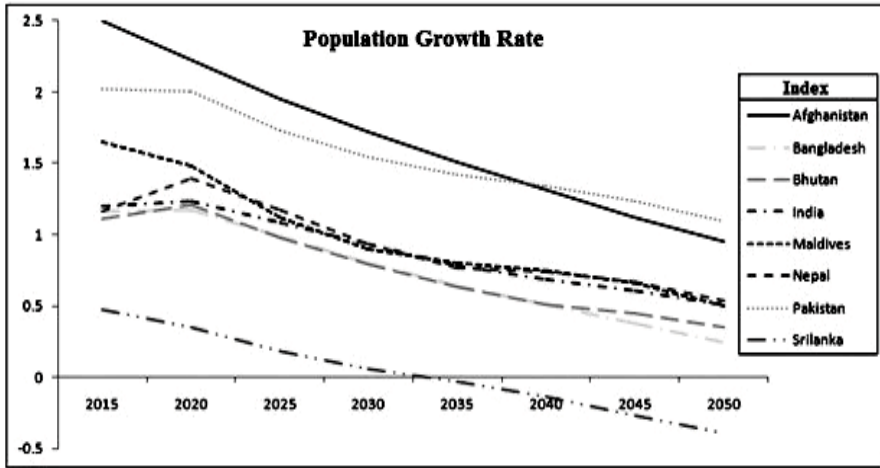
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**Figure 1**

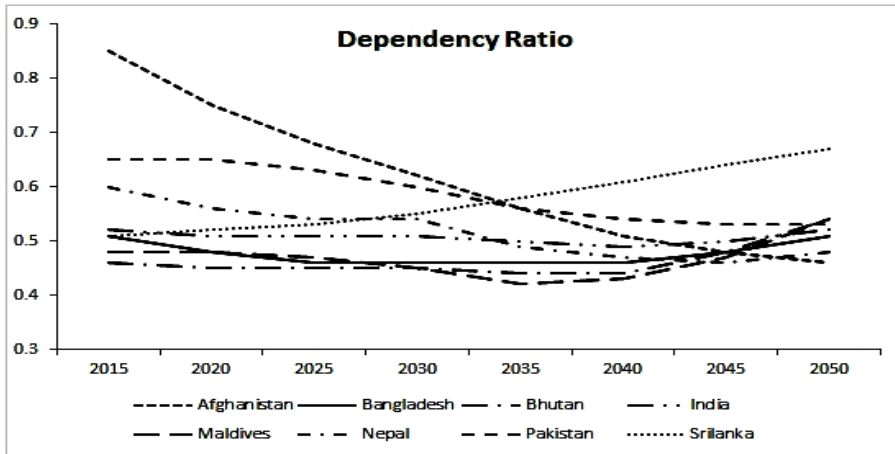
*Population Growth Rate (%)*



Source: (i) Calculated by the Authors based on country-wise data obtained from different sources as mentioned above sub-title-Projection input and methods.  
 (ii) Base year has taken 2015 for projection.

**Figure 2**

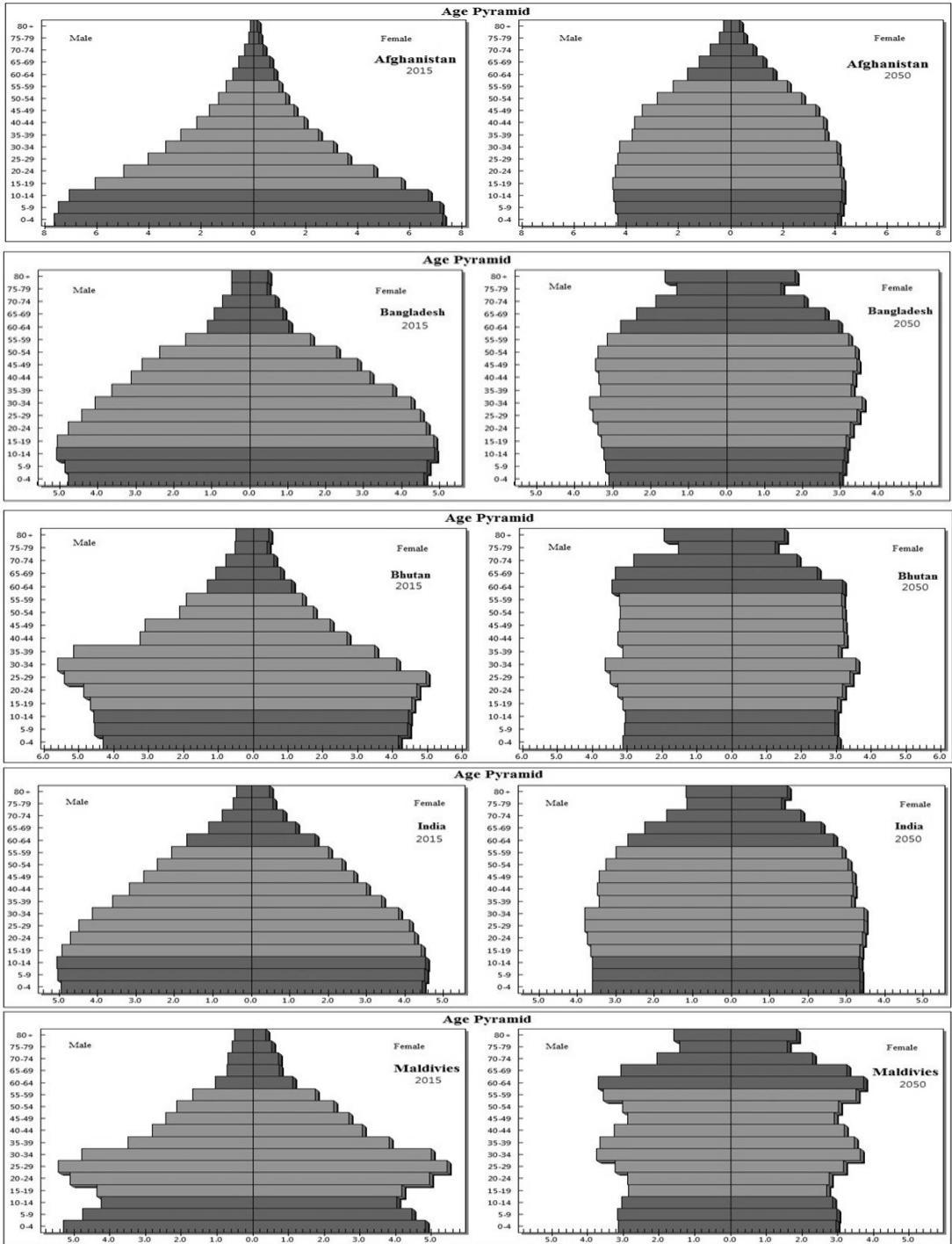
*Dependency Ratio of SAARC Nation*

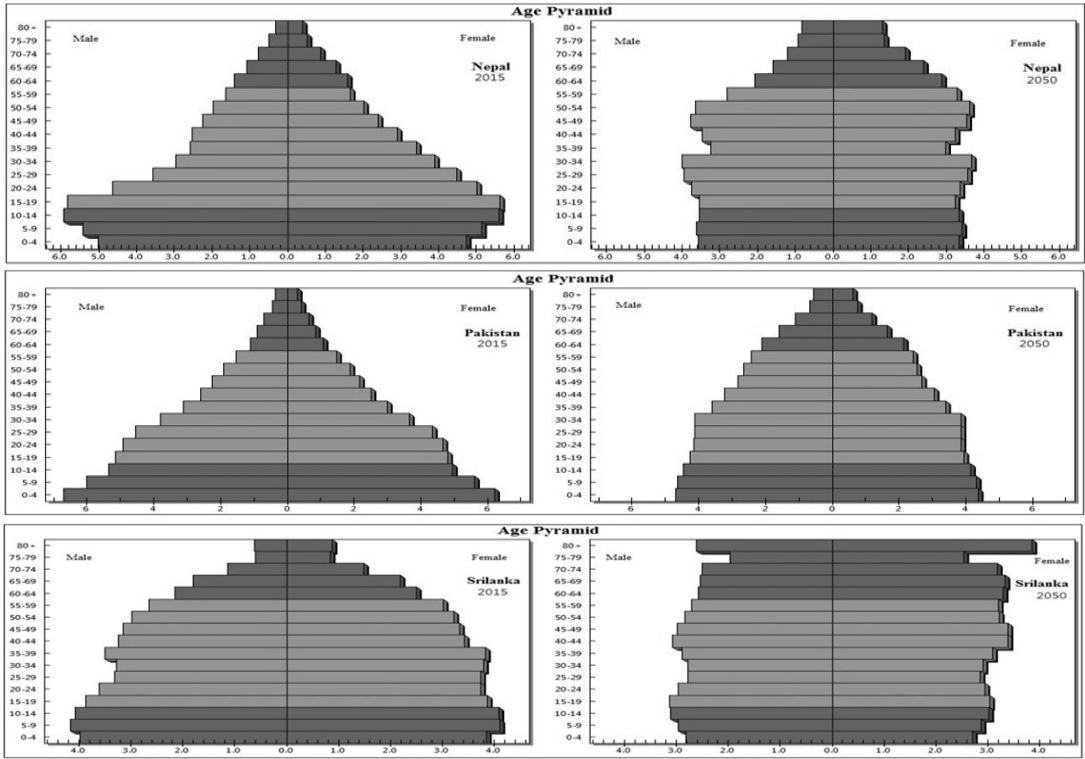


Source: (i) Calculated by the Authors based on country-wise data obtained from different sources as mentioned above sub-title-Projection input and methods.  
 (ii) Base year has taken 2015 for projection.

**Figure 3**

*Age Structure of SAARC Countries, 2011 and 2050*

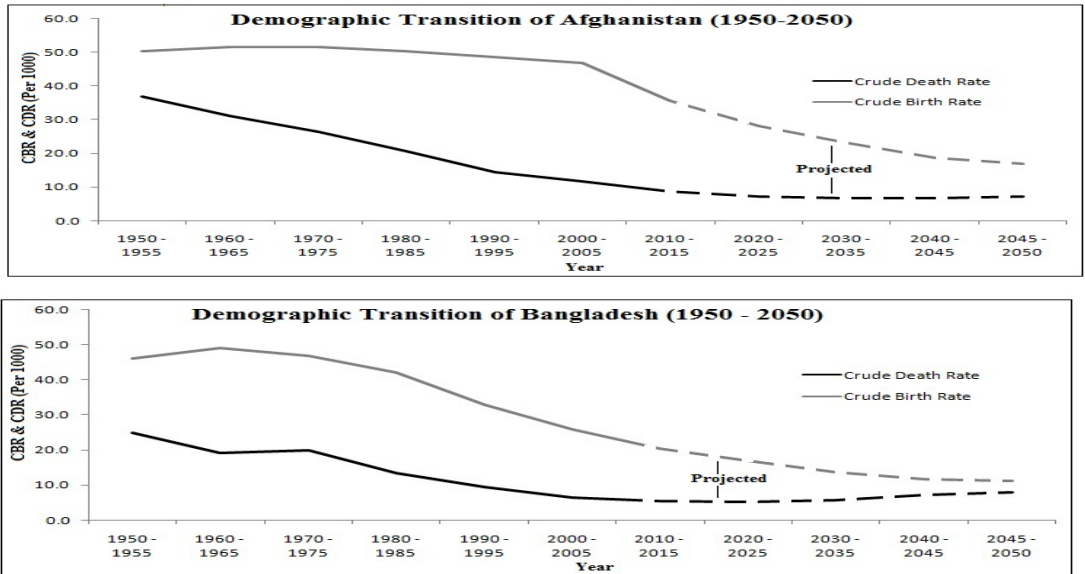


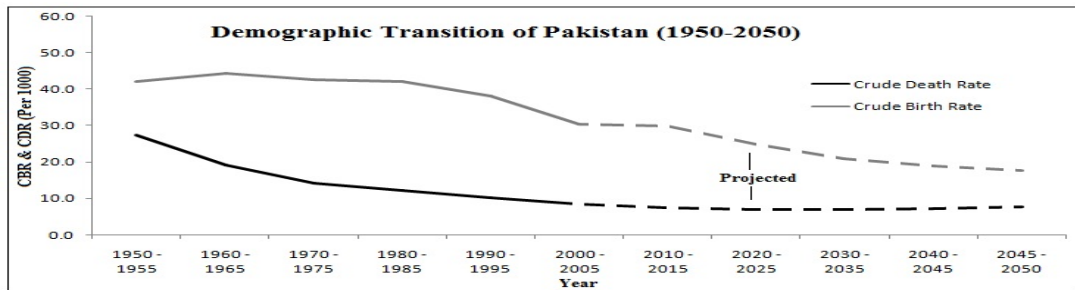
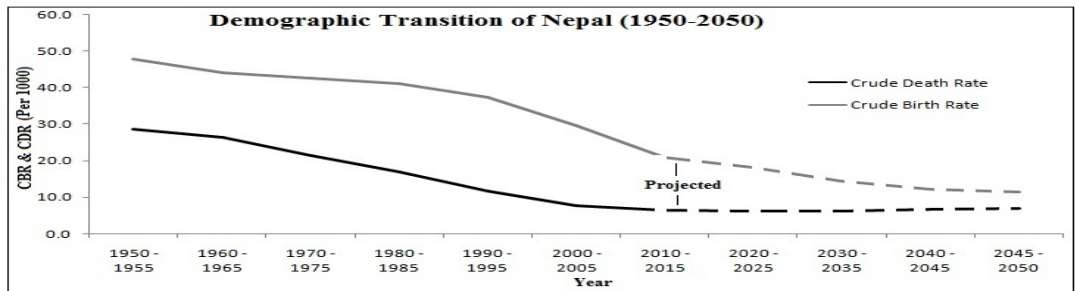
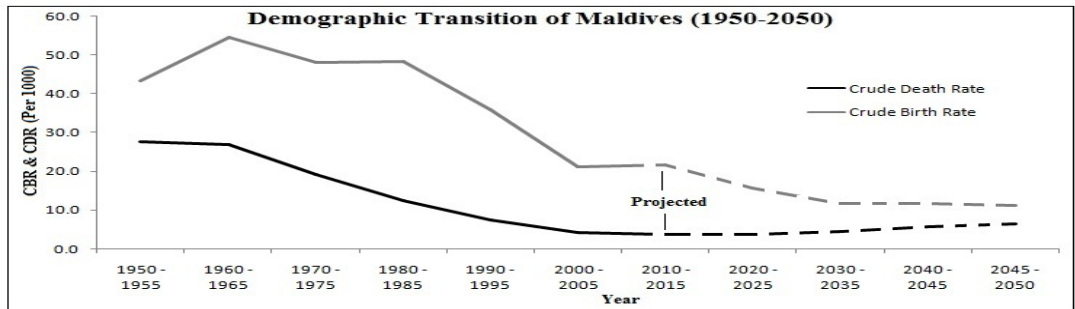
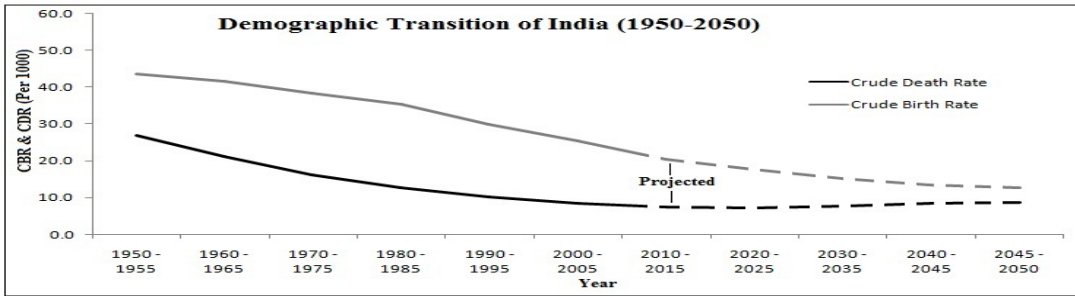
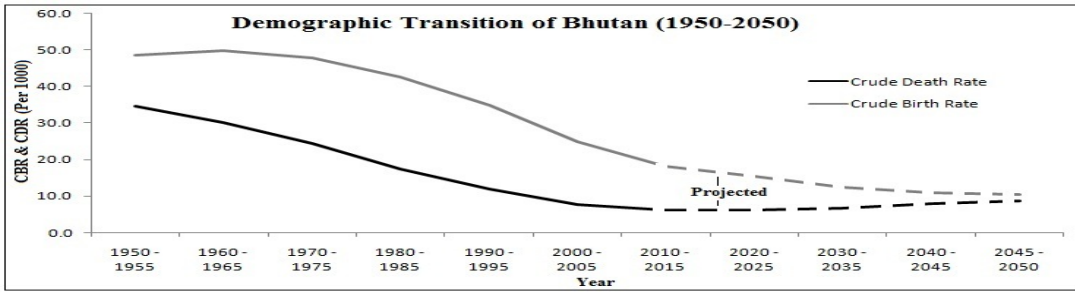


Source: As in Figure 1

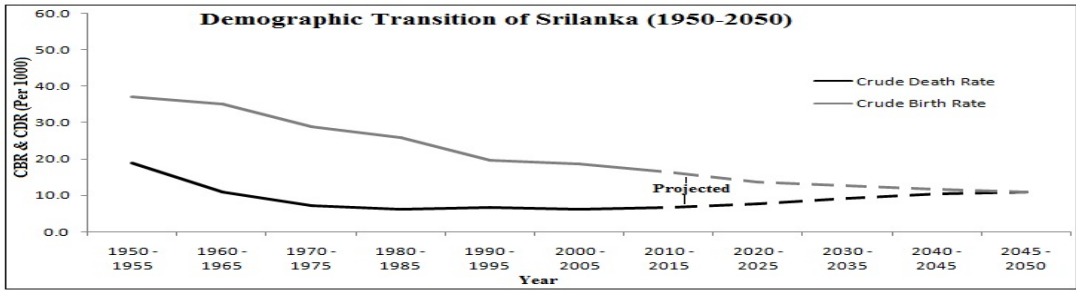
**Figure 4**

*Demographic transitions of SAARC Countries (1950- 2050)*









Source: As in Figure 1

**Table 6**

*Statistical Analysis of Demography of SAARC Countries*

Year	Mean Age			Median Age			Modal Age			Standard Deviation			Skewness		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F
Afghanistan															
2015	21.71	21.67	21.75	17.39	17.54	17.24	8.77	9.28	8.22	21.71	21.67	21.75	0.60	0.57	0.62
2020	22.78	22.74	22.83	19.15	19.25	19.04	11.87	12.27	11.45	22.78	22.74	22.83	0.48	0.46	0.50
2030	25.34	25.26	25.42	22.83	22.83	22.82	17.81	17.98	17.64	25.34	25.26	25.42	0.30	0.29	0.31
2040	28.20	28.06	28.33	26.37	26.28	26.47	22.72	22.71	22.73	28.20	28.06	28.33	0.19	0.19	0.20
2050	31.30	31.08	31.53	30.01	29.80	30.24	27.44	27.24	27.66	31.30	31.08	31.53	0.12	0.12	0.12
Bangladesh															
2015	28.33	28.26	29.81	25.93	25.65	27.28	21.13	20.42	22.22	28.33	28.26	29.81	0.25	0.28	0.25
2020	29.81	29.68	29.93	27.73	27.39	28.08	23.57	22.79	24.39	29.81	29.68	29.93	0.21	0.23	0.19
2030	33.08	32.83	33.34	32.14	31.65	32.65	30.26	29.31	31.27	33.08	32.83	33.34	0.09	0.11	0.06
2040	36.54	36.16	36.93	36.34	35.70	37.00	35.93	34.77	37.15	36.54	36.16	36.93	0.02	0.04	-0.01
2050	39.74	39.26	40.23	40.93	40.12	41.77	43.29	41.83	44.85	39.74	39.26	40.23	-0.09	-0.07	-0.12
Bhutan															
2015	28.85	29.67	27.91	27.46	28.98	25.88	24.68	27.61	21.84	28.85	29.67	27.91	0.14	0.07	0.22
2020	30.61	31.49	29.60	29.84	31.40	28.23	28.30	31.22	25.51	30.61	31.49	29.59	0.08	0.01	0.14
2030	34.30	35.23	33.24	34.20	35.60	32.76	34.00	36.34	31.79	34.30	35.23	33.24	0.01	-0.03	0.04
2040	38.02	38.92	37.02	38.96	40.17	37.72	40.85	42.65	39.13	38.02	38.92	37.02	-0.07	-0.10	-0.06
2050	41.37	42.17	40.51	43.94	44.91	42.94	49.07	50.37	47.81	41.37	42.17	40.51	-0.19	-0.19	-0.18
India															
2015	29.33	28.87	29.81	26.78	26.32	27.28	21.68	21.21	22.22	29.33	28.87	29.81	0.26	0.27	0.25
2020	30.51	30.03	31.03	28.23	27.73	28.78	23.66	23.13	24.29	30.51	30.03	31.03	0.22	0.23	0.22
2030	32.93	32.40	33.50	31.35	30.80	31.97	28.19	27.60	28.91	32.93	32.40	33.50	0.14	0.15	0.14
2040	35.43	34.87	36.03	34.53	33.95	35.18	32.74	32.11	33.50	35.43	34.87	36.03	0.08	0.08	0.07
2050	37.84	37.25	38.47	37.59	37.00	38.25	37.09	36.49	37.81	37.84	37.25	38.47	0.02	0.02	0.02
Maldives															
2015	28.37	27.99	28.74	26.89	26.22	27.58	23.93	22.68	25.25	28.37	27.99	28.74	0.16	0.19	0.12
2020	29.92	29.42	30.42	29.98	29.14	30.83	30.09	28.59	31.64	29.92	29.42	30.42	-0.01	0.03	-0.04
2030	33.96	33.34	34.58	33.51	32.52	34.53	32.60	30.88	34.44	33.96	33.34	34.58	0.04	0.07	0.00
2040	38.01	37.37	38.65	38.06	37.13	39.04	38.17	36.64	39.83	38.01	37.37	38.65	0.00	0.02	-0.03
2050	41.33	40.75	41.92	46.39	45.46	47.35	56.50	54.86	58.23	41.33	40.75	41.92	-0.37	-0.35	-0.39
Nepal															
2015	27.46	26.78	28.09	23.44	22.14	24.64	15.41	12.86	17.74	27.46	26.78	28.09	0.44	0.52	0.37

2020	28.71	27.80	29.57	25.18	23.81	26.64	18.12	15.82	20.77	28.71	27.80	29.57	0.37	0.43	0.30
2030	31.58	30.30	32.79	30.14	28.41	32.06	27.27	24.62	30.61	31.58	30.30	32.79	0.14	0.19	0.07
2040	35.01	33.49	36.46	34.74	32.78	36.93	34.20	31.35	37.86	35.01	33.49	36.46	0.02	0.06	-0.04
2050	38.53	36.88	40.12	40.06	37.83	42.56	43.12	39.74	47.45	38.53	36.88	40.12	-0.12	-0.08	-0.18
Pakistan															
2015	25.11	24.99	25.25	21.68	21.49	21.88	14.80	14.48	15.14	25.11	24.99	25.25	0.41	0.42	0.40
2020	25.59	25.43	25.76	22.42	22.19	22.65	16.07	15.73	16.44	25.59	25.43	25.76	0.37	0.38	0.36
2030	27.04	26.83	27.26	23.93	23.71	24.17	17.70	17.46	17.98	27.04	26.83	27.26	0.35	0.35	0.34
2040	28.51	28.27	28.75	25.31	25.12	25.53	18.93	18.81	19.08	28.51	28.27	28.75	0.34	0.33	0.34
2050	29.43	29.18	29.69	26.64	26.44	26.85	21.05	20.95	21.17	29.43	29.18	29.69	0.28	0.28	0.29
Sri Lanka															
2015	33.71	32.90	34.47	32.23	31.04	33.39	29.28	27.32	31.22	33.71	32.90	34.47	0.13	0.17	0.09
2020	35.22	34.27	36.10	33.46	31.95	34.95	29.93	27.31	32.63	35.22	34.27	36.10	0.15	0.20	0.10
2030	38.17	36.94	39.28	35.71	33.87	37.52	30.79	27.74	34.00	38.17	36.94	39.28	0.19	0.25	0.13
2040	40.46	39.00	41.78	40.00	37.50	42.51	39.06	34.52	43.97	40.46	39.00	41.78	0.03	0.11	-0.05
2050	42.51	40.87	43.98	42.79	39.99	45.62	43.36	38.23	48.90	42.51	40.87	43.98	-0.02	0.06	-0.11

Source: Calculated by the Authors.

Note: T-Total, M-Male, F-Female

# Socioeconomic Transformation of Women in National Capital Region of Delhi: A District Level Analysis

Saumya Singh<sup>1</sup>, and Vishal Warpa

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**Abstract:** The gender gap or inequality is common in a developing country like India. This paper focuses on the gender gap in the National Capital Region of Delhi and women's socioeconomic conditions. It correlates the gender gap and the socioeconomic condition of women to assess the nature and trend of the prevailing gender gap across sectors of the economy. It was found that the major factor behind the inequality is the poor socioeconomic condition of women. Results indicate a high correlation when we compared the socioeconomic condition of women with that of the gender inequality index of Delhi NCR, with few exceptions. Women, who constitute nearly half of the demographic dividend potential of India, however, are contributing much less than their male counterparts. It is observed that Delhi NCT is the most developed part of NCR, having the least gender inequality as opposed to peripheral regions. Education, work participation, income, and social structure are pillars to uphold women's position in society, which may help form a better and gender-balanced nation.

**Keywords:** Gender gap, women, social structure, empowerment, development

Women contribute to half of the world's population but are denied this equality regarding income, decision-making or active participation in national issues. In India, economic development is accelerated, and it is emerging as one of the global powers. Still, when talking about the condition of women, it is observed that the gender gap is widely spread in India. Women being prohibited from contributing to remunerative work leads to lower chances of successful economic development of a nation. Women's participation in the workforce and control of income shall lead to

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greater empowerment. Women have undergone a great change in their condition since Vedic times. It will not be wrong to say that women at those times experienced and enjoyed greater freedom and empowerment than today. India is in a period where it is striving to accelerate its economic growth and has been emerging as a global player on the one hand. However, on the other hand, it is also witnessing various dimensions of socioeconomic disparity aggravating further. The gender gap seems to be most widely spread in India according to the gender-wise data on the work participation rate. According to UNICEF, gender equality means that women and men enjoy the same rights, resources, opportunities and protections. However, prohibiting women's participation in economic and social activities puts half the populace outside the chance to build a prosperous economy (Vaughen, 2010). It is well understood that economic empowerment increases women's access to the economy, resources and opportunities, including jobs, financial services, property, skill development and market information. Hence, it becomes important for any nation to provide ample opportunities to both sexes to strengthen economic empowerment further.

While the international conference on population and development brought about an international consensus on the centrality of women's empowerment and gender equity as desired national goals. However, the conceptualisation and measurement of empowerment in the subjects of demography and economics have been largely understood in a relational and family welfare context where women's altruistic behaviour within the household is tied to development or child health outcomes (Samanta, 2020). Women's condition in India has changed greatly since Vedic times. They enjoyed more freedom than they do today. Women were educated and used to participate in all religious ceremonies. There was no bar for women to study Vedas, and twenty women earned the honour of being included amongst the composers of the Rig Vedic Hymns (Sahgel, 1951). However, women do not enjoy as much liberty and equality as before. There are, however, several modifications to provide recognition and reputed positions to women. However, there is a long way to traverse to unleash a positive and constructive change in the socio-cultural outlook and overall thought process of the people and society.

By and large, in Indian society, women are traditionally discriminated against and excluded from political and family-related decisions barring a few exceptions in some liberalised and matrilineal-headed societies. Despite the work women are supposed to perform daily to support their families, their opinions are rarely acknowledged, and their rights are also limited.

Recently, India is often characterised as an emerging superpower. The huge demographic dividend, the higher quality engineering and management talent, the

powerful Indian diaspora and the emerging Indian transnational power and optimism are seen as stepping stones for harnessing this dream. In contrast, there is another profile of India which rather presents a gloomy picture. Data and evidence show it houses the largest number of the world's poor, illiterate, and unemployed segments. India constitutes about 17 per cent of the world's population but accounts for about 35 per cent of the poor and 40 per cent of the illiterate population (Kurian, 2007). In India, the gender gap in the workplace is reinforced by the extremely low participation of women in the economy and low wages for those who work. On average, data and evidence show that 66% of women's work in India is unpaid and remains unaccounted for, compared to only 12% of men. India has experienced a further decline in its overall global gender gap index ranking by slipping 21 places. The reason for this may be largely attributable to a widening gender gap in political empowerment, healthy life expectancy, and even basic literacy, which is still low. The skewed sex ratio in India in favour of males, too, leads to the identification and poor conditions of "missing" women. Thus, all these pieces of evidence show a broader perspective of India's hollow state of development, where part of its potential dividend continues to be underprivileged even after more than seven decades of Independence (PhD Research Bureau, 2018).

Women in India tend to be engaged mostly in non-remunerative work, whereas when talking about working hours, women tend to work for more duration than men. However, now, women have also started working, but their work is mostly confined to nursing, teaching, and caretaking business. The problems for women start right from the stage of recruitment. Women tend to opt for less demanding jobs even if they are highly qualified as they are ever ready for compromise at any stage owing to unemployment on the one hand and the availability of a surplus labour force on the other hand. Even now, women are only appreciated for some of the work. Women are only considered fit for some of the jobs. Society does not accept a woman working on par with a man. It is an inbuilt conviction that women are lesser than men, and this mindset is not only of males but is also of women to some extent. Even a well-qualified woman finds it difficult to get a job suitable for her qualification. The basic problem of working women is getting a job suitable to their qualifications, wage security and wages at par with their male counterparts; the problem of work-culture politics mostly takes down the women into it.

However, in recent times, on the other hand, it is also noted that India is witnessing an increasing visibility of women in the public spheres with economic contributions in various sectors. Studies have indicated a strong correlation between female education and developmental indicators such as increased economic productivity, health improvement, delayed age at marriage, lower fertility, increased political participation and effective investment in the next generation (Singh, 2008).

This gives us an edge in understanding the areas where the contribution of women can be increased and how can their active participation be encouraged.

### **Database and Methodology**

Data required to conduct the research has been taken from the Census of India 2011.

District PCA 2011 is used to acquire literacy data, sex ratio, workforce participation, place of residence and caste. C series Census Data for the level of education has been taken.

R.L. series for religion data from the R.L. series of Census of India is used. Female as head of the family data has been extracted from PCA. B series Census Data for the sectoral share of women in the workforce has been utilised. For the formulation of the socioeconomic condition of women, indicators taken are workforce participation, sex ratio, religion, caste, female as head, place of residence, and literacy rate. The composite index of all the indicators of socioeconomic condition has been calculated.

To formulate the gender gap, a gender inequality index has been calculated using indicators: workforce participation, sex ratio, literacy rate, and women in primary, secondary and tertiary education. The value of the composite index is compared with the gender inequality index. Maps, tables and graphs are used for illustration purposes.

### **Study Area**

The NCR was created under the National Capital Region Planning Board Act 1985. The act defines the NCR as the whole of Delhi and some adjacent districts of Haryana, Uttar Pradesh and Rajasthan. At the time of the creation, the districts were- Gurgaon, Faridabad, Sonapat, Rohtak (including Jhajjar) and Rewari (in Mahendragarh) from Haryana; Bulandshahr, Muzaffarnagar, Meerut (including Baghpat), Ghaziabad (including Hapur) from Uttar Pradesh; and some parts of Alwar districts from Rajasthan. The latest and detailed list of districts in NCR other than Delhi is—Alwar, Bharatpur (Rajasthan), Baghpat, Bulandshahr, Muzaffarnagar, Meerut, Ghaziabad, Gautam Buddha Nagar, Hapur, Shamli (Uttar Pradesh), Bhiwani, Chakri Dadri, Faridabad, Gurgaon, Jhajjar, Jind, Karnal, Mahendragarh, Nuh, Palwal, Panipat, Rewari, Rohtak, Sonipat (Haryana).

Delhi, the metropolitan region of India, is taken for this study to understand the gap in gender as it is assumed that the capital may be one of the most developed parts of the country. Analysis from this study shall help comprehend and unleash the nuances of gender gaps and may help to evolve the gender-specific policies for the population more inclusively.

## Results and Discussion

The results in this paper show an obvious relation between the level of socioeconomic conditions of women and gender inequality. There is a clear picture of an inverse relationship between both components. The reason for this relationship and exceptions have been elaborately discussed below.

### Determinants of Gender Inequality

**Table 1 (a)**

*Determinants of Gender Inequality Index, Delhi NCR 2011*

Districts	Sex ratio	Literacy rate	Primary education	Secondary education	Tertiary education
Alwar	895	47.4	6.2	4.0	0.7
Baghpat	861	51.1	5.4	4.8	1.0
Bharatpur	880	45.0	6.1	3.2	0.5
Bhiwani	886	55.6	6.1	6.2	1.4
Bulandshahr	907	47.1	5.8	3.6	0.8
Central	892	73.5	5.2	6.1	2.0
East	884	75.4	5.1	6.1	2.8
Faridabad	873	63.7	5.5	5.7	2.2
GB Nagar	851	60.3	5.4	4.9	1.8
Ghaziabad	881	59.8	5.3	5.1	1.9
Gurgaon	854	67.7	4.9	5.4	2.2
Jhajjar	862	62.3	5.4	6.6	1.8
Jind	871	53.2	5.9	5.6	1.2
Karnal	887	58.4	5.3	5.1	1.6
Mahendragarh	895	57.4	5.9	6.8	1.3
Meerut	886	54.8	5.2	5.1	1.7
Mewat	907	28.3	3.4	1.0	0.2
Muzaffarnagar	889	49.7	5.3	4.0	0.8
New Delhi	822	75.7	5.4	8.1	3.7
North	869	72.6	5.8	6.3	2.7
North East	886	66.4	6.0	5.8	1.8
North West	865	68.8	5.7	5.5	2.2
Palwal	880	45.1	5.9	3.9	0.7
Panipat	864	57.7	5.4	5.2	1.3
Rewari	898	61.4	5.5	6.4	1.5
Rohtak	867	63.2	5.5	6.7	2.2
Sonipat	856	61.1	5.5	6.4	1.8
South	862	70.6	5.6	5.7	2.5
South West	840	72.8	5.2	6.3	2.7
West	875	73.1	5.0	6.1	1.9

**Table 1 (b)***Determinants of Gender Inequality Index, Delhi NCR 2011, contd.*

Districts	Workforce	Primary activity	Second activity	Tertiary activity
Alwar	41.2	84.5	5.2	10.3
Baghpat	12.3	44.2	17.5	38.3
Bharatpur	35.5	80.9	5.2	13.9
Bhiwani	25.1	74.8	5.4	19.7
Bulandshahr	16.7	48.2	17.7	34.0
Central	10.8	1.1	15.5	83.4
East	11.6	1.2	11.3	87.5
Faridabad	12.1	10.5	16.0	73.5
GB Nagar	16.6	19.0	11.5	69.5
Ghaziabad	13.2	21.8	15.3	62.9
Gurgaon	16.1	17.2	12.8	70.0
Jhajjar	17.2	54.3	8.1	37.5
Jind	25.0	72.4	6.2	21.4
Karnal	14.8	46.4	13.0	40.6
Mahendragarh	24.3	68.7	6.6	24.7
Meerut	11.9	36.0	11.8	52.2
Mewat	12.6	69.7	7.9	22.5
Muzaffarnagar	10.8	48.9	11.8	39.3
New Delhi	19.7	0.8	5.3	93.9
North	9.4	2.3	14.8	82.9
North East	6.4	1.0	26.0	73.0
North West	9.8	2.5	18.7	78.8
Palwal	13.9	59.1	7.5	33.4
Panipat	15.0	32.1	31.4	36.4
Rewari	24.0	64.2	11.3	24.4
Rohtak	14.9	46.8	10.4	42.9
Sonipat	19.8	50.5	12.4	37.1
South	11.8	1.1	10.5	88.5
South West	12.2	2.0	11.3	86.7
West	11.9	0.8	13.2	86.0

Tables 1 (a) and 1 (b) represent the determinants used to create the gender inequality index for Delhi NCR. The determinants used are- sex ratio, which shows fewer females than males in all the districts of NCR, and literacy rate, which shows a lower proportion of women educated. This is further categorised into primary education, which incorporates education up to fifth; secondary education, which includes education up to 8<sup>th</sup> and tertiary education up to graduation. The workforce



is another determinant used, which again is categorised as a primary sector, including agriculture and allied activities, secondary and tertiary sectors. To calculate the gender inequality index, the traditional method comprises three broad dimensions: reproductive health, empowerment and labour market participation. These dimensions have further sub-categories of indicators, including MMR and AFR for reproductive health, higher education and share of parliamentary seats for empowerment and labour market. Due to the lack of required data in this inequality index, the indicators are modified, keeping the dimensions as such. In this, reproductive health includes sex ratio, empowerment includes only education at all levels, and the labour market includes participation in the workforce at all sectors of the economy.

### **Women in the Workforce in Different Sectors of the Economy in Delhi NCR**

Table 2 shows the participation rate of women in various sectors of the economy across the districts of Delhi NCR. Table 2 infers that the share of the secondary sector in attracting the female workforce could be much higher when compared to other sectors, i.e., primary and tertiary, in all the districts of NCR. Maximum involvement is visible in the tertiary sector, while few districts also show maximum involvement in the primary sector. Districts showing women's maximum participation rate in the primary sector are Alwar, Bharatpur, Bhiwani, Jind, Mewat, Mahendragarh, Rewari, Palwal, Jhajjar and Sonipat, etc. Districts that show higher rates of women's participation in the secondary sector are Panipat, North East Delhi, North West Delhi, Bulandshahr, Baghpat and Faridabad etc. Districts showing the maximum participation rate of women in the tertiary sector include all the districts of Delhi. A few districts have a higher share in both sectors of the economy, i.e., involvement in secondary and tertiary such as Faridabad, Ghaziabad, Gurugram and Gautam Buddha Nagar etc.

**Table 2***Proportion of Women Workforce in Different Sectors of the Economy*

Districts	Primary	Secondary	Tertiary
Alwar	84.49	5.24	10.27
Bharatpur	80.90	5.19	13.91
Bhiwani	74.83	5.45	19.73
Jind	72.44	6.17	21.39
Mewat	69.65	7.85	22.50
Mahendragarh	68.70	6.64	24.67
Rewari	64.24	11.32	24.44
Palwal	59.09	7.49	33.42
Jhajjar	54.32	8.14	37.55
Sonipat	50.51	12.41	37.09
Muzaffarnagar	48.90	11.85	39.26
Bulandshahr	48.25	17.72	34.03
Rohtak	46.75	10.38	42.87
Karnal	46.40	12.99	40.61
Baghpat	44.15	17.52	38.32
Meerut	35.98	11.82	52.19
Panipat	32.15	31.45	36.41
Ghaziabad	21.76	15.34	62.90
GB Nagar	19.04	11.47	69.48
Gurgaon	17.25	12.79	69.96
Faridabad	10.53	15.97	73.50
North West	2.45	18.74	78.80
North	2.32	14.75	82.93
South West	2.01	11.27	86.72
East	1.20	11.28	87.53
Central	1.12	15.49	83.39
South	1.05	10.49	88.46
North East	0.97	26.00	73.03
West	0.83	13.18	85.99
New Delhi	0.76	5.33	93.91

## Determinants of Socioeconomic Condition of Women

**Table 3 (a)**

*Determinants of Socioeconomic Condition of Women Delhi NCR, 2011*

Districts	Female-headed	Literacy rate	Workforce	Sex ratio	SC	ST	Other castes
Alwar	8.2	47.4	41.2	895	17.9	7.8	74.3
Baghpat	10.5	51.1	12.3	861	11.5	0.0	88.5
Bharatpur	7.8	45.0	35.5	880	21.9	2.1	76.0
Bhiwani	12.7	55.6	25.1	886	20.8	0.0	79.2
Bulandshahr	12.5	47.1	16.7	907	20.6	0.0	79.4
Central	17.7	73.5	10.8	892	25.3	0.0	74.7
East	12.0	75.4	11.6	884	16.6	0.0	83.4
Faridabad	9.5	63.7	12.1	873	12.4	0.0	87.6
GB Nagar	8.2	60.3	16.6	851	13.3	0.1	86.6
Ghaziabad	9.6	59.8	13.2	881	16.4	0.1	83.5
Gurgaon	9.9	67.7	16.1	854	13.4	0.0	86.6
Jhajjar	14.8	62.3	17.2	862	17.9	0.0	82.1
Jind	11.7	53.2	25.0	871	21.2	0.0	78.8
Karnal	11.1	58.4	14.8	887	22.6	0.0	77.4
Mahendragarh	13.3	57.4	24.3	895	17.0	0.0	83.0
Meerut	11.3	54.8	11.9	886	17.9	0.1	82.0
Mewat	8.5	28.3	12.6	907	14.5	0.0	93.1
Muzaffarnagar	9.7	49.7	10.8	889	13.5	0.0	86.5
New Delhi	10.3	75.7	19.7	822	24.0	0.0	76.0
North	12.9	72.6	9.4	869	19.0	0.0	81.0
North East	10.8	66.4	6.4	886	16.8	0.0	83.2
North West	11.3	68.8	9.8	865	19.2	0.0	80.8
Palwal	9.6	45.1	13.9	880	19.5	0.0	80.5
Panipat	10.2	57.7	15.0	864	17.3	0.0	82.7
Rewari	13.6	61.4	24.0	898	20.4	0.0	79.6
Rohtak	15.3	63.2	14.9	867	20.6	0.0	79.4
Sonipat	12.8	61.1	19.8	856	18.8	0.0	81.2
South	10.4	70.6	11.8	862	15.8	0.0	84.2
South West	9.7	72.8	12.2	840	14.2	0.0	85.8
West	13.0	73.1	11.9	875	14.9	0.0	85.1

**Table 3 (b)***Determinants of Socioeconomic Condition of Women Delhi NCR, 2011 contd.*

Districts	Rural	Urban	Hindu	Muslim	Christian	Sikh	Buddhist	Jain	Others
Alwar	82.4	17.6	47.1	48.1	46.6	48.5	47.9	47.8	45.4
Baghpat	78.6	21.4	45.6	47.8	47.4	43.7	41.0	47.4	36.0
Bharatpur	80.5	19.5	46.6	48.0	47.3	48.4	45.6	48.2	44.4
Bhiwani	80.4	19.6	47.0	47.2	47.2	47.8	51.6	47.2	46.2
Bulandshahr	75.0	25.0	47.0	48.2	47.8	47.2	42.2	47.5	44.2
Central	0.0	100.0	47.0	47.2	52.5	49.1	48.1	48.3	40.2
East	0.2	99.8	46.9	46.0	50.5	48.4	47.1	48.6	45.6
Faridabad	20.5	79.5	46.5	47.1	49.4	47.8	47.8	49.0	52.6
GB Nagar	41.5	58.5	46.0	46.2	49.3	49.1	47.2	49.1	41.8
Ghaziabad	32.4	67.6	46.6	47.5	49.3	47.1	46.2	48.8	40.4
Gurgaon	31.6	68.4	46.2	43.2	50.2	47.2	47.5	49.4	48.8
Jhajjar	74.6	25.4	46.3	44.0	43.3	40.6	44.8	48.7	45.5
Jind	77.0	23.0	46.5	47.3	48.0	47.3	47.1	46.7	51.8
Karnal	69.7	30.3	47.0	46.8	48.7	47.5	47.9	48.5	46.9
Mahendragarh	85.6	14.4	47.2	47.3	45.5	47.2	42.7	47.0	33.3
Meerut	48.8	51.2	46.4	47.9	48.0	45.0	46.1	48.5	50.0
Mewat	88.6	11.4	47.0	47.7	45.8	46.6	45.5	45.5	25.0
Muzaffarnagar	71.1	28.9	46.5	47.9	47.4	46.6	46.6	47.6	45.0
New Delhi	2.5	97.5	45.1	42.3	51.2	42.5	50.3	53.2	37.9
North	0.0	100.0	46.3	46.8	50.9	48.1	48.1	48.5	55.6
North East	2.0	98.0	46.7	47.4	49.5	48.4	47.1	48.3	58.3
North West	0.9	99.1	46.3	45.8	50.8	48.3	47.3	48.2	48.7
Palwal	5.8	94.2	46.6	47.5	46.0	48.6	47.0	47.2	40.0
Panipat	77.3	22.7	46.3	46.6	46.1	47.2	44.3	48.5	48.5
Rewari	53.8	46.2	47.3	44.3	46.2	44.9	42.1	46.4	41.7
Rohtak	74.5	25.5	46.4	46.0	43.9	46.4	43.0	48.0	41.7
Sonipat	57.4	42.6	46.1	46.9	48.7	47.0	45.5	47.9	34.5
South	68.5	31.5	46.3	45.4	51.9	48.4	49.3	49.5	49.8
South West	0.4	99.6	45.7	41.9	50.4	48.3	47.5	48.5	50.8
West	6.3	93.7	46.6	44.1	51.7	48.5	48.1	48.5	42.9

***Workforce Participation of Women***

Employment is of critical importance for poverty reduction on the one hand and for enhancing women's overall status in society on the other hand. Women still seem largely self-employed or employed as casual labourers in agricultural and allied activities. They face various forms of discrimination, including the unhealthy prevalence of job typing that gradually pushes them into low-paying jobs (Srivastava, N. & Srivastava, R., 2010).

### ***Education***

Higher workforce participation 'per se' only leads to better outcomes if accompanied by the fruits of higher education. Education may not positively influence a women's participation in work. Still, education is the most important determinant of quality non-agriculture work for women in the workforce, providing the maximum economic benefit (Srivastava, N. & Srivastava, R., 2010). Literacy is considered the basic building block towards getting an education. It is a basic component of social cohesion and national identity. It improves the depth and quality of public opinion and garners more active participation of the marginalised sections of the populace as a part of the democratic process.

### ***Political Empowerment***

The Indian Republic had started its journey with the ideals of liberty, equality, and justice, making the Indian women feel secure with promises of survival, equal treatment and gender justice. However, their dream of being equal citizens still needs to be fulfilled even today with sharp variations. The progressive vision of the Constitution needs to be revised to address the complexities of gender-related forms of discrimination. In the given study, political empowerment could have been considerably more visible. Therefore, it has yet to be incorporated into calculating the inequality index.

### ***Place of Residence***

Women in rural areas tend to be engaged in the workforce, primarily in the primary sector. However, they also remain deprived of opportunities, rights and privileges. The Alwar district is one such example which shows good socioeconomic conditions due to its workforce component, which is high for Alwar. Therefore, it shows lower levels of inequality as a major proportion of the workforce comprises women primarily engaged in the primary sector.

### ***Caste Composition***

It is observed in most cases that women from lower castes tend to work more as compared to that of upper castes women. Despite contributing more to the workforce, they need better socioeconomic conditions. They are deprived of proper education and decent living standards, even in the so-called developed regions such as Delhi NCR.

### ***Religious Composition***

There are various instances where it has been observed that the socioeconomic condition of women is also determined by the religion to which she

belongs. Some religions, such as Islam, do not allow much liberty to women. It is also evident from the data analysis of this study. Mewat is a region mostly dominated by a Muslim population, which shows low socioeconomic conditions and a higher proportion of inequality than other regions/districts of Delhi NCR.

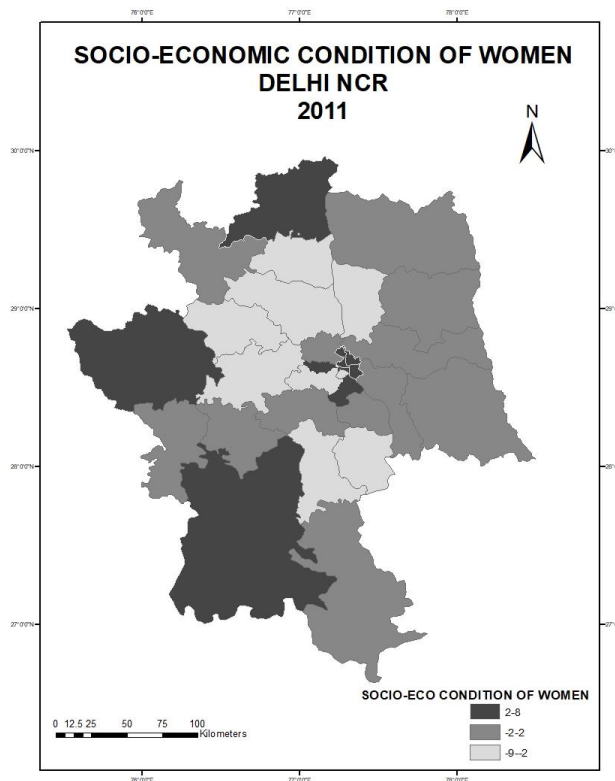
### ***Head of the Family***

The head of the family helps to understand the power of decision-making. If more and more families have a female as the head of the family, it is a good and healthy sign for women's empowerment in that area. Empowerment comes only with the rights of decision-making that may lead the family/region or nation in the positive direction of gender-balanced development. However, no such area shows females as heads in more than 15% of instances. This shows there is a long way to go to attain empowerment, even in the most developed part of the country.

### **Comparative Analysis of Gender Inequality Index and Socioeconomic Condition of Women in Delhi NCR**

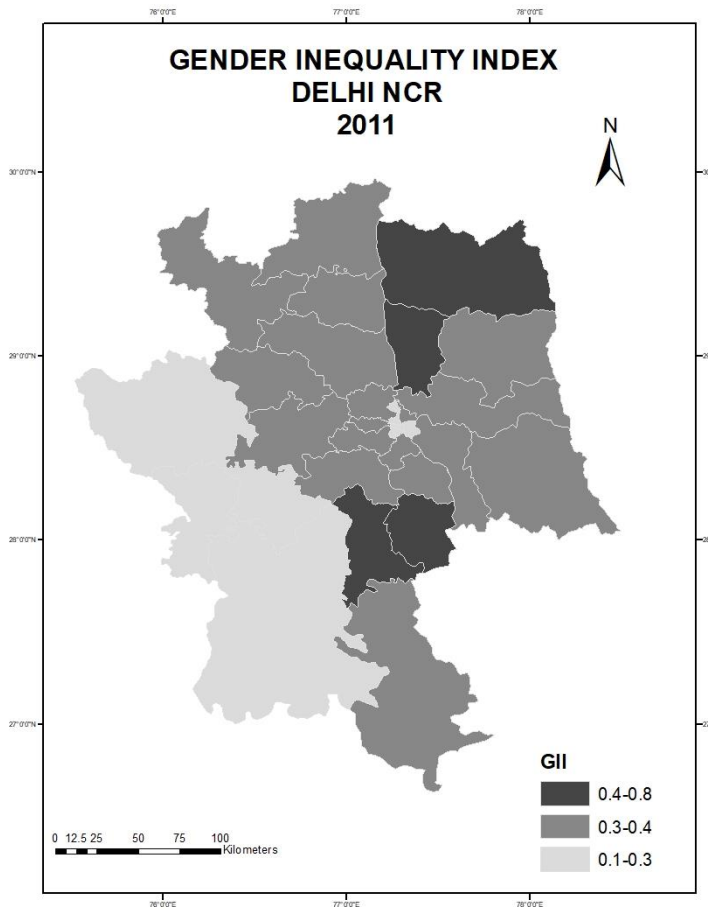
#### **Figure 1**

*Socioeconomic Condition of Women Delhi NCR, 2011*



#### **Figure 2**

*Gender Inequality Index, Delhi NCR, 2011*



The gender inequality index value ranges between 0 to 1. A value near 0 means the least inequality, while those near one show maximum inequality. After categorising the NCR districts based on the inequality index (Figure 2), it is found that districts such as New Delhi, Mahendragarh, Rewari, North Delhi, East Delhi, Bhiwani, Alwar, Central Delhi, Rohtak, South Delhi and North East Delhi have low inequality which means the women in these districts have better position compared to other districts. Districts that are categorised in a medium level of inequality are West Delhi, Jind, Jhajjar, North West Delhi, Faridabad, Sonapat, South West Delhi, Karnal, Ghaziabad, Bharatpur, Gurugram, Meerut, Bulandshahr, Gautam Buddha Nagar and Panipat. Districts with high levels of inequality are Palwal, Muzaffarnagar, Baghpat and Mewat.

The socioeconomic condition of women in districts of Delhi NCR can also be categorised into three categories based on their Composite Index values (Figure 1). Districts with poor socioeconomic conditions for women are, Baghpat, Jhajjar, Mewat, South West Delhi, Rohtak, New Delhi, Panipat, Palwal, Sonipat, Muzaffarnagar and Gautam Buddha Nagar. Districts with good socioeconomic

conditions are Central Delhi, Alwar, Bhiwani, North Delhi, East Delhi, North East Delhi, South Delhi, Karnal and West Delhi.

Comparing the socioeconomic condition of women with that of the gender inequality index of Delhi NCR, it is observed that it is highly correlated. Most states with good socioeconomic conditions also show the least gender inequality and vice-versa. There are some exceptions which are due to the indicators that are incorporated into the socioeconomic condition of women.

It is observed that Delhi NCT, which forms the centre of NCR, is the most developed part of NCR with the least inequality and maximum opportunities for women. However, while moving towards the peripheral regions, this trend decreases. In the peripheral regions, only those regions show good conditions for women, with a more developed primary sector and rural population base. The spread effect is taking place in the NCR region but slowly.

### **Concluding Remarks**

The paper discussed the level of inequality prevailing in Delhi NCR and the socioeconomic condition of women. Delhi, the nation's capital, claims to provide the best educational opportunities, job opportunities, living conditions, etc. Still, it is observed that women remain marginalised to a considerable extent. The efforts have to be doubled to bridge this gap to facilitate the actual empowerment of women across all sectors of the economy. Political empowerment still needs to catch up. Only a few districts from Delhi itself have women as their political heads. Other regions of NCR, which form a part of other states, do not show any political empowerment of women. This has to be addressed seriously. The pay gap in the service sector is also a major problem that must be addressed immediately.

Education plays a major role in shaping the economy and social structure and further helps uplift marginalised sections of society. There is an urgent need to formulate a good and advanced policy that includes more and more women in higher education and technical education.

Delhi NCR being one of the most developed parts of the country, assumed to be full of opportunities and facilities, needs to show more eagerness towards improving women's condition and bridging the gap between the genders. This may pave the way for showing a trickledown effect to other parts of the country where women are more marginalised and deprived of their rights and liberty with inter and intra-regional variations. It is pertinent to remember that empowerment and equality have not only to be preached but practised too. All the aspects of empowerment have to be considered for the overall upliftment of women. This, however, shall lead to a progressive country with huge economic benefits and a great hold on the world, just like China has a comparable demographic structure. There is



a serious need to look deeper into half of the potential demographic dividend: women. If the nation properly addresses this aspect across the geographical regions, India may emerge as a superpower soon. Thus, a long way has to be treaded to untangle the socioeconomic complexities for unleashing the true nature of women's empowerment to achieve gender justice and so on.

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# Educational Level and Infant Mortality in Scheduled Tribes Population in Surguja District, Chhattisgarh

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**To cite this article:** Singh, T., & Baghel, A. (2023). Educational level and infant mortality in Scheduled Tribes population in Surguja district, Chhattisgarh. *Population Geography*, 45(1), 61–80.

**Abstract:** This study aims to assess the status of infant mortality in the Scheduled Tribes population in the Surguja district and to compare the IMRs of Scheduled Tribes with that of Scheduled Castes and other Castes. The present study is based on the primary data. The study is based on 2691 individual mothers selected from 38 villages of 19 development blocks in Surguja district. Two types of schedules have been prepared for the data collection. The first one is based on information about the family, whereas the second one is based on that of an individual woman who has given birth to children within five years before the survey date or whose issues have died. In the Surguja district, IMR found among illiterate mothers is 77.4 per thousand, whereas that of literate mothers is 54.9 per thousand. The study reveals that the educational level is a main factor influencing the IMR.

**Keywords:** mortality, education, society, family

Mortality forms a basic component in population studies. To determine mortality in any region, the age structure makes the most significant demographic factor. The age-specific mortality is found to be higher for infants and old. However, infant mortality plays a key role in determining the mortality of any region.

Any region's infant mortality rate (IMR) makes a sensitive index in determining the region's development. The Geographers take a keen interest in infant mortality studies because it reflects the socioeconomic development of the region, in addition to its demographic significance. It is found that the mortality rate declines with the increase in age. It is the highest for infants. It gradually decreases with the age of persons due to several factors. The factors influencing mortality can

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be classified into two broad categories, i.e., first, the biological factors and second, the ecological ones.

Mother's education has a stronger negative relationship with infant mortality than any other socioeconomic variable. Education is directly associated with the mother's beliefs and attitudes concerning child health care. Educated mothers are more aware of their children's needs and remain attentive to many problems requiring immediate medical action. Moreover, education is also correlated with many other indicators of the level of life, which are believed to have a direct link with infant and child mortality. Higher education is indicative of lower fertility. With fewer children, the desire of parents for child survival becomes stronger. More investment in children's food, medical care and education is possible. Furthermore, the mortality arising from many births can be avoided by reducing the number of births (Das, 1988, p. 94).

Education makes a significant contribution to the development of any human group. The lack of education in a conservative society is the main reason for its economic backwardness. The demographers think that IMR reduces due to the rise in education level. In turn, the Infant mortality rate also decreases. A high negative correlation is found between the level of education and IMR worldwide. The investigation in United Nations (1961), and the Mysore population study, support the concept that there is a reduction in the IMR with the increase in the educational level of the populace.

Education also eliminates the social and psychological disparities among the people. Education is fundamental to individuals' and groups' social, economic and cultural progress. Apart from this, Education affects the birth rate, death rate, age of marriage, migration and economic patterns. Education is an indispensable index for population geography's social, economic and cultural progress. Education affects the mortality rate directly and indirectly. Education leads a person to progress by making him or her decent, intelligent and thoughtful. An educated person is careful toward his family welfare and is more aware of the standard of living. In contrast, illiterates remain orthodox, fatalistic and conservative regarding health and family planning measures. Thus, the IMR among illiterates is higher.

Education is related to many basic indicators of living standards, which are inverse to the mortality rate. (Gandotra and Das, 1988). Hobcraft (1983) explained that spreading education increases the child's survival rate. It works in three ways: first, through good health and personal care; second, by optimum use of health services and third, by improving the quality of children. The mothers' and fathers' educations are important in reducing the death of Infants. Education, especially the father's education, closely related to economic activity, affects the family income in

many studies (Lahari & Acharya, 1999). At the same time, a mother's education affects the family's health in terms of maternal care which reduces IMR considerably.

### **Research Questions**

Physical isolation of the area is a limited scope to access the basic facilities like education and medical services. Geographically, the Bastar plateau in the south and Surguja Upland in the north are parts of the Chhattisgarh state (Vital Statistics, 2011). These areas have a high IMR compared to the state's average IMR of 61 per thousand. The Surguja district is part of the Surguja Upland, which has hilly terrain, forest cover, and inadequate availability of transport, health and educational facilities. The Surguja district has a high IMR of 71.3 per thousand, which includes an early mortality rate (22.2 per thousand), a Neonatal mortality rate (33.7 per thousand) and a postneonatal mortality rate (37.3 per thousand). In terms of IMR, it ranks fourth position in the state. The district has the highest IMR, more than the national average IMR of 57 per thousand and 61 per thousand of the state's average IMR. The literacy rate also affects the mortality rate. The mortality rate is inversely related to the level of education of parents. The district has a low literacy rate of 54.8 per cent. In addition, the mothers of the district have a very low literacy rate of 28.2 per cent of the total mothers, which directly or indirectly affects the IMR of the district. Economically, the district is very backwards compared to other Chhattisgarh Plain districts. The economic condition of the people has also influenced the IMR of the Surguja district. What is the status of rural IMR among the Scheduled tribe's population in the Surguja district? What are the reasons for high rural IMR in the district? What are the spatial differences of rural IMR in the Scheduled tribe population with other casts population of the district? How does the parents' educational level affect the IMR in the district? The tribal population is more concentrated in the district's hilly and forested areas. At the same time, access to medical and educational services is challenging for the people of the Surguja district.

In light of the above statements and research questions of the rural IMR of the Scheduled tribe's population in the Surguja district, the present paper has the following objectives to meet.

### **Research Objectives**

The present study is based on the following objectives

- (1) The present study assesses infant mortality status in the Scheduled Tribes population in the Surguja district.
- (2) To compare IMRs of Scheduled tribes with that of Scheduled Castes and other Castes.
- (3) To analyse the impact of the level of education on the Infant mortality rate.

## Sources of Data and Methodology

The present study is based on the primary data. The district has 1774 villages and 19 Community development blocks. Each block has many villages, between 90 to 120. Randomly, 2 per cent of villages were selected from each CD block of the Surguja district in 2010-11. In the present study, two villages from each of the 19 Development blocks of the Surguja district have been chosen by random sampling. The study is based on 2691 individual mothers selected from 38 villages of Surguja district (Fig. 1). It includes 1707 Scheduled tribes, 173 Scheduled Caste and 811 other backward classes. Scheduled tribes comprise Gond (429), Orao (439), Kawar (317), Bhuihar (159), Majhwar (87), Nagesia (73), and Korwa (63). On the other hand, the Scheduled caste includes Ghasia (61) and Satnami (53), while other backward class consists of Ahir (250), Panika (155) and Rajwar (134).

No information was collected from the houses, which are locked. Two types of schedules have been prepared for the data collection. The first one is based on information about the family, whereas the second one is based on that of an individual woman who has given birth to children within five years before the survey date or whose issues have died. Thus, the collected information relates to the infant death, the level of the mother's education and their determinants.

**Figure 1**



## Study Area

The Surguja district of Chhattisgarh state, India, is between longitudes 82°35' E to 84°51' E and latitudes 22°37'22"N to 24°16'17" N. The headquarter of the district is Ambikapur. The states adjacent to the district are Uttar Pradesh in the North and Jharkhand in the east. Raigarh and Korba's districts are in the south, Jashpur district in the east, and Koriam district in the west. As per the Census of India, the district's population was 23,59,886 in 2011. The gender ratio is 978 females per 1000 males. The literacy percentage of the district is 54.8%. The district's landscape is mixed with uneven lands, deep forests, hilly areas and arid terrains. The total area of the district is 15,731 sq km. The district has five subdivisions, nine tahsils and 19 development blocks. The urban population is merely 7% of the district's total population. Ambikapur City is the centre of administration.

The district has a population with the Scheduled Tribes in the majority (54.6%), whereas the Scheduled Castes (4.8%) in the minority. The Tribes of Pando and Korwa clans still dwell in the forests. They dwell in the deep forests unexposed to modern civilisations; they are backwards- tethered with conservatism, bonded with religions, social traditions and caste system, unaware of the modern education system. Because of uneven land, the district's transportation facility is uncomfortable, leading to costly medical facilities. Illiteracy and poverty are prevailing in the district.

The rock beds in Surguja district are of Archaean, Gondwana, Lameta and Deccan Lava types. Given the landform structures, the district is fraught with several hills, plateaus etc., forming Tablelands, locally called PATs. The landforms in the eastern and northeastern regions are high-even, mainly the plateaus of Mainpat, Jarangpat, Jamirpat and Lahsunpat. In the central region, the narrow valleys of rivers—Rihand, Kanhar, Hasdeo, Gopad, Banas and Mand exist, often causing cold waves with the fall of temperature down to 3°C in January. Alluvial soil deposits are found on the banks of big and broad rivers.

## Results and Discussion

### Infant Mortality Rate (IMR)

The infant mortality rate (IMR) relates to the child-deaths within the first year of their age. It is a ratio between the number of infant deaths within one year of age and the total number of children born that year.

Infant deaths have several reasons. Demographers have categorised them into two major classes— Endogenous and Exogenous causes. Endogenous causes are biological, like underweight infants during their birth. The level of mortality is very high in the first few hours, days and weeks of life. The reasons for infant deaths at the

earlier and later stages of infancy differ to a certain extent; hence in a study of infant mortality, factors which affect fetal and neonatal deaths are primarily endogenous, while those which affect post-neo-natal deaths are primarily exogenous. The endogenous factors to the formation of the fetus in the womb are, therefore, mainly biological. Among the biological factors affecting fetal and neonatal infant mortality rates, the important ones are the mother's age, the birth order, the period of spacing between births, prematurity, weight at birth and the fact of multiple births. Exogenous causes—social, cultural, economic and environmental factors—affect infant mortality, especially during the post-neo-natal period. Post-neo-natal deaths are, therefore, mainly due to various epidemics caused by communicable diseases, both of the digestive systems, such as diarrhoea and enteritis and of the respiratory system, such as bronchitis and pneumonia, as well as by faulty feeding patterns and poor hygiene. The underlying environmental factors include crowding and congested surroundings, lack of proper sunshine and fresh air, etc. (Bhende & Kanitkar). The Exogenous causes relate to ecology – the environmental pollution leading to diseases like pneumonia, the major cause of fever reporting the highest IMR (23.1 per thousand) second cause of higher IMR is diarrhoea (12.6 per thousand). The cause of underweight childbirth leads to IMR (7.4 per thousand).

The IMR (71.3 per thousand) in Surguja district is higher than that of the entire India (57.0 per thousand) as well as that of Chhattisgarh state (61.0 per thousand). The baby boys of the district have more IMR (72.0 per thousand) than baby girls (65.4 per thousand). There have been consistent reports of sex differences in infant mortality in developed countries. Some studies showed that girls suffer excess mortality in societies like India (Das Gupta, 1990), whereas others reported the reverse (Miller et al., 1992). The IMR has been found in different blocks of the district. The highest IMR is noted for Udaipur Block (108.5 per thousand), that before it is for Batauli Block (102.5 per thousand). The lowest IMR is noted for the Kusmi block (34.7 per thousand). The higher IMR for above mentioned two blocks can be attributed to the higher population of tribes (70.6%) dwelling in these blocks. The major reasons for higher IMR obviously can be ascribed to prevailing superstitions, conservatism, the modus vivendi, traditions and rituals.

In the district, perinatal MR is 22.3 per thousand, Neonatal MR is 33.9 per thousand, and postneonatal MR is 37.4 per thousand are found. IMR is the highest in January (9.7 per thousand), whereas it is the lowest in February (2.3 per thousand).

The IMR is more in tribes (74.3 per thousand) than Scheduled cast (54.9 per thousand). The highest IMR is found in the tribe of blacksmiths (360.0 per thousand), and the lowest is found in the Bhuihartribe (19.5 per thousand). The major causes of IMR are Pneumonia (23.1 per thousand), Diarrhea (12.6 per thousand) and low weight of birth (7.4 per thousand) in the Surguja district. The



maximum IMR has been recorded in the January (9.7 per thousand) and May (9.4 per thousand) months. May is the hottest month, and January is the coldest month in the district. Due to this reason, IMR is high in these two months of the year. The scheduled tribe population has the highest IMR with 74.3 per thousand, followed by Other backward classes (71.3 Per thousand) and Scheduled caste (54.9 per thousand). The IMR among the scheduled tribe population has the maximum found in the Kavar tribe, with 82.7 per thousand, followed by Orav (74.6 per thousand) and Gond (68.9 per thousand). Satnami caste has observed the highest IMR of 62.5 per thousand in the Scheduled caste population and Ahir (78.3 per thousand), Panika (58.8 per thousand), and Rajwar (52.2 per thousand) in other backward classes.

### Spatial Pattern of Infant Mortality in Surguja District

In Surguja District, the Infant Mortality Rate (IMR) is 71.3 per thousand. The IMR, however, is different for all 19 development blocks of Surguja district. The highest IMR (195.0 per thousand) is found in the Udaipur block, whereas the lowest (34.7 per thousand) is noted in the Kusmi block. Based on IMR, the blocks of the Surguja district are divided into three areas, as given below (Fig. 2, 3, 4):

1. Area of high infant mortality rate (HIMR): >70 infants per thousand.
2. Area of relatively medium infant mortality rate (RMIMR): 50-70 infants per thousand.
3. Area of relatively low infant mortality rate (RLIMR): < 50 infants per thousand.

**Figure 2**

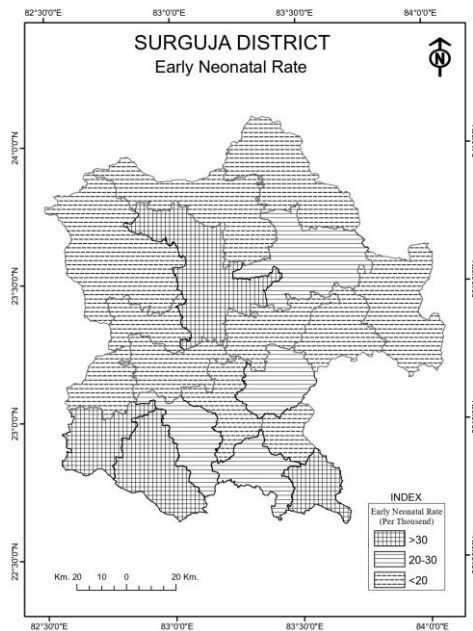


Figure 3

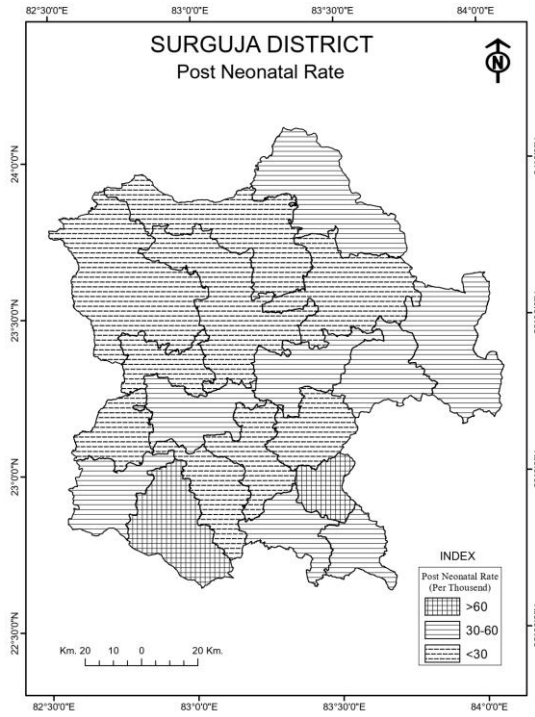
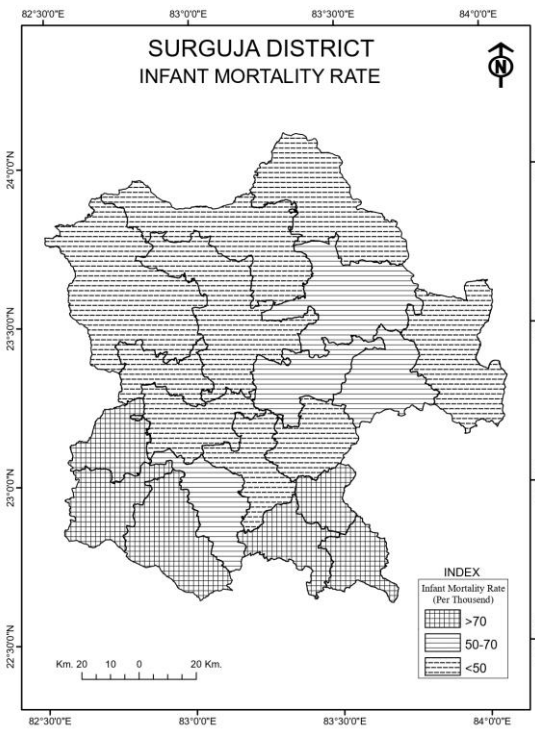


Figure 4



### ***High Infant Mortality Rate (HIMR) Areas***

The regions marked with HIMR in Surguja district include six development blocks- Udaipur, Batauli, Premnagar, Mainpat, Sitapur and Ramanujnagar. These areas have uneven lands situated at heights more than 900m from the sea level. Due to the uneven landscape, these regions face the scarcities of basic amenities of transport, medical and education. In turn, these regions witness more than 70 per thousand infant mortality. The highest mortality rate of about 195.0 per thousand is found in the Udaipur block, with an early neonatal mortality rate of 77.4 per thousand. The blocks of Batauli, Premnagar, Mainpat and Sitapur, and Ramanujnagar have IMR of 112.5, 100.3, 99.1 and 82.7 per thousand, respectively. The high early neonatal mortality rates in Sitapur and Premnagar blocks are 38.8 and 32.4 per thousand. Whereas neonatal mortality rates of 99.1, 56.6, 55.0 and 43.9 per thousand are noted in the blocks of Udaipur, Mainpat, Premnagar and Sitapur and Ramanujnagar (Fig. 2&4). The HIMR makes the marriage age of women less than 18 years. Only 49% of householders are found literate.

The mother's lower average marriage age and the smaller gap between birth cause a higher infant mortality rate. The 89.3% of women involved in obstetrics are mere unskilled assistants. The farming in these regions could be better due to unevenness caused by infertile land, resulting in the average family income below Rs. 20,000/- per annum. Thus the inhabitants of these areas are traditionally orthodox due to illiteracy, backwardness and superstitions.

### ***Medium Infant Mortality Rates (RMIMR) Areas***

The four development blocks- Shankargarh, Balrampur, Lakhanpur and Rajpur, fall in the regions of RMIMR of Surguja district. The average height of these regions is 600 m above sea level. These regions are interstitially plateaus and basins. These regions are parts of the Surguja basin and Jarangpat plateau. The IMR of 50-70 per thousand is noted, making the area of RMIMR. The literacy rate below 40% is found in these areas. Among these areas, IMR ranges from 52.6-68-6 per thousand. It is in Shankargarh block 68.6, Rajpur block 52.6 and Balrampur block 67.7 per thousand. The early neonatal mortality rate (ENMR) is highest in Lakhanpur Block at 26.9, Rajpur Block at 15.8, Balrampur Block at 20.3, and Shankargarh Block at 19.6 per thousand. The neonatal infant mortality rate (NIMR) is highest in Balrampur Block at 54.1, Rajpur Block at 15.8, Lakhanpur Block at 37.6 and Shankargarh Block at 19.6 per thousand. The higher infant mortality rate in these regions is ascribed to low marriage age (17.1 Years), low literacy rate (50.3%), low family income (Rs. 18,926.00 per/annum), and poorer obstetrician facilities 91% of child delivery are performed by unskilled Assistants, neighbours and relatives.

### ***Relatively Low Infant Mortality Rates (RLIMR) Areas***

The nine development blocks of the Surguja district that fall under RLIMR are: These are Ambikapur, Pratappur, Kusami, Surajpur, Bhaiyathan, Lundra, Ramanujganj (Ramchandrapur), Odagi and Vadrarnagar. These areas are parts of basins of the main rivers- Surguja, Rihand and Kanhar basins making the land fertile. The average height above 450m from sea level is noted for these areas. The three main rivers- Rihand, Mahan and Kanhar flow through this region. The IMR of less than 50 per thousand in this region is relatively the least. It is highest in Ambikapur block (48.5 per thousand). Two blocks of Pratappur and Kusami have IMRs 43.5 and 34.7 per thousand, falling second and third in the ranking. Notably, the postneonatal mortality rate is also relatively low in Pratappur and Kusami blocks (Fig. 3). The average family income of these areas is Rs. 22,071.00 per annum, greater than those of the other two areas. The average age of marriage in these areas is greater than 18 years. In addition, about 13% of women deliver babies through doctors and skilled assistants; thus, these areas have better living conditions, better family income, better medical facilities and less infant mortality rates.

### **The Educational Level of Mothers and Infant Mortality Rate**

Parents' educational levels form one of the most important social variables influencing mortality. However, most of the studies in this field give more significance to the educational level of mothers than that of fathers. As Jain (1985) rightly pointed out, adult women's literacy is a proxy for women's autonomy. It has been shown to affect infant mortality primarily through its association with indicators of better medical care at the birth of the child and perhaps during the prenatal period and secondarily through its association with indicators of preventive and curative medical care during the postnatal period. Thus, the deciding factors in reducing the level of infant mortality in rural areas are the educational level of the mothers and the time they devote to the care of infants who are constantly exposed to health risks, ever present in primitive and insanitary surroundings and that poorly educated mothers are less able to respond effectively to the threats presented by the physical environment. (Kumary, 1991, p. 58).

The relationships between a mother's educational level and infant and child mortality have received much attention recently. The median relative risks associated with a mother with little education contrasted with a mother with seven or more years of education. (Hobcraft et al., 1983).

A powerful case for the importance of maternal education as a determinant of child mortality has been made recently by Caldwell (1979). He concluded that maternal education was the most important single determinant of mortality in childhood.

The mother's educational level was the strongest, most effective single-factor determinant of infant, neonatal and postneonatal mortality (Ruzicka, 1983).

A mother's education level is the most important factor affecting infant mortality. It affects infant mortality rates (IMR) tremendously. The national-level IMR studies have confirmed the negative correlation between the IMR and the mother's educational levels; the lower IMR is found in educated mothers because of their better understanding of the importance of infant welfare, hygiene and child care. They avail of various government launched child care programs better than illiterate mothers. Due to a lack of education, illiterate mothers must know the available childcare facilities. Thus, IMR is found to be more related to illiterate mothers than that to educated mothers. The life expectancy of educated mothers' infants is more than that of illiterate mothers. Education of parents, especially of fathers, usually correlates strongly with the occupation and, therefore, with household income. (Khan, 1991)

The mother's level of education plays an important role in determining her family's health. Maternity care education radically changes her family's structure, for it influences the IMR in the long term. An educated mother knows better about prevalent diseases -epidemic, endemic or pandemic. She responds promptly to incoming as well as existing diseases. Moreover, she plans for an optimum number of children so that she gives appropriate care to their education, food, and hygiene and provides proper prenatal care to the infants (Gandotra and Das, 1988). The educated mother thus can take proper care of the fetus, which eventually causes a reduction in the IMR.

In an uneducated society, the infant mortality rate usually increases due to ignorance, indecision, fortune-keeping, traditional and scarce usage of family planning measures, family welfare and medical facilities. In the case of literate women, the death rate is lower than that of illiterate women. The root cause is that literate women understand the importance of child welfare, health and child-rearing responsibility. The children's deaths are noted more for primary school-educated mothers than that for highly educated ones.

**Table 1**

*Surguja District: Educational Level of Mother and Infant Mortality Rate*

Educational level	Number of mothers	Live births	Mortality	Rate (per thousand)
Graduate&above	16	21	0	0.0
Higher Secondary	40	51	0	0.0
High School	60	82	2	24.4
Middle	238	327	19	58.1
Primary	233	328	21	64.0
Literate Without	171	246	16	65.0

Educational level	Number of mothers	Live births	Mortality	Rate (per thousand)
Educational Level				
Literate	758	1055	58	55.0
Illiterate	1933	2844	220	77.4
Total	2691	3899	278	71.3

Source: Field Survey, 2010-11

The spectrum of mother's education in the Surguja district shows a total literacy of 28.2% which include 6.4% below primary level, 8.7% primary school level, 8.8% middle school level, 3.7% high school and higher secondary level and only 0.6% graduate and post graduated level.

According to the castes of Indian society, the education level of women; the highest 37.0% of women of Scheduled Caste (SC) are educated, then 32.8% of women of the other backward class (OBC), the lowest 25.10% of women of the Scheduled Tribes (ST) are educated in the district. The highest literacy in SC women is in the Satnami caste (35.8%), in OBC women is in the Teli caste (77.8%), whereas the lowest among OBC women is in the Lohar caste (8.6%). Literacy among ST women is found to be the highest (41.7%) in the Uraon caste, (33.4%) in the Kanwar caste, and the lowest (3.2%) in the Korwa caste women (Table 2).

**Table 2**

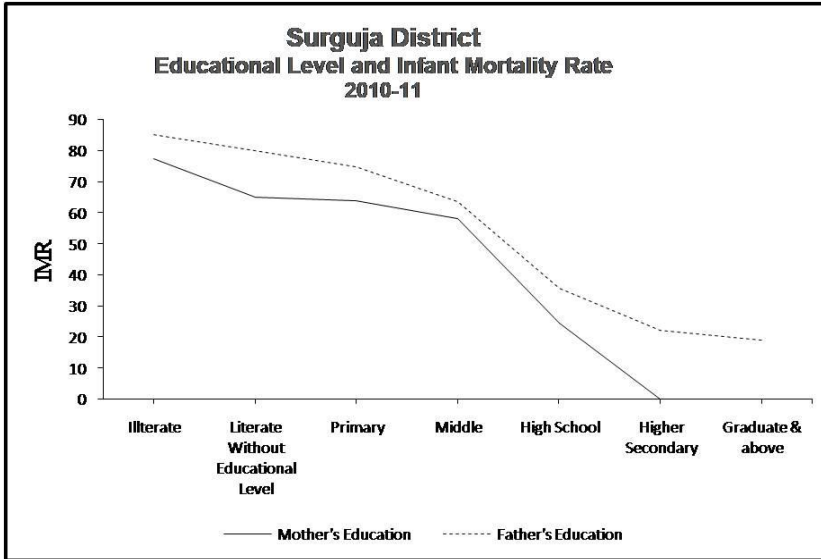
*Surguja District: Caste-wise Fathers and Mothers Literacy*

Caste	Mothers			Fathers		
	number	literate	per cent	number	literate	per cent
Gond	461	82	17.8	461	238	51.6
Uraon	439	183	41.7	439	297	67.7
Kanwar	317	106	33.4	317	183	57.7
Bhuinhar	159	15	9.4	159	55	34.6
Majhwar	87	3	3.4	87	21	24.1
Nigeria	73	13	17.8	73	34	46.6
Korwa	63	2	3.2	63	13	20.6
Agaria	36	4	11.1	36	14	38.9
Khairwar	22	7	31.8	22	11	50.0
Other	50	13	26.0	50	23	46.0
ST	1707	428	25.1	1707	889	52.1
Ghasia	61	11	18.0	61	42	68.9
Satnami	53	19	35.8	53	36	67.9
Other	59	34	57.6	59	42	71.2
SC	173	64	37.0	173	120	69.4
Ahir	250	52	20.8	250	115	46.0
Panika	155	58	37.4	155	102	65.8
Rajwar	134	37	27.6	134	100	74.6
Koira	35	7	20.0	35	14	40.0
Teli	36	28	77.8	36	34	94.4

Caste	Mothers			Fathers		
	number	literate	per cent	number	literate	per cent
Kumhar	35	6	17.1	35	21	60.0
Lohar	35	3	8.6	35	12	34.3
Other	131	75	57.3	131	108	82.4
OBC	811	266	32.8	811	506	62.4
Total	2691	758	28.2	2691	1515	56.3

Source: Field survey, 2010-11

**Figure 5**



The infant mortality rate of illiterate and literate mothers has 77.4 and 55.0 per thousand, respectively. The infant mortality rate is reduced with increasing educational levels. Primary school-literate mothers have an IMR of 64.0 per thousand, while the corresponding figure for high school-educated mothers with 24.4 per thousand. The neonatal mortality rate (NMR) related to illiterate and educated mothers are respectively 36.9 and 25.6 per thousand, which shows a decline with education (Table 1). The differential NMR with the level of education shows a considerable decrease in NMR. NMR relates to the levels of women's education – below primary, primary, middle, and higher secondary, respectively per thousand are 32.5, 30.5, 24.5 and 12.5. It indicates the fall in NMR with the increasing level of education. The IMR about illiterate mothers from various classes in the district viz ST, SC and OBC, respectively per thousand, are 78.2, 56.6 and 79.4. These are higher in comparison with those of the counterparts of literate women (Fig. 5). Among the tribes, the IMR concerning literate and illiterate women of the ST-Gond tribe are respectively 26.5 and 58.3 per thousand. In contrast, those of the ST-Kanwar tribe are respectively 89.7 and 114.8 per thousand showing an educational differentiation in IMR.

### Educational Level of Father and Infant Mortality Rate

As hypothesised earlier, the father's education also has an inverse relationship with infant mortality in the cultural groups and the total population. Here again, infant mortality declined considerably with the advancement of education. (Kumary, 1991).

Father's education and the mother's also influence the infant mortality rate. Due to the father being educated, more attention is given to the infant's upbringing; the highly educated man also meditates on the health of the mother and family planning measures. The fertility rate is higher in illiterate families, and it considerably impacts the infant mortality rate. Thus, education indirectly affects the infant mortality rate. In many studies, there has been an adverse relationship between a couple's education and death in the family. At first, Couple's education enhances knowledge of health, income and health facilities (Achyut et al., 1999). There can be many arguments about the father's education and mortality, but the mother's education is a good indicator of social and economic factors which directly affect infant mortality (Hobcraft, 1983; Desai, 1998).

### Table 3

*Surguja District: Educational Level of Father and Infant Mortality Rate*

Educational level	Number of Mothers	Live birth	Mortality	Rate (per thousand)
Bachelor and above	74	104	2	19.2
Higher Secondary	166	223	5	22.4
High School	184	252	9	35.7
Middle	417	597	38	63.7
Primary	393	573	43	75.0
Literate Only	281	412	33	80.1
Literate	1515	2161	130	60.2
Illterate	1176	1738	148	85.2
Total	2691	3899	278	71.3

Source: Field Survey, 2010-11

56.8 per cent of fathers are literate in the Surguja district's surveyed family. Out of them, there are only 10.4 per cent only literate, include 14.6 per cent in primary school, 15.5 per cent in middle school and 6.8 per cent in High school, 6.2 per cent in Higher secondary school level, and 2.7 per cent of fathers who have completed graduate and postgraduate degrees.

In the Surguja district, the infant mortality rate with illiterate fathers is 85.2 per thousand, whereas that with literate fathers is 60.2 per thousand. The variation of IMR with the level of fathers' education shows a graduate fall IMR corresponding to only literate fathers, primarily educated fathers, middle school educated fathers,



high school educated fathers, higher secondary school educated fathers and graduate and higher educated fathers, respectively 80.1, 75.1, 63.7, 35.7, 22.4, and 19.3 per thousand (Fig. 5). The neonatal mortality rate in illiterate father is 40.3 per thousand and 38.8 per thousand in literate father. The IMR among the fathers includes the primary level of 36.6 per thousand, while at the high school level, it is reduced to half. The infant mortality rate with illiterate fathers is 43.4 in boys and 37.1 per thousand in girls, gradually decreasing at the high school level to 15.4 and 16.4 per thousand (Table 3).

In Surguja district, literate fathers of scheduled tribes are 52.1%, of scheduled caste with 69.4 per cent and another backward category with 62.4 per cent. The most literate fathers of the Uraon caste in scheduled tribes is 67.7%; on the contrary, that of Korwa is the lowest, i.e., 20.61%, 57.3% in Kanwar, 51.6% in Gond, 50% in Khairwar and 46.6% in Nigera. In scheduled castes, literate fathers are 68.9% in the Ghasia, 67.9% in the Satnami, whereas, in the other backward castes, the highest is in the Teli caste (94.4%). In contrast, the lowest is in Lohar (34.3%). These are 74.6% in Rajwar, 65.8% in Panika, 60% in Kumhar, 46% in Ahir and 40% in Koira.

In the Surguja district, the infant mortality rate corresponding to illiterate fathers in scheduled tribes is 81.7 per thousand, in scheduled castes is 40.0 per thousand, and in other backward classes is 101.3 per thousand. In the Gond tribe, the infant mortality rate corresponding to illiterate fathers is 76.7 per thousand. Whereas 95.2 per thousand illiterate fathers of Uraon and 65.2 per thousand literate fathers. Kanwar, this rate is 116.4 per thousand, while 99.6 per thousand. The infant mortality rate among the illiterate father of other backward classes is a 99.5 per thousand increase, only literate 69.0 per thousand, in primary 76.0 per thousand, middle level 50.0 per thousand, and this rate decreased at higher secondary 37.0 per thousand. The infant mortality rate for illiterate fathers in Panika is 63.3 per thousand and for literate fathers 56.3 per thousand, and in Rajwar infant mortality rate is only literate fathers 41.7 per thousand, primary 57.7 per thousand and 71.4 per thousand in the middle level (Table 2).

### **Educational Level of the Woman and her Husband and Infant Mortality Rate**

Parents' Education, especially of the father, usually correlates strongly with occupation and household income. Thus, in many cases, the correlation between infant survival in the first week of life and parents' education level largely occurs because of operation on intermediate determinants through the income effects. Parent education also influences attitudes towards health and health-related matters, and income helps materialise the utility of available health facilities. Above all, an educated woman can care for herself and her newborn better than an illiterate woman. (Achyut et al., 1999, p. 246).

The high education level of the women and their husbands reduces the rate of infant mortality. Compared to an illiterate woman and her illiterate husband, the literate woman and her literate husband understand better the Government facilities and programs for pregnancy, delivery and care post-birth period. Therefore, the educational level of spouses influences the infant mortality rate very much. A high negative correlation is found in IMR with the educational levels of both spouses.

**Table 4**

*Surguja District: Educational level of Women and their husbands an infant mortality rate*

The academic level of the Husband/female		Graduate and above	Higher Secondary	High school	Middle	Primary	Only literate	Literate	Illiterate	Total
Graduate and above	Number of couples	9	3	4	0	0	0	16	0	16
	IMR	0	0	0	0	0	0	0	0	0
Higher Secondary	Number of couples	7	24	8	1	0	0	40	0	40
	IMR	0	0	0	0	0	0	0	0	0
High School	Number of couples	15	28	8	6	3	1	60	0	60
	IMR	0	27.0	0	100.0	0.0	0.0	24.4	0	24.4
Middle	Number of couples	25	51	47	86	18	2	227	11	238
	IMR	55.6	0.0	34.5	74.4	120.0	0.0	51.9	157.9	58.1
Primary	Number of couples	8	21	38	84	53	8	204	29	233
	IMR	0.0	0.0	33.9	43.5	58.0	111.1	38.2	250.0	64.0
Literate	Number of couples	1	13	11	35	104	72	164	7	171
	IMR	0.0	62.5	0.0	56.6	46.7	68.0	47.0	416.7	65.0
Illiterate	Number of couples	9	26	68	205	298	198	804	1129	1933
	IMR	0.0	83.3	53.2	67.3	84.0	84.7	76.5	78.0	77.4
Total	Number of couples	74	166	184	417	1255	281	2096	1176	3272
	IMR	19.2	22.4	35.7	63.7	82.3	80.1	65.7	85.2	71.3

Source: Individual Survey, 2010-11

The infant mortality rate in the Surguja district with illiterate couples is 78.0 per thousand. The Infant mortality rate is influenced by education level. It is 50.0 per thousand for primary-level literate couples; the infant mortality rate in illiterate

husbands and primary literate wives is 83.5 per thousand. Whereas in the husband literate primary level and illiterate wife, it is 416.7 per thousand (Table 4).

In India, the wife's education usually indicates the husband's education. Generally, the man marries a less literate woman than himself, while the educated woman generally does not marry a less educated man than her. Therefore, the husband's educational level does not indicate the wife's educational level, but the wife's literacy level indicates the husband's (Khan, 1991). The infant mortality rate in illiterate wives and middle school-educated husbands is 157.9 per thousand, whereas that of illiterate husbands and middle school-educated wives is 53.9 per thousand. The husband and wife's educational level can further clarify infant mortality. The infant mortality rate in illiterate husbands and literate wives is 76.5 per thousand, but in illiterate women and only illiterate husbands is 166.7 per thousand; it is below the primary level of literate husbands, and the primary level of educated wives is 111.1 per thousand. It is worth noting that the death rate of the infant influences husband and wife.

Literacy in any area affects the IMR, but literacy depends on geographical, demographic and socioeconomic factors. Education level is directly related to the economic condition of the family. The economic status of the farmers of Chhattisgarh Plain is high due to the plain surface and high level of agricultural development. On the other hand, the schools are far from their physical isolation, and the transport facility must also be improved. The soils are unfertile due to uneven land. The economic condition of the farmers could be better. Agriculture is the main occupation in these areas. In this occupation, mostly engaged cultivators and agricultural labourers are given less importance for education. As a result, the literacy rate is low.

The infant mortality rate in illiterate couples in the Surguja district is in Udaipur, with 219.9 per thousand. In illiterate couples, the infant mortality rate is the lowest in Ramchandrapur, at 13.2 per thousand. In the same way, the infant mortality rate in illiterate couples is 144.6 per thousand in Sitapur, 134.6 per thousand in the Batauli, 114.9 per thousand in Ramanujnagar and the Mainpath, 108.3 per thousand. Udaipur block has the highest infant mortality rate of 167.7 per thousand illiterate mothers and literate fathers. The infant mortality rate in illiterate mothers and primary-level educated fathers is 154.6 per thousand. In contrast, the infant mortality rate in only literate mothers and fathers is 150.3 per thousand and the infant mortality rate in educated females at the primary level and only literate fathers is 122.7 per thousand.

In contrast, in illiterate fathers and primarily educated mothers, its rate is 130.9 per thousand. As these, middle-level educated mothers, and illiterate father infant mortality rate is 80.5 per thousand. The infant mortality rate in Batauli blocks

the infant mortality rate in illiterate fathers and literate primary educated mothers is 85.8 per thousand. For this, in Sitapur block, only literate mothers and illiterate fathers are 98.2 per thousand, and primary level mothers and illiterate father infant mortality rate is 88.9 per thousand.

## **Conclusion**

Factors affecting the infant mortality rate in the Surguja district include parents' education and educational level. In the district of Surguja, where uneven land exists, the transportation facilities could be better. Hence, educational facilities are scarce, and this area's infant mortality rate is very high. On the contrary, in the plain areas with fertile agricultural land and with developed transport facilities, relatively IMR is less. However, it is remarkable that early neonatal mortality rates in both areas are not significantly different. In these areas, the neonatal and postneonatal mortality rates are remarkably different. The impact of the mother's education level on IMR is more effective than that of the father's education level because the mother's higher level of education has a twofold benefit. The mother's education level is a proxy for the fathers. By increasing the education level of the mother and father, the infant mortality rate can be reduced more.

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# Inter-Caste, Inter-Ethnic and Inter-Religious Marriages in India

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**Abstract:** Inter-caste and inter-religious marriages are still considered taboo in India. India has experienced a very low prevalence of inter-caste marriages. It has been studied that inter-caste and inter-religious marriages will abolish religious and caste conflicts, but society still struggles to escape this social menace. The present paper aims to assess the prevalence of inter-caste and inter-religious marriages among currently married women. Additionally, determinants of inter-caste marriages have also been explored in the study. The data has been analysed from the fourth round of the National Family Health Survey (NFHS-5) conducted during 2019-2021 in India. Bivariate and multivariate analysis has been used in the study. The study shows that most inter-caste marriages occurred within the same religion. Similarly, inter-ethnic marriages are comparatively higher among inter-caste marriages. On the contrary, inter-caste and inter-ethnic marriages are quite low among the inter-religious group. The analysis reveals that inter-caste marriages are more significant between the two nearest caste groups in the social hierarchy. It replicates that, like any other phenomenon, caste hierarchy persists in inter-caste marriages. Hence, the policymaker should enhance the existing policies and programmes to promote inter-caste, inter-religious and inter-ethnic.

**Keywords:** caste, religion, inter-ethnic, inter-caste, inter-religious, NFHS

Marriage is one of the important events that creates one of the important institutions of society named family. Indian marriage system is confined to caste, religion, and ethnicity. Inter-caste and inter-religious marriages are considered in Indian culture (Srinivasan & James, 2015). The spousal family faces violence and social boycott for violating the social norm (Das et al., 2011). Inter-caste and inter-religious marriages are registered under the Special Marriage Act 1954. However, the Special Marriage Act allows persons from two different castes and religions to marry

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without religious formalities (Mody, 2002). The institution of caste predominantly has *Brahmin* supremacy (Ketkar, 2004). The existing Hindu religion is the collection of numerous castes, as are other religions in India. Every Hindu must marry within his/her caste group (*jati*) to maintain the caste's purity (Shah, 2007). Inter-dining and intermarriage of different castes are prohibited to maintain the purity of the higher castes. (Baas, 2007).

Marriage of the girl is considered a matter of honour in many states of the country (Sekher, 2012). Arranged marriages are meant to preserve endogamy and reduce the probability of marriage outside the group (Nawsagaray, 2014). Inter-caste, inter-religious and inter-ethnic marriages lead to honour killing and other deadliest phenomena (Phophalia & Goswami, 2018). Inter-caste marriages vary cohort by cohort, and tribes with different cultural practices always stay away from mainstream society (Bharti, 2012). The caste has been part of the Hindu religion, but now it has aired in Indian society. As a result, many tribal groups also claimed to be Hindu, and some feel superior in caste consciousness (von, 1982).

In the current global era, equal economic status is the primary concern of unions in Indian society, which has not been broken by inter-caste marriages (Goli et al., 2013; Dhar, 2013). However, inter-caste marriages are more (5.9%) prevalent in urban areas (Ahuja & Ostermann, 2016; Daset et al., 2011). The impact of women's education, public policy, and socio-economic development on intermarriage is negligible in India (Narzary & Ladusingh, 2019; Das et al., 2011; Shrinivasan & James, 2015). It is learned that the Indian education system has failed to fuel social inclusion in society. Very few dare cross the social control line and go for inter-caste and inter-religious marriages (Saroja, 1999). Moreover, those holding prominent societal positions do not support inter-caste marriages (Krishnaswamy, 1996).

The *Dravidian* movement has encouraged inter-caste marriages in India's southern states (Shrinivasan & James, 2015). It has been observed that economic well-being does not play a role in inter-caste marriage. On the contrary, it is found that inter-caste marriages are more common among poor than wealthy households (Sanghera, 2020). There is a significant deviation in the proportion of inter-caste marriages in the Indian States (Salve & Tewari, 2016). The Ministry of Social Justice and Empowerment announced funding for the Dr Ambedkar Scheme for Social Integration by improving inter-caste marriages (Hortaçsu et al., 2019).

## Objectives

This paper has included tribal samples in the analysis as many studies have not included tribal populations. The existing literature focuses on the prevalence of



inter-caste marriage across different socio-economic conditions and geo-special differentials.

The present paper's objectives are:

1. To assess the prevalence of inter-caste, inter-ethnic and inter-religious marriages in India.
2. To understand the impact of socio-economic and demographic variables on inter-caste, inter-ethnic and inter-religious marriages.

## **Data and Methodology**

The data have been used from the fourth round of the National Family Health Survey 2019-21 (NFHS-5), an ongoing socio-demographic health survey conducted by the International Institute for Population Sciences, Mumbai. The data has been collected from a total representative sample of 57693 currently married couples. Information on the caste, religion, and ethnicity of the respondent and her partner has been collected. Indian society has separate compartments of caste, religion, and ethnicity. The present analysis is not limited to the Hindu and has aired into Indian society of all other religions.

Along with scheduled caste, scheduled tribe (ST), other backward classes, and none of the other castes are included in the analysis. Some tribes have purity and Hindu attributes, considered high castes (von, 1982). Suppose a woman married to a man other than her caste, religion, and ethnicity is considered inter-caste, inter-religious, and inter-ethnic marriage. Similarly, religions are classified into four groups: Hindu, Muslim, Christian, and Others.

Bivariate and multivariate analysis is used to examine the effect of socio-economic factors on inter-ethnic, inter-religious, and inter-caste marriages in India. Similarly, the polychoric correlation coefficient and Spearman correlation coefficient have been used to see the relationship between male-female education, desire for childbearing, and age at marriage among couples who have inter-caste, inter-ethnic and inter-religious marriage.

## **Variables**

### ***Dependent Variables***

**Inter-Caste Marriage.** If the husband's caste is the same as the wife's, it is considered 0 "within the caste." If the husband's caste is different from the caste of the wife, then it is considered 1 "inter-caste."

**Inter-Religious Marriage.** Suppose the husband's religion is the same as the wife's caste. In that case, it is considered 0 “within religion”. If the husband's religion differs from the wife's caste, it is considered 1 “inter-religious”.

**Inter-Ethnic Marriage.** If the husband's ethnicity is the same as the ethnicity of the wife, then it is considered 0 “within ethnicity.” If the husband's ethnicity is different from the ethnicity of the wife, then it is considered 1 “inter-ethnic”.

**Inter-Caste Combinations.** It has given six categories 1 “SC and ST”, 2 “SC and OBC”, 3 “SC and Other castes”, 4 “ST and OBC”, 5 “ST and Other caste”, and 6 “OBC and Other caste”.

### ***Independent Variables***

**Age of the Women.** A dummy variable has been created using variables related to the age of both husband and wife. This variable is recoded into three categories. 0 “same as husband's age,” 1 “more than husband's age”, and 2 “less than husband's age.”

**Place of Residence.** The place of residence is given in two categories; that is, 0 “rural” and 1 “urban.”

**Education of Women.** The education information is available in no education, primary, secondary, and higher secondary categories. The variable is converted into two categories 0 “no education”, 1 “primary”, 2 “secondary”, and 3 “higher secondary.”

**Caste of Women.** The variable has three categories. 1 “scheduled caste,” 2 “scheduled tribe”, 3 “other backward classes”, and 4 “other cast.”

**Religion.** It has three categories. 1 “hindu” 2 “muslim” 3 “christian” 4 “other.”

**Ethnicity.** It has three categories. 1 “caste” 2 “tribe” 3 “no caste/tribe.”

**Family Type.** The family type is recoded into two categories. 0 “non-nuclear family” 1 “nuclear family.”

**Mass Media Exposure.** It has two categories. 0 “no exposure” and 1 “exposure.”

**Regions.** The total population has divided into six geographic regions. 1 “north”, 2 “east”, 3 “central”, 4 “northeast”, 5 “west”, and 6 “south.”

**Related to Husband Before Marriage.** It has two categories. 0 “not related” 1 “related.”

**Husband Married More Than Once.** It has two categories of “married once” and “married more than once.”

## Results

It has been found that inter-caste marriages increase with socio-economic development as it dilutes religious beliefs, values, and customs and increases the percentage of inter-caste marriages. Religion is a bunch of homogeneous caste groups following the same belief and culture. Marriages are not welcomed out of the religious group. It is considered that inter-religious and inter-ethnic marriage can develop harmony in society.

### Inter-Caste, Inter-Ethnic and Inter-Religious Marriages

Table 1 presents the per cent distribution of inter-caste inter-ethnic, and inter-religious marriages across India. The result shows that 17% of currently married women have inter-caste marriages in India. However, around 10 per cent of them have inter-ethnic, and only 3 per cent have inter-religious marriages. The analysis found that inter-caste marriages are highest in the western region (18%) of India, followed by the north (18%), northeast (17%), west (15%), and central (14%). Karnataka has the highest (24%) percentage of inter-caste marriages. On the contrary, Ladakh has the lowest inter-caste marriages (4%). The Northeast region has more than (11%) of inter-ethnic marriages. On the contrary, the north region has (4%) the lowest inter-ethnic marriages. Similarly, Punjab, Tamil Nadu, Haryana, Uttar Pradesh and Bihar have less than (3%) of inter-ethnic marriages. On the other hand, Odisha, Karnataka, West Bengal, and Manipur have 12%, 14%, 26%, and 9% inter-ethnic marriages.

**Table 1**

*Per Cent Distribution of Inter-Caste, Inter-Ethnicity, and Inter-Religious Marriages Among Currently Married Women in The States of India, 2019–21*

State	Within caste	Inter-caste	Within ethnicity	Inter-ethnic	Within religion	Inter-religious	Total
North	82.0	18.0	92.0	8.0	96.0	4.0	8851
Haryana	85.0	15.0	96.3	3.7	97.9	2.2	1711
Himachal Pradesh	90.8	9.2	97.8	2.3	98.4	1.6	818
Jammu and Kashmir	86.4	13.6	86.9	13.1	97.2	2.8	1640
Punjab	83.9	16.1	99.6	0.5	94.1	5.9	1699
Rajasthan	86.3	13.7	91.5	8.6	97.7	2.3	3673
Ladakh	96.2	3.8	71.0	29.0	92.7	7.3	158
Central	85.4	14.6	84.5	15.5	97.5	2.5	4768
Madhya Pradesh	83.3	16.7	86.5	13.5	98.6	1.4	4034

State	Within caste	Inter-caste	Within ethnicity	Inter-ethnic	Within religion	Inter-religious	Total
Uttar Pradesh	86.2	13.8	98.4	1.7	97.9	2.1	6360
East	85.7	14.3	90.4	9.6	97.4	2.6	3244
Bihar	81.2	18.8	97.8	2.2	97.6	2.5	2646
Jharkhand	80.8	19.3	86.5	13.5	90.7	9.3	2001
Odisha	84.1	15.9	87.9	12.1	99.0	1.0	2367
West Bengal	79.3	20.7	73.8	26.2	97.7	2.3	1902
North-East	83.3	16.7	88.7	11.3	97.9	2.1	14658
Arunachal Pradesh	90.0	10.0	84.5	15.5	91.2	8.8	1668
Assam	79.9	20.1	80.6	19.4	98.4	1.6	3088
Manipur	79.1	20.9	91.0	9.0	85.1	14.9	646
West	84.6	15.4	95.7	4.3	97.1	2.9	14921
Gujarat	80.4	19.7	88.6	11.4	98.1	1.9	3183
Maharashtra	79.4	20.6	85.2	14.8	95.0	5.0	3181
South	81.8	18.2	86.5	13.5	96.0	4.0	11251
Karnataka	75.8	24.2	85.9	14.1	97.7	2.3	2466
Kerala	83.4	16.6	92.1	7.9	96.6	3.4	754
Tamil Nadu	93.5	6.5	98.5	1.5	97.3	2.7	1995
India	83.6	16.4	90.1	9.9	97.1	2.9	57693

Source: Author's calculation using NFHS-5 2019-21 dataset. Weights are used to estimate the values.

It has been studied that inter-religious marriages increase with education and socio-economic development. The southern region of India is more socio-economically developed than other regions of India. Therefore, more inter-religious marriages are expected in the southern region than in other regions in India. Analysis reveals that the southern region has around (4%) inter-religious marriages and the east region has only (2.6%) marriages.

The percentage distribution of inter-caste marriages, inter-religious and inter-ethnic marriages according to background characteristics are presented in Table 2. Out of total marriages, 17 per cent are inter-caste marriages among urban residents. Nearly one-third of the women with different ethnicity have inter-caste marriages, which is more than that of the same ethnicity. The nuclear family has not significantly impacted inter-caste, inter-ethnic and inter-religious marriage. The analysis has shown a positive relationship between education and inter-caste marriages.

Normally it is accepted that woman should not be older than a man for marriage. However, in the case of inter-caste marriage majority (19%) of women are older than their spouse. Exposure to any media does not show any impact on inter-caste marriage but on inter-religious marriages. Comparatively, more women (16%) were related to their current husbands before marriage went for inter-caste marriage. However, it does not show any effect on inter-religion marriage. A husband married

more than once is also significantly related to inter-caste and inter-religious marriages.

**Table 2**

*Marriages by Same and Different Caste, Ethnicity and Religion According to Different Characteristics*

Background variables	Types of marriage						Total Sample
	Within caste	Inter-caste	Within ethnicity	Inter-ethnic	Within religion	Inter-religious	
Resident							
Urban	82.4	17.6	91.2	8.9	96.5	3.6	14112
Rural	84.2	15.8	89.6	10.4	97.3	2.7	43581
Ethnicity							
Same	84.5	15.4	NA	NA	97.3	2.7	51613
Different	69.6	30.4	NA	NA	95.2	4.8	6080
Religion							
Same	83.8	16.2	90.3	9.7	NA	NA	55871
Different	79.4	20.6	83.8	16.2	NA	NA	1822
Caste*							
Same	NA	NA	94.9	5.1	97.3	2.7	45688
Different	NA	NA	88.6	11.3	96.4	3.5	8182
Family type							
Non-nuclear	84.1	15.9	90.0	10.0	97.3	2.7	16674
Nuclear	83.4	16.6	90.1	9.9	96.9	3.1	41019
Age of women							
Same as men	83.1	16.9	87.7	12.3	97.2	2.8	2717
Elder than men	80.6	19.4	89.7	10.3	96.9	3.2	2154
Younger than men	83.8	16.3	90.2	9.8	97.1	3.0	52822
Access any media							
No	82.9	17.1	88.5	11.5	97.0	3.0	27163
Yes	84.2	15.8	91.3	8.7	97.1	2.9	30530
Related to husband before marriage							
No	83.5	16.5	90.2	9.9	97.1	2.9	50884
Yes	84.3	15.7	89.8	10.3	96.6	3.4	6809
Husband married							
Once	83.8	16.2	90.0	10.0	97.1	2.9	52808
More than once	82.2	17.8	91.6	8.4	96.9	3.1	4885
Education							
Illiterate	83.02	16.98	90.00	10.00	97.08	2.92	16270
Educated	83.87	16.13	90.13	9.87	97.05	2.95	41423
Total	83.63	16.37	90.1	9.9	97.06	2.94	57693

\*Total sample for the columns is(53870), different from the given in the total sample column due to missing cases.

NA – Not applicable due to the same variable in the column and row

Source: Author's calculation using NFHS-5 (2019-21) dataset. Weights are used to estimate the values.

### Inter-Caste Marriage Combinations, Marital Age, Fertility Behaviour

Table 3 provides information about castes, religion, ethnicity, and education level of men and women involved in inter-caste marriage. The analysis shows that among total females in scheduled tribes (18%) do inter-caste marriage. However, females (16.6%) performed inter-caste marriages among the total scheduled caste. Out of the total Muslim male and female, (24%) of male and female has performed inter-caste marriage. Ahmad and Chakrabarti (1981) have found that Muslim caste systems display many characteristics of Hindu Castes. The proportion of inter-caste marriage is higher among Muslims than in other religions. It is found that economic uniformity is more important in inter-caste marriage, especially among Muslims (Ahmad & Chakrabarti, 1981). The table does not show any significant impact of education on inter-caste marriage.

**Table 3**

*Distribution of male and female by inter-caste and same-caste marriage according to background characteristics*

	Within caste marriage		Inter-caste marriage		total male	total female
	male	female	male	female		
Caste						
Schedule caste	83.2	83.4	16.9	16.6	10767	10760
Schedule tribe	83.4	81.7	16.6	18.3	11285	11357
OBC	86.5	87.2	13.5	12.8	21877	21786
None of them	79.2	79.0	20.8	21.0	9941	9967
Religion						
Hindu	84.3	84.3	15.7	15.7	42427	42385
Muslim	75.4	75.5	24.6	24.5	4795	4786
Christian	90.1	89.2	9.9	10.8	3894	3965
Other	87.6	87.0	12.5	13.0	2754	2734
Ethnicity						
Caste	83.44	83.7	16.6	16.3	45324	45133
Tribe	87.74	85.3	12.3	14.7	8272	8453
No Caste/Tribe	65.68	55.7	34.3	44.3	274	284
Education						
No education	81.03	83.0	19.0	17.0	8658	15483
Primary	82.16	81.4	17.8	18.6	7961	7690
Secondary	84.01	84.1	16.0	15.9	29473	24961
Higher Secondary	86.3	85.6	13.7	14.4	7778	5736
Total	83.6	83.6	16.4	16.4	53870	53870

Source: Author's calculation using NFHS-5 (2019-21) dataset. Weights are used to estimate the values.

Table 4 shows the education, age at marriage, birth interval, and ideal number of children among inter-caste and different inter-caste marriage combinations. The mean years of education for females are lower than that of males. The table also shows that most inter-caste marriages happened between OBC and Other, followed by SC and OBC, ST and Other castes, SC and Other and ST and OBC. The mean education difference between males and females is almost equal in all caste combinations. The mean age at marriage is highest for males in ST and OBC.

**Table 4**

*Education, Median Age at Marriage, and Childbearing Behaviour Among No Inter-Caste Marriages, Inter-Caste Marriages and Inter-Caste Marriage Combinations in India, 2019–21*

Characteristics	Marriage			Inter-caste marriage combinations					
	Within caste Marriage	Inter-Caste Marriage	Total	SC and ST	SC and OBC	SC and Other	ST and OBC	ST and Other	OBC and Other
Mean Years of Education									
Female	6.6	6.3	6.5	5.6	7.4	7.4	7.5	5.7	7.7
Male	8.0	7.7	7.9	7.1	8.7	8.5	8.5	7.2	8.8
The mean number of the ideal number of children									
Female	3.0	2.7	2.9	3.0	2.7	2.8	3.3	2.7	2.5
Male	3.5	3.2	3.4	3.7	3.2	2.8	4.7	3.1	2.9
Mean number of Children ever born	2.4	2.3	2.3	2.5	2.5	2.2	2.2	2.4	2.2
Mean age at childbearing	20.8	20.7	20.6	20.3	20.6	21.0	21.0	20.6	21.1
Total	45688	8182	53870	1226	2076	683	280	749	2763

*Source: Author's calculation using NFHS-5(2019-21) dataset. Weights are used to estimate the values.*

### **Correlation Between Different Characteristics of Male and Female**

Table 5 shows the correlation between the education of the wife and her husband, the correlation between the wife and her husband's marital age, and the ideal number of children of wife and husband. Since many women and their husbands have zero education, the correlation after removing the zero education cases is more informative. At the all-India level, the correlation is at 0.51 between women's and men's education. In the inter-religious group, the correlation is relatively high (0.52) compared to other groups between women's and men's education. The table depicts no change in the correlation between the education of women and men correlation coefficient for inter-caste and inter-ethnic marriages. It clearly shows that for inter-

religious marriages, both males and females are equally educated than inter-caste and inter-ethnic marriages. The marital age correlation coefficient between husband and wife is high among all marital types and higher for men and women within caste, ethnicity, and religion. The analysis reveals a (0.41) correlation coefficient in the wife and husband's ideal number of children. However, the correlation coefficient in the wife and husband's ideal number of children in the inter-caste marriage group is (0.27). It means male and female shows a lack of correlation in terms of childbearing number in the inter-caste marriage category. Inter-marriages do not significantly impact the correlation between education, age at marriage and an ideal number of male and female children.

**Table 5**

*Correlation Between Women's and Men's Education, Marital Age and The Ideal Number of Children for Different Groups*

	Within caste	Inter- caste	Within ethnicity	Inter- ethnic	Within religion	Inter- religious	Total
Women's education correlation with partner education (excluding cases hus_edu=wife_edu=0)							
Polychoric	0.50	0.50	0.51	0.47	0.51	0.52	0.51
CI	(0.460- 0.524)	(0.493- 0.530)	(0.509- 0.522)	(0.446- 0.494)	(0.506- 0.519)	(0.481- 0.559)	(0.506- 0.519)
Spearman	0.52	0.50	0.52	0.47	0.52	0.49	0.52
CI	(0.509- 0.523)	(0.487- 0.525)	(0.517 - 0.529)	(0.445- 0.493)	(0.515- 0.527)	(0.450- 0.531)	(0.514- 0.526)
Observations	45449	5942	50634	4002	53301	1335	54636
Woman marital age correlation with partner age (excluding cases hus_age=wife_age=0)							
Polychoric	0.57	0.50	0.57	0.53	0.57	0.54	0.57
CI	(0.569- 0.580)	(0.483- 0.519)	(0.569- 0.580)	(0.513- 0.553)	(0.566- 0.577)	(0.512- 0.582)	(0.566- 0.576)
Spearman	0.55	0.52	0.54	0.53	0.54	0.54	0.54
CI	(0.546- 0.558)	(0.511- 0.545)	(0.541- 0.553)	(0.519 - 0.559)	(0.541- 0.552)	(0.512- 0.582)	(0.541- 0.552)
Observations	52610	6920	58519	4820	61808	1531	63339
Women's ideal children correlation with partner's ideal children (hus_chil=wife_chil=0)							
Polychoric	0.44	0.30	0.42	0.33	0.41	0.37	0.41
CI	(0.433- 0.447)	(0.278 - 0.322)	(0.414- 0.428)	(0.310- 0.361)	(0.408- 0.421)	(0.334- 0.421)	(0.407- 0.420)
Spearman	0.36	0.27	0.35	0.30	0.34	0.37	0.34
CI	(0.360 - 0.375)	(0.257- 0.301)	(0.344- 0.359)	(0.279- 0.331)	(0.340- 0.354)	(0.335- 0.422)	(0.341- 0.355)
Observations	45688	8182	51613	6080	55871	1822	57693

*Source: Author's calculation using NFHS-5 (2019-21) dataset. Weights are used to estimate the values.*



## Determinants of Inter-Caste, Inter-Religious and Inter-Ethnic Marriages

The multivariable statistical results in Table 6 show that the place of residence plays a significant and positive role in inter-caste marriage. Compared to the urban area respondents who live in a rural area, the odds of getting married out of the caste are lower (odds ratio 0.874). The likelihood of inter-caste marriages was two times more likely among the women who married out of her ethnicity (odd ratio 2.402). As compared to the non-nuclear family nuclear family, respondents who live in the nuclear family are more likely to go for inter-caste marriage (odd ratio 0.036). The odds of livelihood for women older than men are 0.184 times higher than women and men the same age. It means the probability of the wife being older than the husband is higher in inter-caste marriage couples. The result shows that inter-caste marriage breaks the assumption that the wife should not be older than men. Educated women are less likely to have inter-caste marriages than non-educated women (odd ratio 0.964). This finding is the same as the results of large-scale studies (Das et al., 2011; Goli et al., 2013; Narzary&Ladusingh, 2019), as we have combined all educated women in one group and compared them with non-educated women.

On the contrary, male education does not impact inter-caste marriage. It indicates that mass media exposure can impact inter-caste marriages. This finding is similar to the finding of large-scale studies (Shrinivasan& James, 2015).

**Table 6**

*A Logistic Regression Analysis of Variation in Inter-Caste Marriages Among Currently Married Women in India, 2019-21*

Explanatory variables	Exp(B)	Sig.	95% Conf. Interval	
			Lower	Upper
Resident				
Urban®				
Rural	0.832	0.000	0.791	0.876
Ethnicity				
Same®				
Different	2.402	0.000	2.218	2.600
Religion				
Same®				
Different	1.284	0.000	1.128	1.461
Family type				
Non-nuclear®				
Nuclear	1.036	0.191	0.983	1.091
Age of women				
Same as men®				

Explanatory variables	Exp(B)	Sig.	95% Conf. Interval	
			Lower	Upper
Elder than men	1.184	0.054	0.997	1.406
Younger than men	0.963	0.516	0.859	1.079
Access any media				
No®				
Yes	0.918	0.001	0.874	0.966
	Related to husband before marriage			
No®				
Yes	0.946	0.121	0.882	1.015
	Partner married more than once			
No®				
Yes	1.120	0.006	1.033	1.214
Education				
Non-educated				
Educated	0.964	0.191	0.911	1.019
Constant	0.222	0.000	0.194	0.254

Note: Dependent Variable: 0- Within caste marriage, 1- Inter-caste marriage

Source: Author's calculation using NFHS-5 (2019-21) dataset. Weights are used to estimate the values.

The logistic regression results (Table 7) show that compared to women living in urban areas, women living in rural areas are less likely to marry out of their religion (odd ratio 0.731). The likelihood of inter-religious marriages is significantly higher among the women who married out of the ethnic group (odd ratio 1.469). However, the odds of getting married out of their religion are 0.284 times higher among those who married a person from a different caste. The table shows that respondents in nuclear are 0.074 times more likely to marry inter-caste than non-nuclear families. Educated women are less likely to have inter-religious marriages than non-educated women (odd ratio 0.966).

**Table 7**

*A Logistic Regression Analysis of Variation in Inter-Religious Marriages Among Currently Married Women in India, 2019-21*

Explanatory variables	Exp(B)	Sig.	95% Conf. Interval	
			Lower	Upper
Resident				
Urban®				
Rural	0.731	0.000	0.653	0.817
Ethnicity				
Same®				
Different	1.469	0.000	1.221	1.768

Explanatory variables	Exp(B)	Sig.	95% Conf. Interval	
			Lower	Upper
Caste				
Same®				
Different	1.284	0.000	1.129	1.461
Family type				
Non-nuclear®				
Nuclear	1.074	0.234	0.955	1.208
Age of women				
Same as men®				
Elder than men	1.114	0.580	0.760	1.635
Younger than men	0.968	0.801	0.752	1.247
Access any media				
No®				
Yes	0.908	0.090	0.812	1.015
Related to husband before marriage				
No®				
Yes	1.256	0.002	1.089	1.449
Partner married more than once				
No®				
Yes	1.115	0.229	0.934	1.330
Woman education				
Not educated®				
Educated	0.966	0.583	0.853	1.093
Constant	0.034	0.000	0.025	0.045

Note: Dependent Variable: 0- Within religion marriage 1- Inter-religious marriage

Source: Author's calculation using NFHS-5 (2019-21) dataset. Weights are used to estimate the values.

However, a husband who married more than once is more likely to marry out of religion. The odds of getting married out of the religion for a husband married more than once is (1.115). Similarly, compared to a woman not related to their husband before marriage, the odds of getting married out of religion are more likely among the women somehow related to their husband before marriage (1.256).

The logistic regression results (Table 8) show that rural areas are likelier to have an inter-ethnic marriage (odd ratio 1.499). The likelihood of inter-ethnic marriages is significantly higher among the women who married out of the caste group (odd ratio 2.401). As compared to the respondent with a non-nuclear family, the nuclear family respondent is times less likely to marry inter-caste. Compared to women with no mass media exposure, women with mass media exposure are less likely to marry out of their ethnic group (odd ratio 0.900). It indicates that mass media exposure cannot influence inter-ethnic marriages. Educated women are less likely to have inter-religious marriages than non-educated women (odd ratio 0.838). It shows that education is unable to promote inter-ethnic marriages in society. It could be because inter-ethnic marriages are more prevalent among the rural

population. However, a husband who married more than once is less likely to marry out of the ethnic group.

**Table 8**

*A Logistic Regression Analysis of Variation in Inter-Ethnic Marriage Among Currently Married Women in India, 2019-21*

Explanatory variables	Exp(B)	Sig.	95% Conf. Interval	
			Lower	Upper
Resident				
Urban®				
Rural	1.499	0.000	1.372	1.638
Caste				
Same®				
Different	2.401	0.000	2.218	2.599
Religion				
Same®				
Different	1.460	0.000	1.213	1.758
Family type				
Non-nuclear®				
Nuclear	0.943	0.153	0.869	1.022
Age of women				
Same as men ®				
Elder than men	0.913	0.493	0.704	1.184
Younger than men	0.812	0.014	0.688	0.959
Access any media				
No®				
Yes	0.705	0.000	0.653	0.761
Related to husband prior to marriage				
No®				
Yes	1.094	0.094	0.985	1.216
Partner married more than once				
No®				
Yes	0.860	0.027	0.752	0.983
Education				
Not educated®				
Educated	0.838	0.000	0.772	0.910
Constant	0.068	0.000	0.055	0.083

*Note: Dependent Variable: 0- Within ethnicity marriage 1- Inter-ethnic marriage*

*Source: Author's calculation using NFHS-5 (2019-21) dataset. Weights are used to estimate the values.*

## Discussion

Marriages in India are indigenous and supported by religious beliefs to maintain the purity of higher caste. If anyone is born in a caste, he or she cannot change it, but religion. People in India are divided into numerous castes, with no marital intercourse. Inter-caste marriage challenges the caste system; as a result, religious compartments have also been damaged. It results in the consociation of the society with no caste discrimination. Special Marriage Act 1954 protects an

individual's right and allows them to get married in different caste groups. Modernisation, education, exposure to mass media, and intermingling may lay a good foundation for inter-caste and inter-caste marriages. As Das et al. (2011) and Ray, Chaudhari, and Sahai (2017) have found, the education of the women and men, income, and the resident does not significantly impact inter-caste marriages in India. We found that these factors affect inter-caste marriages but not inter-religious marriages significantly. Narzary and Ladusingh (2019) have found that inter-marriages are highest in the Northeast region of India. It may happen due to the inclusion of scheduled tribes in the sample. It has been observed that the western region of India is more socio-economically developed than other regions of India. It is expected that inter-caste marriages are more in the Western region than in other regions in India.

The paper shows that inter-caste marriages happen due to love marriages because of regular interaction and affection where the household is barely involved. The social movement has been systematically recorded in regional languages in various parts of India. As Shrinivasan and James (2015) mentioned, the Dravidian movement has tried hard to break the caste system and encourage inter-caste marriages in the South but failed to impact significantly.

## **Conclusion**

The inter-religion, inter-ethnic and inter-caste marriages have been gradually increasing, but India is still struggling to escape this social menace. An individual's education level does not predict the likelihood of inter-religious but inter-caste marriages. The marriage pattern is changing in India due to urbanisation, modernisation, socio-economic development, and globalisation of the Indian economy. The socio-economic and demographic factors also affect the pattern of inter-caste, inter-ethnic and inter-religious marriages in India. There is a need to encourage inter-caste, inter-ethnic and inter-religious marriages by giving promotional messages through mass media for a healthy society. There is a need to reduce the caste discrimination and caste barrier prevalent in Indian society.

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# Quality of Life of Rural Women in Arajiline Block of Varanasi District, Uttar Pradesh

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**Abstract:** Quality of life (QOL) is a broad and multidimensional concept. WHO defines the quality of life as the condition resulting from the combination of effects of a complete range of factors, such as health, happiness, education, social and intellectual attainment, freedom of action, justice and freedom of expression. This paper aims to analyse several factors which have affected the QOL of rural women. The study is based on the primary survey of 400 female respondents in the Arajiline block through an interview schedule to assess the QOL. Composite Index and Standard Deviation technique has been used for analysis mapped through Arc-Map. The research finding shows that the QOL of rural women has improved significantly based on the indicators like literacy, reduced poverty owing to Ration card facilities, and availability of electricity. However, they suffer from basic needs like proper housing facilities, clean fuel for cooking, piped water supply, sanitation and healthcare facilities. So, there is a dire need to provide basic needs and proper implementation of welfare schemes in rural areas considering women's needs.

*Keywords:* quality of life, rural women, satisfaction level, composite index, welfare schemes

Quality of life comprises a complex and multidimensional concept with a wide scope, including various social, cultural, economic, political and environmental elements in any given spatiotemporal context. Seth James (1889) was the first in history to develop the concept of Quality of life and stated that in an ethical theory, we must not regard the mere quantity but also the quality of life.

QOL is newer than public happiness (Kerce, 1992; Meeberg, 1993), whereas some favoured health and welfare concerns (Farquhar, 1995; Roy, 1997). However, the distinction between objective and subjective QOL was also brought to light (Forward, 2003). In addition to this World Bank, World Health Organization, and United Nations also worked and contributed a lot to the enhancement of QOL of people globally (Sinha, 2019).

World Health Organization defines quality of life as the condition resulting from the combination of effects of a complete range of factors, such as health, happiness, education, social and intellectual attainment, freedom of action, justice and freedom of expression. It requires that people's basic and social needs are met and that they have the autonomy to choose to enjoy life, flourish and participate as citizens in a society with high levels of civic integration, social connectivity and other integrative norms, including at least fairness and equity all within a physically and socially sustainable global environment. Thus, quality of life is the product of the interplay among social, health, economic and environmental conditions which affect human and social development.

In the geography discipline, D.M. Smith (1973) titled '*The Geography of social well-being in the United States: An introduction to territorial social indicators*' and Knox's (1975) '*Social well-being: A spatial perspective*' are seminal works. The QOL of both rural and urban people remains one of the important contemporary social issues, which is more complex when we look at rural women who lack adequate basic facilities to lead a good quality of life. Abundant research has been carried out on the Quality of life of rural women in the Hugli district of West Bengal and Mysore District of Karnataka, which has given a detailed focus on their socioeconomic condition through Objective and Subjective indicators.

Around the world, approximately 3.4 billion people live in rural areas. About 90% of the world's rural population resides in Africa and Asia. India has the largest rural population, 893 million, followed by China (United Nations Department of Economic and Social Affairs, 2018). Though rural areas always remain a centre for development in government policies, it is also a bitter fact that the quality of life of people is not improving as in urban areas. Rural women face persistent structural constraints every day around the world that prevent them from fully enjoying their human rights and hamper their efforts to improve their quality of life. It is a fact that rural women play a key role in supporting their households and communities in achieving food and nutrition security, generating income and overall well-being. They make up 43 per cent of the agricultural labour force of developing countries. The UN inter-agency task force on Rural Women has reported that rural women and girls still fare worse than rural men and urban women in every sustainable development goal indicator. Rural Women are key agents for achieving the

transformational economic, environmental and social changes required for sustainable development.

Basic amenities and facilities are important in leading a good quality of life. In the present study, composite scores have been calculated to understand the quality of life in the study area. This will help to know the status of Nyay panchayats, which has a low quality of life, and evaluate the quality of life of rural women amidst the various responsibilities and burdens they bear. Another purpose of the composite index is to help policymakers understand the importance of basic facilities to enhance rural women's quality of life.

### **Approaches to Study Quality of Life**

QOL studies can be construed from different perspectives like the health approach, needs approach, Happiness versus life satisfaction and resource management approach. However, there are two major approaches to assessing the QOL – Objective and Subjective Approach, Measurable and Non- Measurable aspects of human living. The objective approach concerns whether people are healthy, well-fed, have proper housing and economic stability, and are well-educated rather than happy and satisfied with their environment. The subjective approach concerns happiness and satisfaction with objective indicators such as income, health, marriage, education, house etc. In this study objective approach has been used for assessing the QOL of rural women.

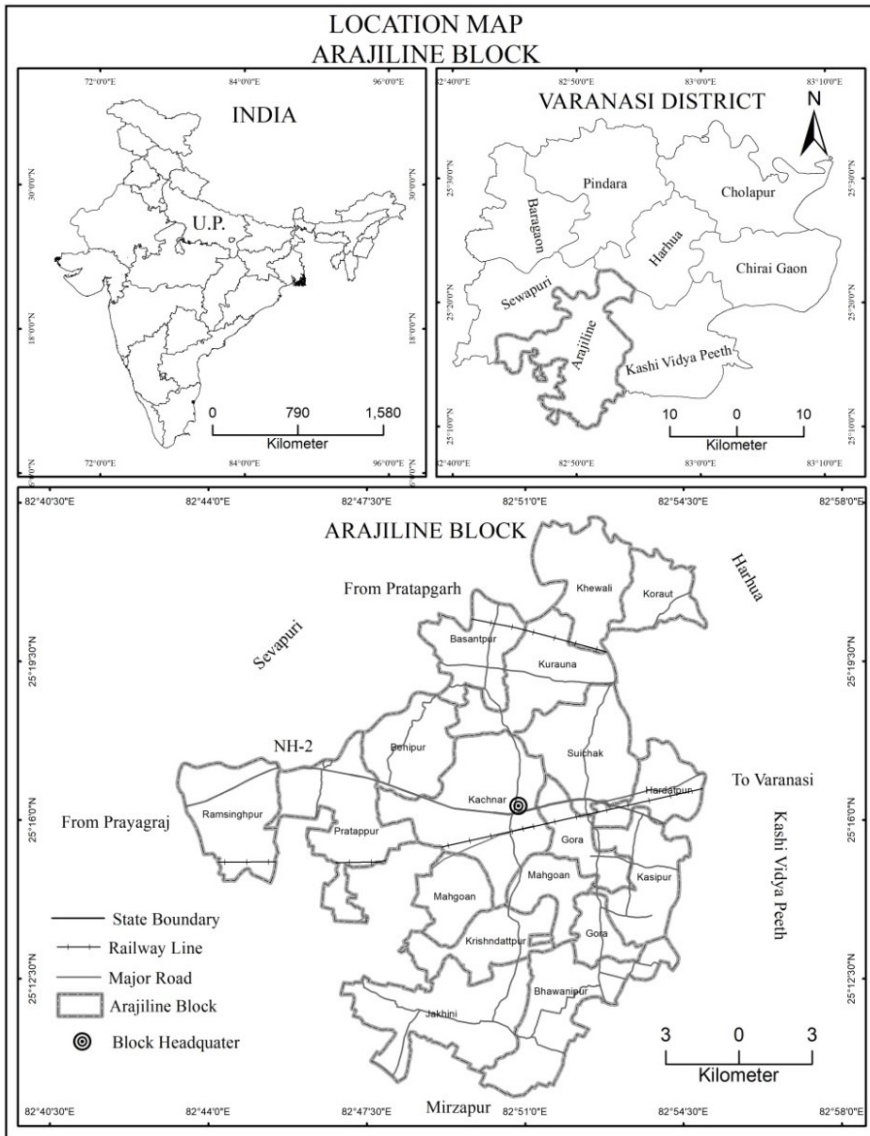
### **Objectives**

1. To understand the spatial pattern of quality of life in the study area.
2. To analyse the existing government programmes in improving the quality of life of rural women in the study area

### **Study Area**

Varanasi lies on the left bank of the river Ganga and has been held sacred by the Hindus since very early times. The Ganga River forms its natural boundary in the east, and the Gomati flows on the northern boundary. The total Geographical area of Varanasi district is 1535 sq. km. The total population is 3,676,841, of which males and females are 19, 21,857 and 17, 54,984, respectively, per the 2011 census. Arajiline had a population of 3.61 lakhs; males constituted 52.29%, and females constituted 47.70%. The rural population in Arajiline block is about 3.17 lakh. According to the 2011 census, 87.75% population of Arajiline block lives in rural areas. The work participation rate is 47.0 % and 19.4% for males and females, respectively. So, it is essential to understand the quality of life at the micro level to find relevant issues and resolve them to enable a good quality of life for rural women (Fig.1).

**Figure 1**



### Data Source and Methodology

The study is primarily based on Primary data collected through an interview schedule of 400 households of Arajiline Block. Here composite rank index method for Stratified random sampling has been used as given by Kumar and Sharma (2015). For determining sample units (followed by the sample size and respondent design) 'six-step method' is utilised, which is more appropriate for statistical analysis. In the present study, the above sampling method has been applied to generate a sample of

households for the entire block of Arajiline consisting of 226 revenue villages belonging to 16 Nyay Panchayats. Since the sampling unit is vast enough, a sample household for 4% of the total household was selected to make 400 samples. Table 1 shows the sample villages calculated by the earlier sampling techniques. For the cartographic representation, maps have been prepared with the help of ArcGIS software. Ten socioeconomic variables have been mentioned below:

1. Type of house (X<sub>1</sub>)
2. Availability of electricity (X<sub>2</sub>)
3. Fuel used for cooking (X<sub>3</sub>)
4. Source of drinking water (X<sub>4</sub>)
5. Sewage disposal facility (X<sub>5</sub>)
6. Sanitation facility (X<sub>6</sub>)
7. Female literacy (X<sub>7</sub>)
8. Medical facilities (X<sub>8</sub>)
9. Bank account (X<sub>9</sub>)
10. Working Status (X<sub>10</sub>)

**Table 1**

*Sample Villages in Arajiline Block*

Selected Nyay Panchayat	Total No. of Villages	No. of sample villages (40%) of the total
Kachanar	12	5
Ramsinghpur	22	9
Hardattpur	7	3
Jakhini	16	6
Korout	11	5
Kashipur	14	6
Kurauna	9	4
Total	91	38

Source: Computed by Authors

### **Calculation of Composite Scores and Levels of Quality of Life**

A composite Index and standard deviation technique (Bracy, 1952; Singh et al., 1979) is used to analyse the quality of life of rural women in Arajiline block. With the help of ten variables, composite scores have been calculated. Reasonable weights were assigned to each variable. Composite scores of all variables are taken as X value, and the mean value and standard deviation have been calculated (Tables 2 & 3).

The mean value of the composite score is 20.3, with a standard deviation of 0.53. Further, the quality of life under deviation is grouped into low, medium and high (Table-4).

**Table 2**

*Selected Variables for Quality of Life of Rural Women and their X value*

Variables	Parameters	Indicators	Weightage value	Hardattpur		Jakhini		Kachanar		Kashipur		Korout		Ramsinghpur	
				% of HH	X value	% of HH	X value	% of HH	X value	% of HH	X value	% of HH	X value	% of HH	X value
X1	House Type	pucca	3	55.8	1.7	51.8	1.6	50.8	1.5	44.2	1.3	82.1	2.5	54.5	1.6
		semi pucca	2	27.4	0.5	28.6	0.6	33.3	0.7	32.6	0.7	14.3	0.3	27.3	0.5
		kachha	1	16.8	0.2	19.6	0.2	15.9	0.2	23.3	0.2	3.6	0	18.2	0.2
X2	Availability of electricity	Yes	2	90.5	1.8	94.6	1.9	88.9	1.8	90.7	1.8	100	2	93.9	1.9
		No	1	9.5	0.1	5.4	0.1	11.1	0.1	9.3	0.1	0	0	6.1	0.1
X3	Fuel used for cooking	LPG	3	38.9	1.2	35.7	1.1	50.8	1.5	30.2	0.9	53.6	1.6	18.2	0.5
		wood/LPG	2	42.1	0.8	37.5	0.8	38.1	0.8	60.5	1.2	28.6	0.6	60.6	1.2
		Wood/dung	1	18.9	0.2	25	0.3	7.9	0.1	9.3	0.1	17.9	0.2	21.2	0.2
X4	Source of drinking water	pipd water	4	18.9	0.8	0	0	6.3	0.3	4.7	0.2	3.6	0.1	0	0
		handpump	3	51.6	1.5	67.9	2	31.7	1	76.7	2.3	53.6	1.6	72.7	2.2
		submersible	2	27.4	0.5	32.1	0.6	50.8	1	16.3	0.3	42.9	0.9	15.2	0.3
		well	1	1.1	0	0	0	4.8	0	2.3	0	0	0	3	0
X5	Sewage disposal facility	sewer	5	30.5	1.5	32.1	1.6	49.2	2.5	18.6	0.9	17.9	0.9	36.4	1.8
		compost post	4	7.4	0.3	0	0	6.3	0.3	7	0.3	0	0	6.1	0.2
		pond	3	14.7	0.4	33.9	1	9.5	0.3	16.3	0.5	14.3	0.4	15.2	0.5
		field	2	5.3	0.1	0	0	7.9	0.2	11.6	0.2	21.4	0.4	12.1	0.2
		open area	1	42.1	0.4	33.9	0.3	27	0.3	46.5	0.5	46.4	0.5	30.3	0.3
X6	Sanitation facility	Yes	2	87.4	1.7	100	2	88.9	1.8	81.4	1.6	92.9	1.9	84.8	1.7
		No	1	12.6	0.1	0	0	11.1	0.1	18.6	0.2	7.1	0.1	15.2	0.2
X7	Medical facilities	Government	2	7.4	0.1	28.6	0.6	15.9	0.3	23.3	0.5	10.7	0.2	21.2	0.4
		Private	1	89.5	0.9	39.3	0.4	58.7	0.6	39.5	0.4	42.9	0.4	39.4	0.4
X8	Bank account	Yes	2	77.9	1.6	91.1	1.8	95.2	1.9	95.3	1.9	100	2	97	1.9
		No	1	22.1	0.2	8.9	0.1	4.8	0	4.7	0	0	0	3	0
X9	Female literacy (% pop.)	literate	2	68.4	1.4	91.1	1.8	87.3	1.7	65.1	1.3	82.1	1.6	63.6	1.3
		illiterate	1	31.6	0.3	8.9	0.1	12.7	0.1	34.9	0.3	17.9	0.2	36.4	0.4
X10	Working status	Yes	2	83.2	1.7	89.3	1.8	90.5	1.8	74.4	1.5	64.3	1.3	90.9	1.8
		No	1	16.8	0.2	10.7	0.1	9.5	0.1	25.6	0.3	35.7	0.4	9.1	0.1

Source: Computed by Authors

**Table 3***Composite Score for Rural Women of Arajiline Block*

Nyay Panchayat	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	X <sub>8</sub>	X <sub>9</sub>	X <sub>10</sub>	X	(X- $\bar{X}$ )	(X- $\bar{X}$ ) <sup>2</sup>
Hardattpur	2.4	1.9	2.2	2.8	2.7	1.8	1	1.8	1.7	1.9	20.2	-0.1	0.01
Jakhini	2.4	2	2.2	2.6	2.9	2	1	1.9	1.9	1.9	20.8	0.5	0.25
Kachanar	2.4	1.9	2.4	2.3	3.6	1.9	0.9	1.9	1.8	1.9	21	0.7	0.49
Kashipur	2.2	1.9	2.2	2.8	2.4	1.8	0.9	1.9	2	1.9	20	-0.3	0.09
Korout	2.8	2	2.4	2.6	2.2	2	0.9	1.6	1.8	1.7	20	-0.3	0.09
Ramsinghpur	2.3	2	1.9	2.5	3	1.9	0.6	1.8	1.7	1.9	19.6	-0.7	0.49
Total											121.6		1.42

Source: Computed by Authors

**Table 4***Levels of Quality of Life Rural Women of Arajiline block*

Category	Composite Score	Name of Nyay Panchayat
Low	19.2 to 19.8	Ramsinghpur
Medium	19.9 to 20.8	Hardattpur, Kashipur and Korout
High	20.9 to 21.4	Kachanar and Jakhini

Source: Computed by Authors

## Results and Discussion

### Spatial Variation of Quality of Life in Arajiline Block

For selected variables, the X value (Composite Scores) has been calculated for each nyay panchayat shown in Table 2. After that, Composite scores were drawn to calculate the mean score and standard deviation, and then all the nyay panchayats were grouped into three categories, i.e., low, medium, and high, to understand the levels of quality of life of rural women in Arajiline block (Table 4).

**Figure 2**





Table 4 & Figure 2 shows the levels and spatial pattern of quality of life of selected Nyay panchayats. It has been found that Kachanar and Jakhni Nyay Panchayat enjoy a good quality of life, and the condition of women is better than other Nyay panchayats. The basic reasons for their high quality of life are location near Varanasi city, availability of educational facilities and transport connectivity, which helped them economically empowered. In contrast, Hardattpur, Kashipur and Korout have moderate quality of life due to a lack of basic facilities. Ramsinghpur experienced a low quality of life as it lacks basic facilities like proper housing, drinking water facilities and clean fuel for cooking, as well as its remote location from the towns and Varanasi city and ignorance of local government towards its development.

### **Government Welfare Schemes and Quality of Life**

#### ***Pradhan Mantri Awas Yojana (PMAY)***

It was launched in 2015 with a target of constructing 50 million new housing units by 2022, of which 30 million are proposed to be constructed in rural areas and 20 million in urban areas. However, the study area reveals that half of the respondents still do not have pucca houses. It has been found that under the PMAY, only 22 per cent of the beneficiaries (rural women) have availed the housing facilities which were not fully constructed or structured. There is a lag in implementing and allotting the PMAY to the study area's beneficiaries, hampering rural women's quality of life.

#### ***PM SAUBHAGYA- Sahaj Bijali Har Ghar Yojana***

In rural areas, electricity is required for cooking, basic lighting, irrigation, communication and water heating etc.; the use of electronic equipment by women aids their cooking process and saves time and energy by reducing their manual power. So, it provides them sufficient time for leisure, entertainment and other such requirements to lead a better quality of life. PM Saubhagya was launched in September 2017, and its target of 100% electrification nationwide is yet to be achieved. However, in the study area, it is 92%, and it is satisfactory among the respondents. Rural electrification is often considered to be the backbone of the rural economy, and it is essential for improving the quality of life as it is required for various basic purposes in rural households.

#### ***Pradhan Mantri Ujjawala Yojana (PMUY)***

Using clean fuels will help reduce indoor and outdoor pollution, enhance women's empowerment and ensure better health. The unclean cooking fuel causes

deaths mostly due to non-communicable diseases, including heart disease, stroke, pulmonary disease and lung cancer. In 2019, about 3 lakh women died prematurely from diseases which are caused due to polluting cooking fuels in India. It is noted that it affects women and other family members, as most of the time is spent indoors. Pradhan Mantri Ujjawala Yojana (PMUY) was launched in 2016 for household clean cooking fuel. The scheme originally envisaged the distribution of 59 million LPG connections to women below the poverty line. However, the major issue is affordability to refill and difficulty in getting a refill, which is the reason for switching to conventional cooking fuel such as cow dung cake and wood etc., and the study area also reveals this fact. Despite the success of the yojana, a significant portion of these users are hesitant to use LPG as an exclusive fuel, forcing us to rethink the yojana. About 68 % of the beneficiaries have LPG connections in the study area, but it is not widely used due to its high cost.

### ***Jal Jeevan mission***

Access to safe and hygienic drinking water is the most basic human health and quality of life requirement. It helps in achieving good health because lack of safe drinking water affects QOL as it is the root cause of many diseases such as diarrhoea, cholera and typhoid etc.; further, economic productivity suffers due to the unavailability of potable water as rural women lack access to piped drinking water supply and have to travel a long distance for fetching water which is time and energy consuming process. About 82% of the respondents are waiting to install a tap in their homes. Jal Jeevan mission was launched on August 15 2019, to provide safe piped drinking water to every rural household in the country by 2024. In the Nyay Panchayat sample, only Hardattpur have piped water connection, and only 18 % of the households benefit from piped water connections. So, this fact shows a pathetic picture of the Jal Jeevan Mission in the study area.

### ***Swachh Bharat mission- Gramin***

It was launched on October 2 2014, to ensure cleanliness in India and make it open defecation free in five years. It seeks to improve cleanliness in rural areas through solid and liquid waste management activities and to make gram panchayats open-defecation-free, clean and sanitised. However, in the study area, only one-third of households have sewage facilities, and despite the availability of toilets, most beneficiaries prefer open defecation because of improper construction of these toilets. This is due to the ignorance of the local government, where. They are unable to fulfil the need for proper drainage facilities. Ending open defecation and

promoting social inclusion by improving sanitation is essential. This will lead to increased security, convenience and self-respect for women and dignified life.

### ***National Rural Health Mission***

Health is an essential input for the development of human resources and the QOL and, in turn, the social and economic development of the nation. The health of the country's female population has profound implications for the health and education of children and the well-being of households and the women themselves. The main objective of NRHM is to reduce maternal mortality rate, minimise anaemia tendencies in women and provide quality healthcare and service delivery in rural areas. In the study area, the no. of Primary health care centres (PHCs) is limited; 8% of the centres do not have doctors or medical staff, 39% do not have lab technicians, and 18% PHCs do not even have a pharmacist. Because of above mentioned reasons, women prefer private hospitals in the study area.

### ***PM Jan Dhan Yojana***

Rural women tend to have minimal or no access to financial information, coupled with a lack of literacy which leaves them unable to engage with banking services. According to NFHS-5 (2019-21), 77.4 % of women have a bank or saving account that they use. The finding also reveals that most respondents have bank accounts under the PMJDY, operated by their family members.

### ***Targeted Public Distribution System***

Accessing Ration Card is a significant indicator of poverty in rural areas in India. It is important to avail the subsidised rate of food items for the poor people in rural India; hence, it plays a vital role in the rural economy. Over three-fourths of the households have ration cards in the study area under the TPDS.

Thus, to improve the quality of life of rural women, it is necessary to implement government programs efficiently. There is a dire need to focus on the problems of rural women to improve their quality of life and achieve the targets of welfare schemes.

### **Conclusion**

The study reveals that low quality of life found in the Ramsinghpur Nyay panchayat because of poor infrastructure facilities and the high quality of life experienced in Kachanar Nyay panchayat due to high Literacy rate, proper housing facilities, clean fuel, and piped water supply. In rural areas, basic facilities play a crucial role in determining the status of rural women as it affects their physical and

mental quality of life directly or indirectly. Therefore, to improve the quality of life of rural women, rural infrastructure should be improved, and all government schemes should be implemented evenly and timely. For this, there is a need to strengthen the role of NGOs, participatory planning, gender-based planning and other inclusive planning measures.

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I, Nina Singh, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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