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## "Uttar Pradesh Geographical Journal"

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# ASSESSING THE RELATIONSHIP OF THE INEQUALITY IN HOUSE OWNERSHIP OF HEADED HOUSEHOLDS AND LITERACY OF RURAL INDIA: A CASE STUDY OF PURULIYA DISTRICT, WEST BENGAL

**Riti Deshmukh, Sabina Bano and Sakshi**

**ABSTRACT**

*Persistent socio-economic struggles over several decades have marked the enduring dilemma of women in rural Indian society. A significant contributing factor to the challenging living conditions faced by rural women is the deep-rooted gender inequality prevalent in various socio-economic spheres, prolonged by a structured patriarchy. In the specific context of house ownership of headed households and literacy in the Puruliya district of West Bengal, an alarming trend emerges when comparing the ownership of houses by female-headed households and female literacy to their male counterparts. Through the Gini Coefficient Index, it has been found that inequality in house ownership between male and female-headed households is at 38%, reflecting a substantial inequality. The gender gap in literacy by the Sopher Index is at 44%, indicating vast disparity. The study also explores the relation between house ownership inequality and gender-based literacy distinctions, with a correlation index of 0.54, highlighting the need for targeted interventions.*

## Introduction

Literacy is the cornerstone of all kinds of awareness in socio-economic developmental facets and intricately promotes understanding of human rights (Bishin and Cherif, 2017; Yasun, 2018). While, the Human Development Index, Sustainable Development Goal, and Global Gender Gap Index universally asserted that literacy serves as a conduit from the realm of drawback to the progress of human development to achieve the goal of gender parity (Sakshi & Bano, 2023). In the context of societal empowerment, literacy is positively correlated with awareness towards possession of property ownership, especially sheds light on economic development. Previous research has also shown that various socio-demographic factors like age, gender, ethnicity, and cultural background have an impact on the present scenario of literacy and property ownership, (Bishin and Cherif, 2017; Yasun,2018). Apart from that ownership of property like a house, serves as a symbolic indicator for determining prosperity, fostering financial growth, and commanding social esteem (Forrest & Hirayama, 2018). But globally a substantial portion of the female population owned very few property and inadequate resources, despite constituting half of the total population due to the presence of ground-rooted patriarchy (Doss, et al., 2014; Kameri-Mbote, 2005). Even though literacy is also a basic right and a symbol of prosperity, women are deprived of their fundamental requirements because of gender discrimination. India is home of 272.9 million illiterate people(about 53 per cent) and is distributed in the five states of Uttar Pradesh,

1. **Riti Deshmukh, Research Scholar, Department of Geography, Banaras Hindu University, Varanasi. email: riti1999@bhu.ac.in, contact No-8945591710**
2. **Dr. Sabina Bano, Assistant Professor, Department of Geography, Mahila Maha Vidyalaya, Banaras Hindu University, Varanasi. email: sabinabano@bhu.ac.in, contact No-9369460012**
3. **Sakshi, Research Scholar, Dept. of Geography, B.H.U., Varanasi, Mob. No. 8896940194.**

Bihar, Andhra Pradesh, Rajasthan, and West Bengal (Sakshi & Bano, 2023). In the state of West Bengal, the Puruliya district pronounced as a backward district of West Bengal, literacy is evident in the context of discrimination where female literacy stands at 48.06%, contrasting with male literacy at 76.83%, thus yielding a gender differential percentage of 28.77%. Additionally, the prevailing percentage of inequality in house ownership for both female, and male-headed households of Puruliya is 37%, more pronounced in the rural areas (Deshmukh & Bano, 2023). Empirical evidence signifies that in Puruliya, the Gender Development Index stands at 0.40, as per the West Bengal Human Development Report 2004, which indicates a significant gap in house ownership of headed households as well as literacy on this Gender Development Index, as highlighted by Ghosh (2004). So, in this context, with the above, the present study intends to assess the status of inequality in house ownership of female and male-headed households and gender disparity in literacy, and the relationship between the inequality in house ownership and disparity in literacy in the rural area of the Puruliya district.

**The Study Area**

The Puruliya district is positioned within the geographical coordinates ranging from 22°42'35" to 23°42'0" north latitude and 85° 49'25" to 86° 54'37" east longitude which lies in the extreme western portion of West Bengal state. It shares its eastern boundaries with west Midnapore and Bankura, while its northern borders are bounded by Burdwan in West Bengal and Dhanbad in Jharkhand. Bokaro, Hazaribagh, Ranchi, West Singbhum, and East Singbhum districts of Jharkhand bordered Puruliya in the north-west, west, and south-west directions respectively (District Census Handbook, 2011; Government of West Bengal, 1985). In fact, the Puruliya district was established as an independent district of West Bengal in 1956 under the States Reorganization Act and the Bihar and West Bengal (Transfer of Territories) Act. Notably, Puruliya holds significant status due to its geographical setting which channelizes the tropical monsoon currents from the Bay of Bengal to the subtropical regions of north-west India (Government of West Bengal, 1985). It is a district of considerable national importance and it serves as a crucial link between the industrial hubs of West Bengal and the rural areas of Orissa, Jharkhand, Madhya Pradesh, and Uttar Pradesh. According to the 2011 census, the population of Puruliya district stands at 29,30,115 individuals, with 25,56,801 residing in rural areas and 3,73,314 in urban areas. As per the District Census Handbook in 2011, 87.26% of the population resides in rural regions, while 12.74% in urban centers.

**Objectives**

The main objectives of the present study are:

- to analyze the spatial distribution of gender inequality in the house ownership status of female and male-headed households in the rural area of Puruliya district.
- to assess the status of the spatial pattern of gender disparity in literacy in this district.
- To measure the correlation between the status of gender inequality in house ownership and gender disparity in Literacy at the district level.

**Database and Research Methodology**

The present study is based on secondary data from the Socio-economic Caste Census (SECC) and District Census Handbook of 2011, in reference to house ownership of female and male-headed households and gender disparity in literacy of the rural Puruliya District. However, the paper focuses on the relationship between the inequality in house ownership of headed households (Gini coefficient) and the gender disparity in literacy (Sopher index) with a correlation coefficient. The Gini Coefficient is well-suited for assessing the regional distribution of economic inequality in terms of house ownership of

female and male-headed households (Haye and Zizler, 2019). On the other hand, the Sopher Index is used to highlight disparities in literacy levels between males and females. Both index ranges between 0 to 1, offering comprehensive measures of inequality within their respective contexts (Sopher, 1974; Haye and Zizler, 2019). Additionally, the Pearson correlation coefficient function is utilized to determine the relationship between literacy and house ownership of headed households. Lastly, for block-wise mapping and visual representation of the data analysis, ArcGIS 10.8 and Microsoft Excel are used.

**Results and Discussion**

**1. Spatial Pattern of House Ownership of Female And Male-Headed Households:**

In general, the rural Puruliya district demonstrates a diverse pattern of gender differential in house ownership depicted in Table 01. From the analysis, it is identified that among the blocks of

**Table 01 : Rural Puruliya: Gender Differential in House Ownership of Headed Households**

| Blocks | House Ownership of Female-Headed Household (%) | House Ownership of Male-Headed Household (%) | Gender Differential in House Ownership |
|---|---|---|---|
| **High Gender Differential** | | | |
| Jaipur | 10.04 | 89.96 | 79.92 |
| Para | 10.61 | 89.38 | 78.77 |
| Jhalda-II | 11.04 | 88.96 | 77.92 |
| **Moderate Gender Differential** | | | |
| Barabazar | 11.55 | 88.44 | 76.89 |
| Balarampur | 12.04 | 87.96 | 75.92 |
| Puruliya-II | 12.05 | 87.94 | 75.89 |
| Jhalda-I | 12.12 | 87.88 | 75.76 |
| Bundwan | 12.17 | 87.83 | 75.66 |
| Baghmundi | 12.4 | 87.59 | 75.19 |
| Purulia-I | 12.43 | 87.57 | 75.14 |
| Manbazar-II | 12.51 | 87.48 | 74.97 |
| Arsha | 12.67 | 87.33 | 74.66 |
| Puncha | 12.72 | 87.28 | 74.56 |
| **Low Gender Differential** | | | |
| Raghunathpur-II | 13.07 | 86.92 | 73.85 |
| Manbazar-I | 13.49 | 86.5 | 73.01 |
| Hura | 13.64 | 86.35 | 72.71 |
| Raghunathpur-I | 13.92 | 86.07 | 72.15 |
| Santuri | 14.07 | 85.92 | 71.85 |
| Neturia | 14.27 | 85.73 | 71.46 |
| Kashipur | 14.47 | 85.53 | 71.06 |
| **Overall Puruliya** | **12.51** | **87.49** | **74.98** |

Source : Socio-Economic Caste Census (SECC) of Puruliya District, 2011.

Puruliya district, Jaipur (10.04%), Para (10.61%) and Jhalda-II (11.04%) blocks record low percentages of house ownership by female-headed households, and consequently have high house ownership by male-headed, with respective percentages of 89.96%, 89.38% and 88.96%.

Conversely, the blocks of Santuri, Neturia, and Kashipur have the highest proportion of house ownership of female-headed households, accounting for more than 14%. Among rural areas in the Puruliya district, 48.99% of women hold only 12.51% of house ownership responsibilities while 51.01% are males hold 87.49% of ownership of houses of households.

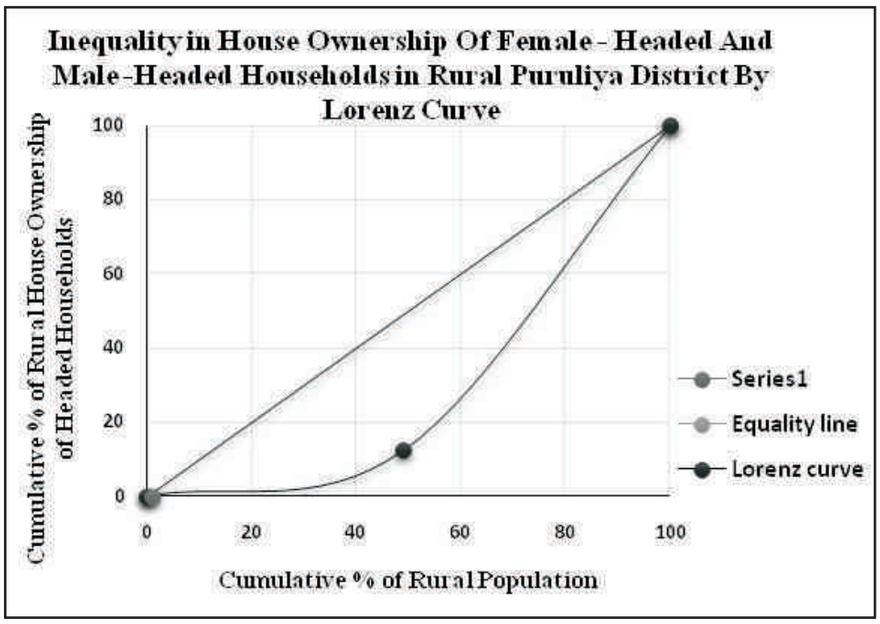


Fig. 01

Further, the lorenz curve has been taken into account to show the moderate towards higher concentration of inequality in the context of rural house ownership (Fig 01). Further, the Gini co-efficients for house ownership have been computed individually for each block within the Puruliya district. Overall, the index of inequality in the Puruliya district is 0.38, i.e. closer to 0.4, indicating a reasonable house ownership gap with 38% inequality, where it has been found that the Barabazar block records the highest rate of inequality, i.e. 40%, has an index of (0.4) indicating a large percentage of the house ownership gap. At the same time, Raghunathpur I (0.35), Neturia (0.35),and Santuri (0.35) hold comparatively low levels of inequality (35%). It is apparent from the distribution map (Fig 02 and Table 02).

By using the Gini coefficient index the author has identified the spatial distribution of house ownership among female and male-headed households. Three categories have been identified based on the ownership pattern according to the

disparity index.

a. High Inequality:0.39-0.40

b. Moderate Inequality:0.37-0.38

c. Low Inequality: 0.35-0.36

**High Inequality:** High inequality is evident in certain blocks, notably Barabazar, Manbazar-II, Jhalda-II, Jaipur, and Para, which are among the twenty blocks of backward districts of West Bengal. In these blocks, there is a significant contrast in house ownership rates between male and female-headed households, suggesting a situation of pronounced discrimination towards decision-making and empowerment. Barabazar demonstrates the highest gender gap at 40%, followed closely by Manbazar-II (39%), Jhalda-II (39%), Jaipur (39%), and Para (39%). These blocks are geographically situated on the border of Odisha and Jharkhand, where low awareness among rural populations, the rural characteristics, and the predominance of migration to the surroundings urbanized area likely contribute to the observed disparity in ownership favouring males over females.

**Moderate Inequality:** Ten blocks are displaying moderate inequality in house ownership between female and male-headed households. These blocks, including Manbazar-I, Bundwan, Arsha, Jhalda-I, Baghmundi, Puruliya-II, Raghunathpur-II, Puruliya-I, Puncha, and Balarampur, exhibit moderate levels of disparity with ownership indices ranging from 0.37 to 0.38. Manbazar-I, Bundwan, Arsha, Jhalda-I, Baghmundi, and Puruliya -II stand out with the highest recorded disparity rate of 38% among them. The majority of this backward district's areas show moderate levels of disparity, possibly attributed to increasing awareness facilitated by literacy initiatives, contributing to a gradual shift in status.

**Low Inequality:** Only five blocks within the districts exhibit minimal gender inequality in house ownership between female and male-headed households. The area comprises the blocks of Hura, Kashipur, Raghunathpur-I, Neturia, and Santuri. Geographically situated as the innermost blocks of the district, they are located near progressive districts like Burdwan, Bankura, and Medinipur. The presence of educational infrastructure, awareness status, and the influence of modernization may contribute to this phenomenon.

**2. Spatial Pattern of Gender Gap in Literacy Rate:** In India, women encounter extensive discrimination across all societal strata, experiencing disparities in social, economic, and political treatment compared to men. Consequently, they significantly lag behind men in various life spheres and developmental dimensions. Literacy serves as a critical tool for alleviating gender inequality across all facets of our society (Katiyar, 2016).

In the Puruliya district, the literacy rate of the rural population is 62.7%, with females at 48.1% and males at 76.8%. Comparatively, in rural West Bengal, female literacy stands at 65.5% and male literacy at 78.4%, yielding an overall literacy rate of 72.1%. This under scores a contrasting scenario in the discriminatory pattern of female literacy rates within the Puruliya district as opposed to the state's arena. By using the Sopher Index authors have identified that within the Puruliya district, literacy rates vary among different blocks. However, based on the male-female literacy pattern disparity index has been categorized into three stages:

a. High disparity: >0.46

b. Moderate disparity:0.41-0.45

c. Low disparity: <0.40

**High Disparity :** The blocks revealing high gender disparity in literacy include Jhalda-II, Arsha, Baghmundi, Jaipur, Balarampur, and para (Fig03). These six blocks collectively cover approximately 30% of the district's area. Jhalda-II reports the highest disparity at 0.64% while the differential percentage in male and female literacy rates is 64%, highlighting the alarming situation of literacy within this block.

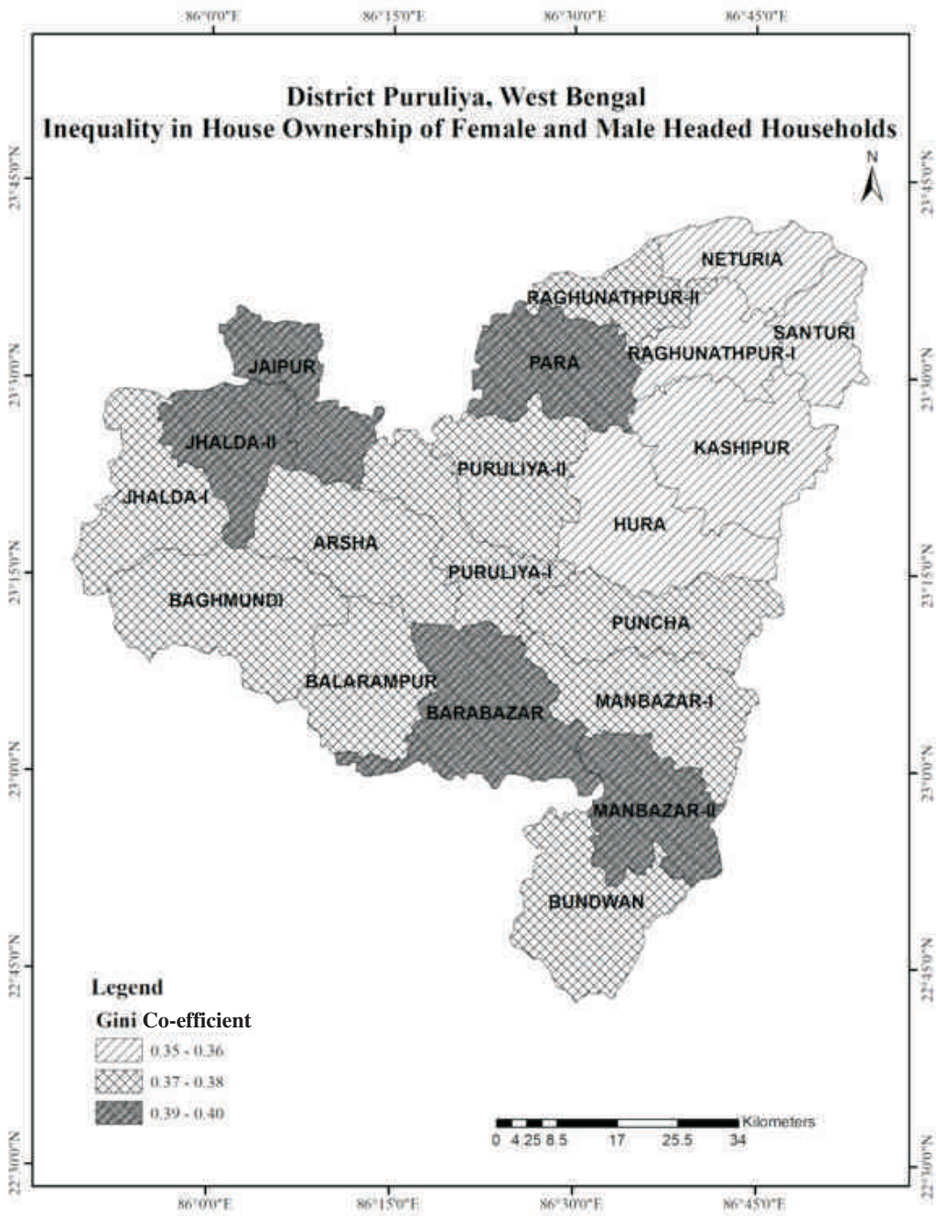
District Puruliya, West Bengal
Inequality in House Ownership of Female and Male Headed Households
N
NETURIA
RAGHUNATHPUR-II
SANTURI
RAGHUNATHPUR-I
PARA
JAIPUR
JHALDA-II
KASHIPUR
PURULIYA-II
JHALDA-I
HURA
ARSHA
PURULIYA-I
BAGHMUNDI
PUNCHA
BALARAMPUR
BARABAZAR
MANBAZAR-I
MANBAZAR-II
BUNDWAN
Legend
Gini Co-efficient
0.35 - 0.36
0.37 - 0.38
0.39 - 0.40
Kilometers
0 4.25 8.5 17 25.5 34
86°00'E
86°15'0"E
86°30'0"E
86°45'0"E
23°45'0"N
23°30'0"N
23°15'0"N
23°0'0"N
22°45'0"N
22°30'0"N

Fig. 02

**Table 02 : Rural Puruliya: Gini Co-efficient Index to Measure Gender Inequality in House Ownership of Headed Households**

| Blocks | Gender | House Ownership of headed households | | Population | | Cumulative Population (%) | Cumulative House Ownership (%) | Fraction of population for house Ownership is higher | Score | Sum | Gini-Co-efficient Index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No | Fraction | No | Fraction | | | | | | |
| **High Inequality** | | | | | | | | | | | |
| Barabazar | Female | 3,755 | 0.115 | 80,350 | 0.49 | 49.44 | 11.56 | 0.505 | 0.16 | 0.6 | 0.40 |
| | Male | 28,740 | 0.881 | 82,158 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Manbazar-II | Female | 2,642 | 0.12 | 48,221 | 0.5 | 49.63 | 12.51 | 0.503 | 0.18 | 0.61 | 0.39 |
| | Male | 18,474 | 0.88 | 48,943 | 0.5 | 100 | 100 | 0 | 0.43 | | |
| Jhalda-II | Female | 3,098 | 0.11 | 66,673 | 0.49 | 49.09 | 11.04 | 0.509 | 0.16 | 0.61 | 0.39 |
| | Male | 24,958 | 0.89 | 69,141 | 0.51 | 100 | 100 | 0 | 0.45 | | |
| Jaipur | Female | 2,467 | 0.1 | 59,457 | 0.48 | 48.3 | 10.04 | 0.52 | 0.152 | 0.61 | 0.39 |
| | Male | 22,098 | 0.9 | 63,633 | 0.52 | 100 | 100 | 0 | 0.46 | | |
| Para | Female | 3,868 | 0.11 | 81,574 | 0.49 | 48.56 | 10.61 | 0.51 | 0.165 | 0.61 | 0.39 |
| | Male | 32,588 | 0.89 | 86,423 | 0.51 | 100 | 100 | 0 | 0.45 | | |
| | | | | | **Moderate Inequality** | | | | | | |
| Manbazar-I | Female | 4,662 | 0.13 | 71,378 | 0.49 | 49.38 | 13.5 | 0.506 | 0.19 | 0.62 | 0.38 |
| | Male | 29,872 | 0.87 | 73,172 | 0.51 | 100 | 100 | 0 | 0.43 | | |
| Bundwan | Female | 2,505 | 0.12 | 44,250 | 0.5 | 49.75 | 12.17 | 0.502 | 0.18 | 0.62 | 0.38 |
| | Male | 18,085 | 0.88 | 44,686 | 0.5 | 100 | 100 | 0 | 0.44 | | |
| Arsha | Female | 3,709 | 0.13 | 76,338 | 0.49 | 49.33 | 12.67 | 0.506 | 0.18 | 0.62 | 0.38 |
| | Male | 25,560 | 0.87 | 78,398 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Jhalda-I | Female | 2,915 | 0.12 | 62,512 | 0.49 | 48.93 | 12.12 | 0.51 | 0.18 | 0.62 | 0.38 |
| | Male | 21,130 | 0.88 | 65,247 | 0.51 | 100 | 100 | 0 | 0.44 | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Baghmundi | Female | 3,394 | 0.12 | 66,059 | 0.49 | 48.72 | 12.4 | 0.51 | 0.18 | 0.62 | 0.38 |
| | Male | 23,971 | 0.88 | 69,520 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Puruliya-II | Female | 4,074 | 0.12 | 77,370 | 0.49 | 49.01 | 12.05 | 0.509 | 0.18 | 0.62 | 0.38 |
| | Male | 29,734 | 0.88 | 80,492 | 0.51 | 100 | 100 | 0 | 0.448 | | |
| Raghunathpur-II | Female | 2,715 | 0.13 | 52,364 | 0.49 | 48.56 | 13.08 | 0.514 | 0.19 | 0.63 | 0.37 |
| | Male | 18,042 | 0.87 | 55,463 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Puruliya-I | Female | 3,457 | 0.12 | 70,621 | 0.49 | 48.54 | 12.43 | 0.514 | 0.18 | 0.63 | 0.37 |
| | Male | 24,361 | 0.88 | 74,873 | 0.51 | 100 | 100 | 0 | 0.45 | | |
| Puncha | Female | 3,502 | 0.13 | 61,179 | 0.49 | 49.4 | 12.72 | 0.506 | 0.19 | 0.63 | 0.37 |
| | Male | 24,037 | 0.87 | 62,676 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Balarampur | Female | 3,159 | 0.12 | 55,205 | 0.49 | 48.63 | 12.04 | 0.51 | 0.18 | 0.63 | 0.37 |
| | Male | 23,079 | 0.88 | 58,314 | 0.51 | 100 | 100 | 0 | 0.45 | | |
| **Low Inequality** | | | | | | | | | | | |
| Hura | Female | 3,929 | 0.14 | 70,708 | 0.49 | 49.25 | 13.64 | 0.507 | 0.2 | 0.64 | 0.36 |
| | Male | 24,866 | 0.86 | 72,867 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Kashipur | Female | 5,355 | 0.14 | 85,587 | 0.49 | 49.1 | 14.47 | 0.509 | 0.211 | 0.64 | 0.36 |
| | Male | 31,653 | 0.86 | 88,738 | 0.51 | 100 | 100 | 0 | 0.43 | | |
| Raghunathpur-I | Female | 3,234 | 0.14 | 46,726 | 0.48 | 48.43 | 13.92 | 0.51 | 0.21 | 0.65 | 0.35 |
| | Male | 19,991 | 0.86 | 49,762 | 0.52 | 100 | 100 | 0 | 0.44 | | |
| Neturia | Female | 2,613 | 0.14 | 40,430 | 0.49 | 48.63 | 14.26 | 0.51 | 0.21 | 0.65 | 0.35 |
| | Male | 15,707 | 0.86 | 42,707 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| Santuri | Female | 2,108 | 0.14 | 35,591 | 0.49 | 49.03 | 14.08 | 0.509 | 0.21 | 0.65 | 0.35 |
| | Male | 12,865 | 0.86 | 36,995 | 0.51 | 100 | 100 | 0 | 0.44 | | |
| **Overall Puruliya** | **Female** | **67,161** | **0.13** | **12,52,593** | **0.49** | **48.99** | **12.51** | **0.51** | **0.18** | **0.62** | **0.38** |
| | **Male** | **46,9811** | **0.87** | **13,04,208** | **0.51** | **100.00** | **100.00** | **0.00** | **0.44** | | |

Source: Computed by Authors

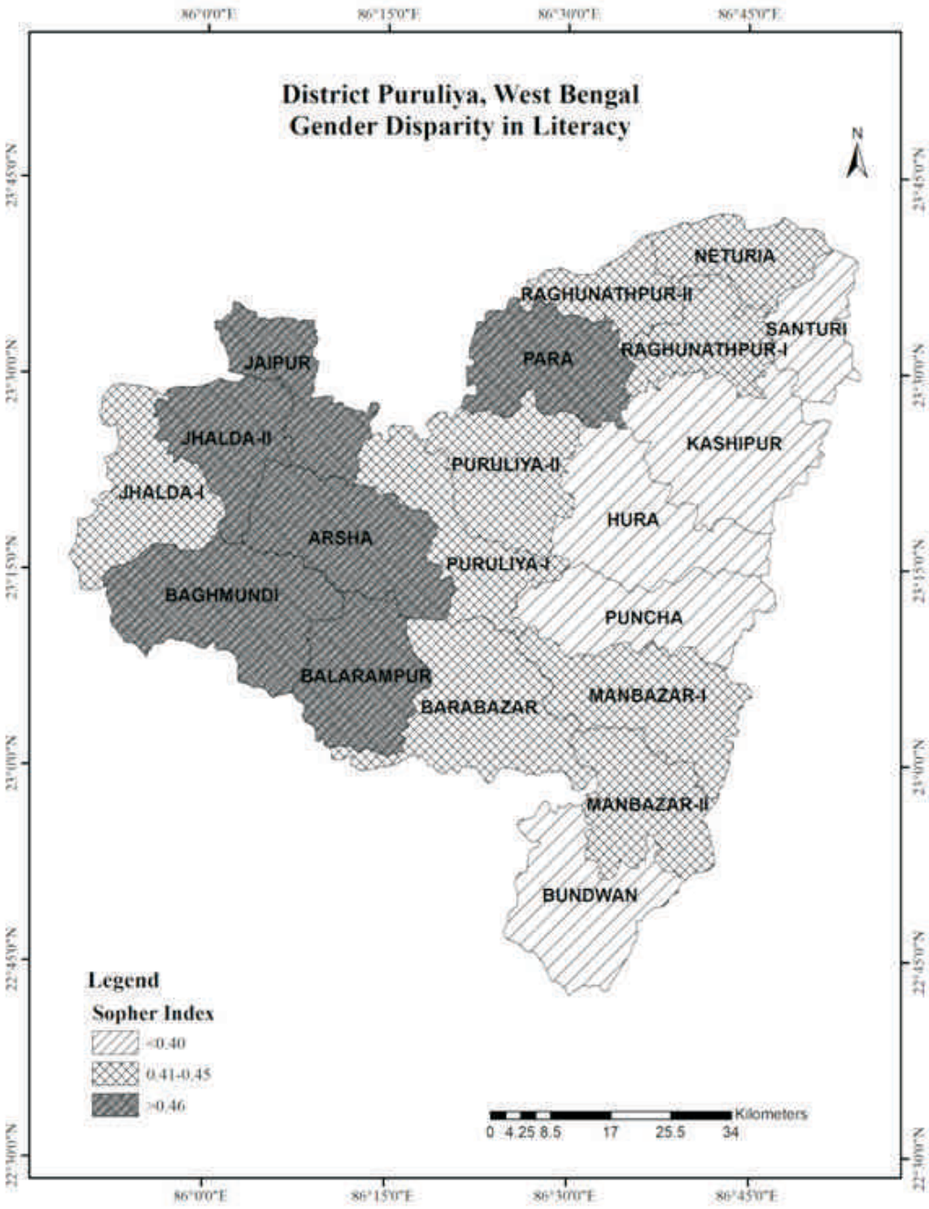
District Puruliya, West Bengal
Gender Disparity in Literacy
N
NETURIA
RAGHUNATHPUR-II
SANTURI
RAGHUNATHPUR-I
PARA
JAIPUR
JHALDA-II
KASHIPUR
PURULIYA-II
JHALDA-I
HURA
ARSHA
PURULIYA-I
BAGHMUNDI
PUNCHA
BALARAMPUR
BARABAZAR
MANBAZAR-I
MANBAZAR-II
BUNDWAN
Legend
Sopher Index
<0.40
0.41-0.45
>0.46
Kilometers
0 4.25 8.5 17 25.5 34
86°0'0"E
86°15'0"E
86°30'0"E
86°45'0"E
23°45'0"N
23°30'0"N
23°15'0"N
23°0'0"N
22°45'0"N
22°30'0"N

Fig. 03

**Table 03 : Assessing the Disparity In Literacy Between Males and Females In Rural Puruliya**

| Blocks | Literate Number of Males (X2) | Literate Number of Females (X1) | A=log (X2/X1) | B=log {(100-X1)/(100-X2)} | Sopher = A+B |
|---|---|---|---|---|---|
| **High Disparity** | | | | | |
| Jhalda-II | 41,767 | 19,941 | 0.32 | 0.32 | 0.64 |
| Arsha | 45,876 | 24,537 | 0.27 | 0.27 | 0.54 |
| Jaipur | 38,314 | 20,837 | 0.26 | 0.26 | 0.53 |
| Baghmundi | 42,019 | 22,920 | 0.26 | 0.26 | 0.53 |
| Balarampur | 35,635 | 19,593 | 0.26 | 0.26 | 0.52 |
| Para | 59,052 | 34,603 | 0.23 | 0.23 | 0.46 |
| **Moderate Disparity** | | | | | |
| Barabazar | 54,415 | 32,671 | 0.22 | 0.22 | 0.44 |
| Purulia-I | 49,969 | 30,248 | 0.22 | 0.22 | 0.44 |
| Manbazar-I | 48,974 | 29,732 | 0.22 | 0.22 | 0.43 |
| Manbazar-II | 31,997 | 19,428 | 0.22 | 0.22 | 0.43 |
| Raghunathpur-II | 38,563 | 23,559 | 0.21 | 0.21 | 0.43 |
| Neturia | 27,985 | 17,162 | 0.21 | 0.21 | 0.42 |
| Purulia-II | 52,711 | 32,535 | 0.21 | 0.21 | 0.42 |
| Jhalda-I | 44,795 | 27,828 | 0.21 | 0.21 | 0.41 |
| Raghunathpur-I | 33,129 | 20,675 | 0.20 | 0.20 | 0.41 |
| **Low Disparity** | | | | | |
| Bundwan | 28,658 | 18,021 | 0.20 | 0.20 | 0.40 |
| Santuri | 24,963 | 16,270 | 0.19 | 0.19 | 0.37 |
| Hura | 51,971 | 34,096 | 0.18 | 0.18 | 0.37 |
| Puncha | 44,267 | 29,219 | 0.18 | 0.18 | 0.36 |
| Kashipur | 63,560 | 42,365 | 0.18 | 0.18 | 0.35 |
| **Overall Puruliya** | **8,58,620** | **5,16,240** | **0.22** | **0.22** | **0.44** |

Source: Computed by Authors

Most of these blocks are situated along the border zones of the states. Furthermore, the blocks fall into the category of high disparity, the index value indicates some clues that these blocks are suffering due to low awareness, economic sluggishness, and inadequate educational infrastructure.

**Moderate Disparity :** Nine blocks fall within this category (Table03). These blocks include Barabazar (0.44), Purulia-I (0.44), Manbazar-I (0.43),Manbazar-II (0.43), Raghunathpur-II (0.43), Purulia-II (0.42), Neturia (0.42), Jhalda-I (0.41), and Raghunathpur-I (0.41). Most of these areas are situated in the northern and south-central parts of the district. Analysis of the Sopher index reveals Barabazar and Puruliya-I as having the highest disparity and Raghunathpur-I and Jhalda-I as the lowest, with a 44% and 41% gap in literacy rates between males and females, respectively. This underscores the vast diversity prevailing within this category.

**Low Disparity :** Five blocks record comparatively low disparity in literacy rates: Bundwan, Santuri, Hura, Puncha, and Kashipur all measuring below 40%. These blocks constitute the area with the lowest disparity, situated close to the innermost part of the state. Economic growth, the impact of modernization from neighboring districts, and prevailing awareness programmes through educational infrastructural support also play a significant role in shaping the current situation of literacy in this region.

**3. Correlation Between Gender Differences In Literacy and Gender Inequality In House Ownership Among Female and Male-Headed Households :** Currently, the correlation between gender disparity in literacy by Sopher and gender inequality index in house ownership has been calculated using a correlation coefficient. The coefficient value of 0.54 signifies a moderately positive correlation. This suggests that literacy has a positive influence on the existing state of inequality in house ownership.

The present study focussed on the relationship between the gender disparity in literacy and inequality in house ownership among female and male-headed households. Consequently, our investigation reveals a significant gender disparity in literacy within the under developed rural Purulia district, with women's literacy at 48.06% and male literacy at 76.83%, resulting in a gender differential percentage of 28.77%, revealing a substantial disparity. A similar study has found that the gender gap in the literacy rate is highest in rural areas and, the most important fact is that literacy among females is unfavorable in all cases (Katiyar, 2016). Additionally, A study centered on West Bengal highlights the minimal efforts undertaken to foster genuine gender equality or eliminate obstacles hindering women from accessing public amenities provided by the state. The allocation of funds for education has failed to address the specific requirements of girls (Banerjee and Roy, 2004).

However, Various national policy frameworks oriented towards women emphasize prioritizing women's education by providing specialized support services, setting time-bound targets, and effectively monitoring goals. Additionally, significant emphasis is placed on increasing women's participation in diverse economic activities at various levels. Conversely, in the present study, there exists a reasonable gap of 38% in property ownership percentage, indicating notable inequality in this economic aspect. Additionally, our study indicates a moderate positive correlation ($r = +0.54$) between gender disparity in literacy and gender inequality in house ownership among household heads. The findings suggest that prioritizing women's education in the Purulia district is crucial, achievable through governmental initiatives and cultural programmes, to enhance literacy levels blocks-wide. At the same time, mandating female participation in property ownership could enhance progress toward the economic development of their life. However, disparities in literacy across various blocks impact women's participatory rights in other aspects of their lives. In the same arena, another study reveals a positive association between literacy and household decision-making, active economic participation, and engagement in various activities (Sakshi & Bano, 2023). Thus, our study highlights the importance of improving educational infrastructure at the grassroots level in villages and promoting cultural programmes to address regional disparities and enhance the district's overall status as well as awareness of their living rights with a special proxy on house ownership.

## Conclusion

Both literacy and ownership of property with special reference to the headship of households are fundamental human rights for both genders. The result reveals that the northern and north-eastern regions have a comparatively higher percentage of house ownership of female-headed households than the south and south-western parts of the Puruliya

district. Similarly, the level of gender disparity in literacy is notably greater in the southern and south western regions compared to the northern and north eastern regions. However, in rural Indian society, gender inequality, rooted in structural patriarchy, is the primary driver behind disparities in property ownership and literacy. Literacy serves as a bridge from underdeveloped to developed, positively correlated with awareness regarding property ownership. By increasing female literacy levels regarding ownership rights, women's empowerment as well as gender parity goals can be achieved. Government initiatives at the grassroots level for women's education, including extracurricular programmes for awareness, and registration of female titles in property can enhance the overall status of women in the district in terms of literacy and equality in the context of house ownership with household headship.

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# EFFECTS OF EDUCATION ON UTILISATION OF HEALTH CARE FACILITIES IN RURAL SITAPUR DISTRICT

**Ram Singh, Murari Lal Meena, Sumedha Sachan and Mukesh Kumar Meena**

**ABSTRACT**

*Health of an individual depends upon his lifestyle and availability and utilisation of health care facilities. Both awareness and utilisation of health care facilities are affected by education because utilisation of health care facilities is affected by many factors and these factors are affected by education. This study is based on primary data, collected through household survey. With increasing education levels, use of allopathy is decreasing and use of AYUSH (with allopathy) is increasing. Preference to government as well as private health centres for first treatment increases with increasing levels of education while preference to quacks is decreasing. Major causes of non-satisfaction from CHCs and PHCs are unavailability of all medicines, absentee of doctors, schedule of health centres and distance. Therefore, for improvement in utilisation of available health care facilities in the study area, improvement in education and literacy is needed with propaganda of available health care services and presence of available medical staff.*

## Introduction

Health is an important component of social well-being. It depends upon one's lifestyle and availability and utilisation of health care facilities. The government established rural health centres i.e. CHCs, PHCs and sub-centres to provide health care to the rural masses. With these rural health centres, AYUSH health centres and private practitioners are also working in rural areas. These rural health centres do not have all the health care services prescribed as per the Indian Public Health Standards (IPHS) norms but have many health services to care the people in some extent. People have to aware about the existing health services because only after the awareness of availability of different services, they may go to the centres to get the services. Actually, utilisation of health care facilities is a complex phenomenon of availability of health care facilities, awareness about available health care services, accessibility to health care facilities, perception and decision making of individual for the utilisation of health care facilities.

Education is essential for all round development of every individual. It is essential for the socio-cultural advancement and economic transformation as well as to improve the quality of life and standard of living in any region. Education increases awareness which further affects utilisation of health care facilities positively. Rajeshwari (1996) find that education of the head of the family emerged as an important factor which has positive effect on women's health care in preventive and curative care in PHC and non-PHC villages. Panicker and Jerusha (2019) concluded that elderly people having education beyond primary school level and

**1. Dr. Ram Singh, Assistant Professor, Department of Geography, J.L.N. (P.G.) College, Etah, U.P.**
**Email: ramsingh10188@gmail.comMobile: 9450874945**
**2. Dr. Murari Lal Meena, Professor, Dept. of Geography, School of Basic Sciences, Central University of Haryana, Mahendragarh, Haryana, Email: mlmeena@cuh.ac.in**
**3. Dr. Sumedha Sachan, Assistant Professor, Department of Geography, Gandhi Degree College, Orai, Jalaun, U.P.**
**4. Dr. Mukesh Kumar Meena, Assistant Professor, Department of Geography, Shivaji College, University of Delhi, New Delhi, Email: mukeshmeena@shivaji.du.ac.in**

belonging to upper socio-economic status had significant association with better health care utilisation. Sachan and Mishra (2022) analysed that the usage of quacks services decreases with increasing levels of education. 59.5 per cent illiterate and 58.6 per cent primary educated respondents sought first treatment from quacks, compared to higher educated respondents (51.1 per cent). Respondents having higher education more utilise private health care facilities. Thus, education influences fertility, mortality, morbidity, awareness and utilisation of health care facilities, etc.

In our country, 69 per cent population is rural. Yet, level of education and literacy remains lower in rural areas than urban areas. Availability of health care facilities is also poor in rural areas. Yadav and Chaudhary (2012) have revealed that the average number of health institutions is 3.07 per lakh population which accounts for 4.70 in urban areas while only 2.59 in rural areas. District Sitapur is a rural district, having 88.16 per cent rural population in 2011. In the same year, literacy rate in Sitapur district is 61.12 (District Census Handbook, 2011). Keeping in view these observations, study, effects of education on utilisation of health care facilities in rural areas of Sitapur district is significant.

**Objectives**

Objectives of this study are-

- To analyse utilisation of health care facilities in the study area.
- To analyse effects of education on utilisation of health care facilities.
- To suggest some remedial measure's to improve utilisation of health care facilities.

**The Study Area**

District Sitapur is a part of Lucknow division. It has a distance about 89 km from Lucknow, headquarters of the division and capital of the state. It is situated on Lucknow-Delhi National Highway No. 30. It is a part of the Ghaghra-Gomati doab which is a sub-part of the Ganga plain.

The district lies between $27^{0}6'$ N to $27^{0}54'$ N latitude and $80^{0}18'$ E to $80^{0}24'$ E Longitudes. It covers an area of 5,743 $km^{2}$. River Ghaghra separates district Bahraich from Sitapur district in the east. The river Gomti makes the boundary from west to south of Sitapur and Hardoi districts. The district is adjoined by Lakhimpur-Kheri district in the north and in the south by Lucknow and Barabanki districts. Presently, for administrative convenience the district is divided into 7 Tahsils and 19 Community Development Blocks. The district has 11 statuary and 1 census town and 2317 inhabited villages (2011).

**Data Base and Research Methodology**

Present study is confined to the analysis of effects of education on utilisation of health care facilities for the rural areas only. Present study is based on primary data which have been collected through the household survey. The perception study of 380 respondents has been conducted on the basis of stratified random sampling. On the basis of education, 35.79 per cent respondents are illiterate, 43.42 per cent have primary school education, 8.42 per cent secondary school education, higher education (11.32 per cent) and professional education (1.05 per cent). All the information and collected data have been tabulated, calculated and analysed through SPSS.

**Results and Discussion**

**Preferred Medicine Systems**

In India, there are many medicine systems in usage i.e., allopathic, ayurvedic, unani, homeopathic and other traditionally used. AYUSH medicine system denotes to ayurveda, yoga and naturopathy, unani, siddha and homeopathy. To know the popularity and magnitude of different medicine systems, respondents have been asked about the use of medicine systems in last one year. Table 01 indicates the preference for medicine

**Table 01 : Preferred Medicine Systems in Last One Year (in Per cent), 2019**

| Levels of Education | Allopathic | AYUSH & Allopathic | AYUSH | Allopathic & *Jhad-funk* | Total |
|---|---|---|---|---|---|
| Illiterate | 97.06 | 02.21 | - | 0.74 | 136 |
| Primary | 81.21 | 16.36 | - | 2.42 | 165 |
| Secondary | 78.13 | 18.75 | - | 3.13 | 32 |
| Higher | 55.81 | 41.86 | 2.33 | - | 43 |
| Professional | 50.00 | 50.00 | - | - | 4 |
| **Total** | **83.42** | **14.74** | **0.26** | **1.32** | **380** |

Source: Field Investigation Survey, May-June and October, 2019

systems which are prevalent in Sitapur district. Allopathy is the most prevalent medicine system which is used by 83.42 per cent respondents. Only 0.26 per cent respondents have not been used this medicine system in any way, but rest of the respondents used with other medicine systems. Only AYUSH system of medicines is used by only one (0.26 per cent) respondent but 14.74 per cent respondents used this medicine system with allopathic system of medicines.

Education plays a prominent role in the use of medicine systems. With increasing education levels from illiterate to higher and professional, use of allopathy is decreasing from 97.06 per cent to 50.00 per cent respondents and use of AYUSH with allopathy is increasing from 2.21 per cent to 50.00 per cent respondents because literacy increases the awareness and mobility among people. It is noteworthy that the availability of AYUSH health care facilities is less as compared to allopathy. Therefore, people have to travel long distances to avail AYUSH health services. Only AYUSH is used by only one respondent having higher education. Jhad-funk with allopathy is used by illiterate and low literate people.

**Preference to the Place for First Treatment**

The government established CHCs, PHCs, sub-centres and AYUSH health centres to provide health care to the rural masses. With these government health centres, private practitioners are also working in rural areas. Due to the lack of proper awareness, less accessibility, shortage of public health facilities and poverty, people also approach to quacks and medical stores for first treatment. To know the satisfaction, popularity and magnitude of different health care facilities, respondents have been asked about the place of first treatment and their views are given in table 02. The table represents that quacks are most prevalent in overall (69.74 per cent) and among different education levels except higher education level. CHCs, PHCs and AYUSH dispensaries are preferred by 13.42 per cent respondents which are far from quacks. District hospital is visited by 1.58 per cent respondents only.

Table 02 also reveals variations among different education levels regarding preference to the place for first treatment. Education has an important relationship with utilisation of health care facilities. Use of quacks is decreasing from 78.68 to 25.58 per cent while use of CHCs, PHCs and AYUSH dispensaries is increasing from 8.82 to 30.23 per cent with increase in levels of education from illiterate to higher education because education increases

**Table 02 : Place for First Treatment (in Per cent), 2019**

| Levels of Education | District Hospital | CHC/PHC/ AYUSH Hospitals | Private Hospitals/ Clinics | Medical Stores | Quacks | Total |
|---|---|---|---|---|---|---|
| Illiterate | 0.74 | 8.82 | 4.41 | 7.35 | 78.68 | **136** |
| Primary | 0.61 | 12.73 | 6.06 | 6.06 | 74.55 | **165** |
| Secondary | - | 15.63 | 12.50 | 6.25 | 65.63 | **32** |
| Higher | 6.98 | 30.23 | 25.58 | 11.63 | 25.58 | **43** |
| Professional | 25.00 | - | - | - | 75.00 | **4** |
| **Total** | **1.58** | **13.42** | **8.16** | **7.11** | **69.74** | **380** |

Source: Field Investigation Survey, May-June and October, 2019

**Table 03 : Reasons for Non-satisfaction From CHCs and PHCs (in Per cent), 2019**

| Levels of Education | - | Absentee of Doctors | Schedule of Health Centres | More Distance | No Good Treatment | No Good Behaviour of Paramedical Staff | Bribe | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| Illiterate | 80.88 | 69.12 | 30.88 | 29.41 | 18.38 | 13.97 | 8.82 | 14.71 | **136** |
| Primary | 80.00 | 64.85 | 49.09 | 39.39 | 16.97 | 18.79 | 8.48 | 15.15 | **165** |
| Secondary | 78.13 | 62.50 | 46.88 | 21.88 | 15.63 | 12.50 | 3.13 | 15.63 | **32** |
| Higher | 67.44 | 62.79 | 48.84 | 25.58 | 9.30 | 4.65 | - | 25.58 | **43** |
| Professional | 25.00 | 25.00 | 50.00 | 75.00 | - | - | - | 25.00 | **4** |
| **Total** | **78.16** | **65.53** | **42.37** | **33.16** | **16.32** | **14.74** | **7.11** | **16.32** | **380** |

Source: Field Investigation Survey, May-June and October, 2019

awareness about the treatment. Use of private hospitals and clinics is also increasing from 4.41 to 25.58 per cent with increase in the levels of education from illiterate to higher education because education increases awareness and income. Education of respondents having professional education is related to ITI, polytechnic, etc. who have relatively less awareness.

**Reasons for Low Preference to CHCs and PHCs**

Preference to CHCs, PHCs and AYUSH dispensaries for first treatment only by 13.42 per cent respondents (table 02) shows low preference to CHCs and PHCs also. Preference to CHCs and PHCs is low due to non-satisfaction of respondents from different aspects of these rural health care facilities.

We should know the causes for this non-satisfaction so that suggestions can be given to improve the preference and utilisation of available health care services. Reasons of non-satisfaction from CHCs and PHCs are given in table 03. The table represents that highest proportion of respondents is unsatisfied because the all medicines are not available (78.16 per cent) followed by the absentee of doctors (65.53 per cent) during duty hours, in overall and among different education levels except professional education. The bribe (7.11 per cent) is the cause of non-satisfaction for lowest proportion of respondents in overall and among different education levels.

Table 03 depicts variation in the causes for non-satisfaction from CHCs and PHCs among different education levels also. Proportion of respondents, unsatisfied due to the bribe and the lack of proper treatment is decreasing and unsatisfied due to the unavailability of medicines and the absenteeism of doctors widely decreasing with increasing levels of education because education affects socio-economic status and awareness of people. Some people of higher socio-economic status go to the centre even after the calling on phone to medical or paramedical staff that at which time they will be present at the health centre. People have higher socio-economic status do not mind for availability of free medicines. Absentee of Doctors bothers respondents of all the education levels.

**Conclusion and Suggestions**

Health is a fundamental right and the state has responsibility to provide good health care services to all its citizens. Illiterates and poor are most affected groups of the society due to the number of factors. Major problems in utilisation of health care facilities are shortage of health care facilities and health care services (especially AYUSH health care services), absenteeism of the staff, unavailability of medicines and equipment. Utilisation of available health care services is affected by improper behaviour by medical and paramedical staff, corruption in health system, literacy, lack of knowledge about their own health and health care services and poor socio-economic conditions. Some of these problems are from the side of beneficiaries while most of the lacunas are from the side of availability and providers. In the same study area, Singh (2022) find a trend of gradual decrease in health care facilities i.e. CHCs, PHCs, sub-centres and doctors, from 2011 to 2019. These factors stand in the way of improvement of health of people, especially illiterates, poor, women and marginalised groups.

Thus, to improve health of people proper availability of health care facilities and improvement in services is necessary, and to utilise these services improvement in socio-economic conditions, especially education is significant. Education is the major measure to improve health of people because it increases awareness about their own health and about available health care services. It also improves economic status, which increases accessibility to private health care facilities. It also increases awareness to raise the demand for proper availability of health care facilities and services from government. That is why, study of Agyemang and Asibey (2018) recommends adequate interventions to improve access to educational opportunities for the rural people by the Ministry of Education, NGOs and other stakeholders. Therefore, free and qualitative education till at least senior secondary level should be made provision to all, especially women, poor and marginalised people.

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# LAND USE / LAND COVER CHANGE ANALYSIS WITH REMOTE SENSING & GIS TECHNIQUES IN SHAHJAHANPUR CITY

**Amit Singh, Jai Prakash Yadav**

**ABSTRACT**

*At present time, to analyze and characterize land use / land cover change, Remote sensing data and GIS approaches are required. The spatial landscape's structure and pattern are also widely explained by the landscape metrics. The uncontrolled momentum of urbanization and land use changes raise many issues that might have not a positive effect on sustainable development. This study aims to examine the change in land use / land cover of Shahjahanpur city. The geographical area of the city is 56 sq. km. The spatio-temporal study of land use and land cover is carried out for two time points 2004 and 2014. The Landsat MSS and Landsat OLI data sources were employed in the analysis. The analysis mainly used digital image processing techniques like the maximum likelihood classifier algorithm for supervised classification. The result of this study will show a speedy growth in land use in Shahjahanpur city in the duration from 2004 to 2014.*

## Introduction

Land use and Land cover change, are some of the most important factors on the earth's surface nowadays. It is also the center point of the sustainable development debate. Urban growth is the movement of residential and commercial land to rural areas at the periphery areas. Fast LULC changes have resulted in the degradation of its ecosystems and affected adversely the environment (Fenglei Fan, Qihao Weng, et.al.). The rapid change in land use and land cover is a major aspect in developing countries. The reason behind this is the rapid growth rate of the population and the pressure on the earth's resources. It is also a major issue of global environmental change. In the last two decades, the pace, magnitude, and spatial reach of human impacts upon the Earth's land surface have been unprecedented (Lambin et al,).

Land use refers to man's activities and their varied uses which are carried on overland and Land cover refers to natural vegetation, water bodies, rock/soil, artificial cover, and there are noticed on the land (NRSA, 1989). Land Cover, defined as the assemblage of biotic and biotic components on the earth's surface is one of the most crucial properties of the earth system. Land cover includes water, snow, grassland, forest, and bare Soil. Land use can include its use for agriculture, development, recreation, wildlife management, etc.

The application of remotely sensed data made it possible to study the changes in less time, at a low cost, and with better accuracy in association with a Geographical Information System (GIS) that provides a suitable platform for data analysis, update, and retrieval. Remote sensing technology and geographic information systems (GIS) provide efficient methods for the analysis of land use issues and tools for land use planning and modelling. Plans for diverse uses of natural resources and nature protection can be developed by comprehending the historical causes that drove land use development,

1. **Amit Singh, Research Scholar, Department of Geography, D.A.V. College, Kanpur, Email id: amit26546@gmail.com**
2. **Prof (Dr.) Jai Prakash Yadav, Professor& Ex-Head, Department of Geography, D.A.V. College, Kanpur Email id: yadav.jp.geo@gmail.com**

managing the current situation with the aid of contemporary GIS tools, and modelling the future.

**The Study Area**

Shahjahanpur city is situated in the west-central part of Uttar Pradesh and the southeast corner of the Rohilkhand division. The absolute location of Shahjahanpur District, lying between latitude 27°37'N to 28°20'N and 79°37'E to 80°23'E longitude. The district covers 4,575 Sq.km. geographical area. It was carved out as a separate district in 1813. It is bounded by the Pilibhit district in the northwest and the east and southeast by Kheri and the Hardoi, in the south lies the Farrukhabad district separated by the river Ganga, and to the west, the Bareilly and Budaun districts. The district is named after its headquarters city Shahjahanpur which was founded during the reign of Shajahahan by Diler Khan.

**Objectives**

The objective of the present research paper is to create a land use /land cover classification scheme for the study area and generate data on land use/land cover change matrix based on satellite data.

**Research Methodology**

To make the study area shape file, The Topo sheet map no. 54M/13 has been used for extracting study area administrative boundaries. For this first of all, the map has been geo-referenced in Arc-GIS software, then after it has been digitized for making study area final map. The Landsat 5 (Thematic Mapper) image of 2004 has a resolution at 15m and Landsat 8 (11 bonds) images of 2014 has a resolution of 15m, datum 1984 and UTM Zone 44, have been used LU/LC classification. The classification has been made in Erdas Imagine 2014 Software. For visual interpretation and cross checking, Google Earth Pro software has been used. The final map layouts have been made in Arc-GIS software.

**Results and Discussion**

**Digital Image Processing**

The study is made through the use of computer-assisted interpretation of Land sat imageries. For better results, a Field survey was performed of the study area using a Global Positioning System (GPS) to enhance the LULC classification scheme as well as for the creation of signature of training sites. To obtain the required information from satellite imageries, processing, and interpretation were made systematically. Both satellite imageries depict the accurate situation of their own time, even historical data for the study area were used to validate the interpretation

**Table 01 : Description of the land use / land cover classes identified in the study area**

| LULC Types | Description |
|---|---|
| Built up | An area that is populated with permanent residents or any type of buildings or roads. |
| Agriculture land | A land area covered with crops or having a fine texture. |
| Water body | Areas covered with water such as rivers and ponds. |
| Vegetation | An area of land covered with mature trees and other plants growing together. |
| Open land | An area of land covered by barren land or any type of unproductive land. |

After determining the training sites, the Maximum Likelihood Classification method is utilized which is considered to give very accurate results. The classification scheme utilized five land use / land cover classes representing Built-up, Agricultural land, Water body, Vegetation, and open land which are described in Table 01.

The change detection technique employed in this study was post-classification comparison. The overlay consisting of LULC maps of 2004 and 2014 was made through ERDAS IMAGINE software. Then a transition matrix was prepared for the overlaid land use / land cover maps of 2004 and 2014.

**Classification**

The study area has been classified into five Land use / land cover classes, which are Built-up, Water bodies, Agricultural land, and vegetation. The classification is shown in the figure 01.

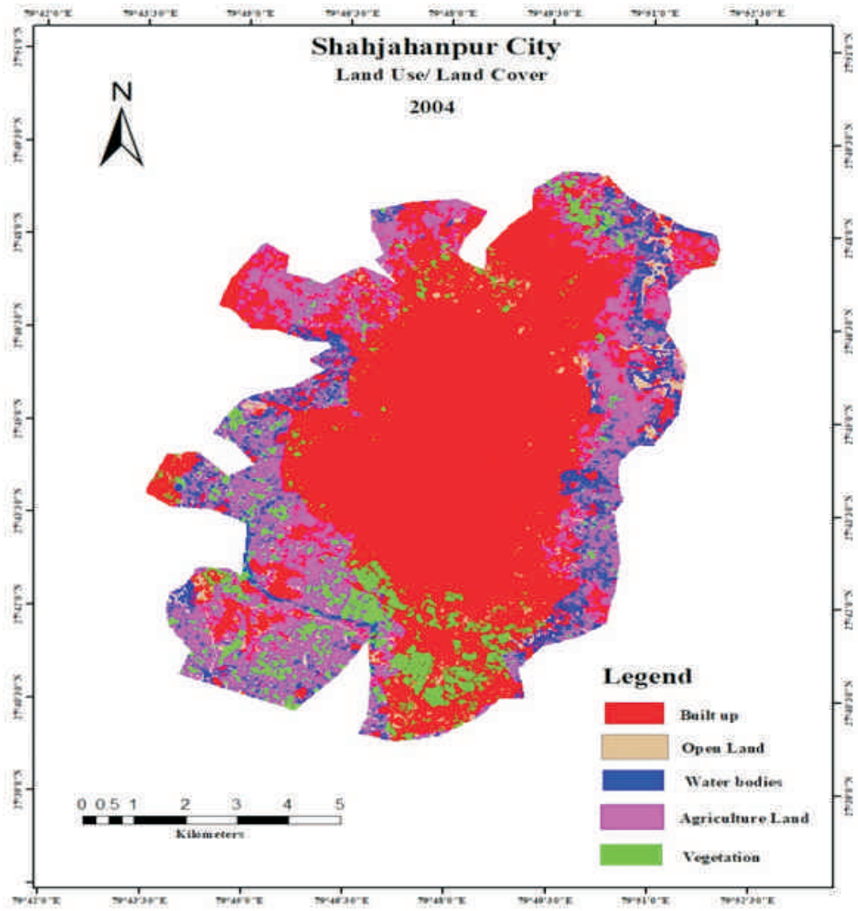


Figure 01: LU/LC Classification map of the study area year 2004
Source: www.earthexplorer.com./Landsat4/image

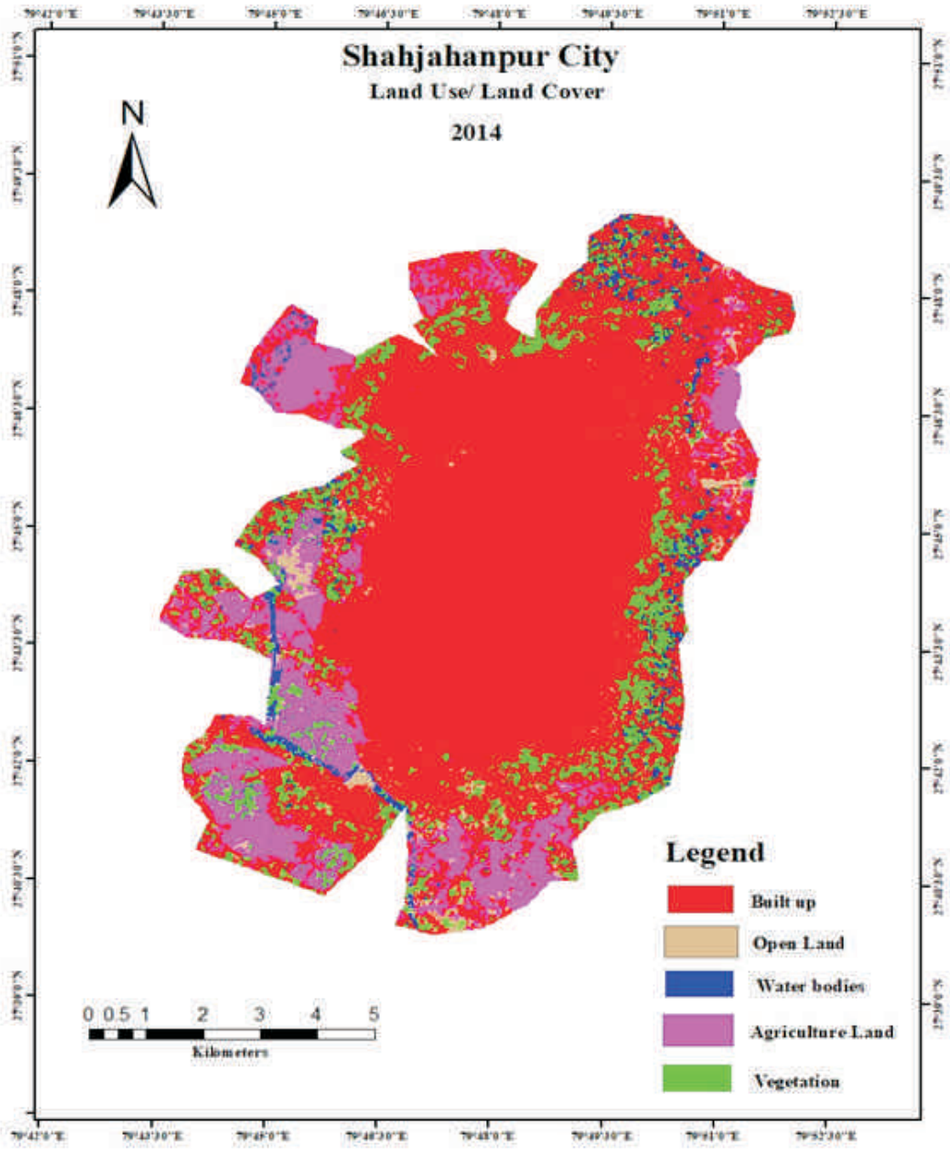


Figure 02: LU/LC Classification map of the study area year 2014
Source: www.earthexplorer.com./Landsat5/image

The tables are the outcome of the analytical efforts of the present classification which states that the existing stage of various LU/LC classes in absolute as well as in percentage form. It is also represented by graphical in Figure 04.

**Table 02 : LU/LC Area of Shahjahanpur City (2004 & 2014)**

| Classes | Area (2004) | | Area (2014) | |
|---|---|---|---|---|
| | Hectare | Percentage (%) | Hectare | Percentage (%) |
| Built - up | 8,383.86 | 58.17 | 10,049.4 | 69.72 |
| Agriculture Land | 2,994.48 | 20.78 | 1,977.57 | 13.73 |
| Vegetation | 1,303.11 | 9.04 | 1,356.93 | 9.41 |
| Water Body | 937.71 | 6.50 | 377.99 | 2.62 |
| Open Land | 794.07 | 5.51 | 651.34 | 4.52 |
| Total | 14,413.23 | 100.00 | 14,413.23 | 100.00 |

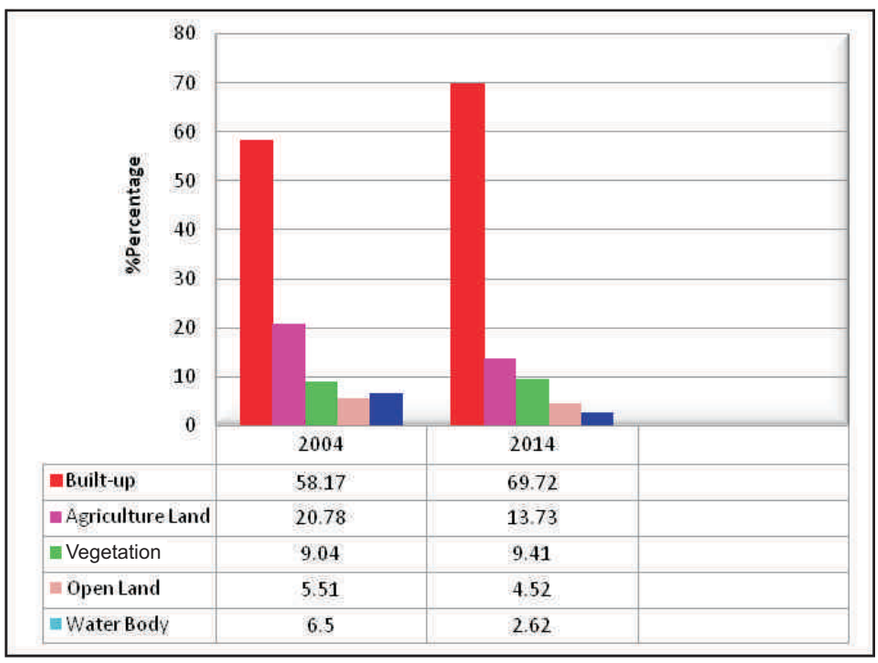


Figure 03 : LU/LC for Shahjahanpur City Year 2004 & 2014

**Change Detection Analysis**

For the change detection in the present study areas, the LANDSAT 5 TM Level-1 and LANDSAT 8 OLI_TIRS Level-1 images are used. The matrix operation in the GIS analysis menu present in ERDAS software is used to find out the change between two years. The matrix operation compares all the classes of the image with all classes of another image and shows the change or transformation of one class to another class.

Change detection is used to identify significant differences in imagery and acquire data at different times. The change detection matrix for the period 2008 and 2018 was produced by using the pixel-by-pixel method. To see the overall changes in one matrix the following matrix is generated below:

**Table 03 : Overall Change Detection Matrix (2014 Area in ha).**

| | | **Built-Up** | **Vegetation** | **Agriculture Land** | **Open Land** | **Water Body** | **Total** |
|---|---|---|---|---|---|---|---|
| **2004** | Built-Up | **8383.86** | - | - | - | - | 8,383.86 |
| | Vegetation | 224.32 | **105.3** | 668.07 | 259.81 | 95.61 | 1,303.11 |
| | Agriculture Land | 992.59 | 920.97 | **759.96** | 184.52 | 136.44 | 2994.48 |
| | Open Land | 119.5 | 111.96 | 320.32 | **117** | 125.29 | 794.07 |
| | Water Body | 329.13 | 218.7 | 229.22 | 90.01 | **70.65** | 937.71 |
| | Total | 10,049.4 | 1,356.93 | 1,977.57 | 651.34 | 377.94 | **14,413.23** |

Thus the Land use classification of the 2004 image covered a total area of 14,413.23 ha, in which Built-up covers 58.17%, Agricultural land covers 20.78%, Vegetation covers 9.04%, and Water body covers 6.50% and Open land covers 5.51% of the total area of the city.

In another image of 2014 Land use classification cover total area is 14,413.23 ha. Built-up covers 69.72%, agriculture land covers 13.73%, vegetation covers 9.41%, open land covers 4.52% and the water body covers 2.62% which is the lowest in all.

Change detection analysis shows the area converted to built-up is mostly from agricultural land. In some areas, agricultural land is also converted into vegetation cover and open land which is reflected in the figure and also in the image. The change analysis indicates that built-up is dominated over all other classes which indicate rapid growth of urban area in the city. The great loss is seen in the area of water bodies even the city is located between two rivers. Thus the city is suffering from expansion of urbanization.

**Conclusion**

This work demonstrates the ability of Remote Sensing & GIS to capture spatial-temporal data. Attempts were made to capture as accurately as possible for land use / land cover as they change through time. The study aimed to quantify land use/land cover changes in Shahjahanpur city with multi-temporal Landsat imagery of the city. The study also unfolds the impact of population growth on changes in the conventional land use / land cover arrangement of the study area. The overall outcomes of the study indicate that agricultural land experienced maximum modifications over this

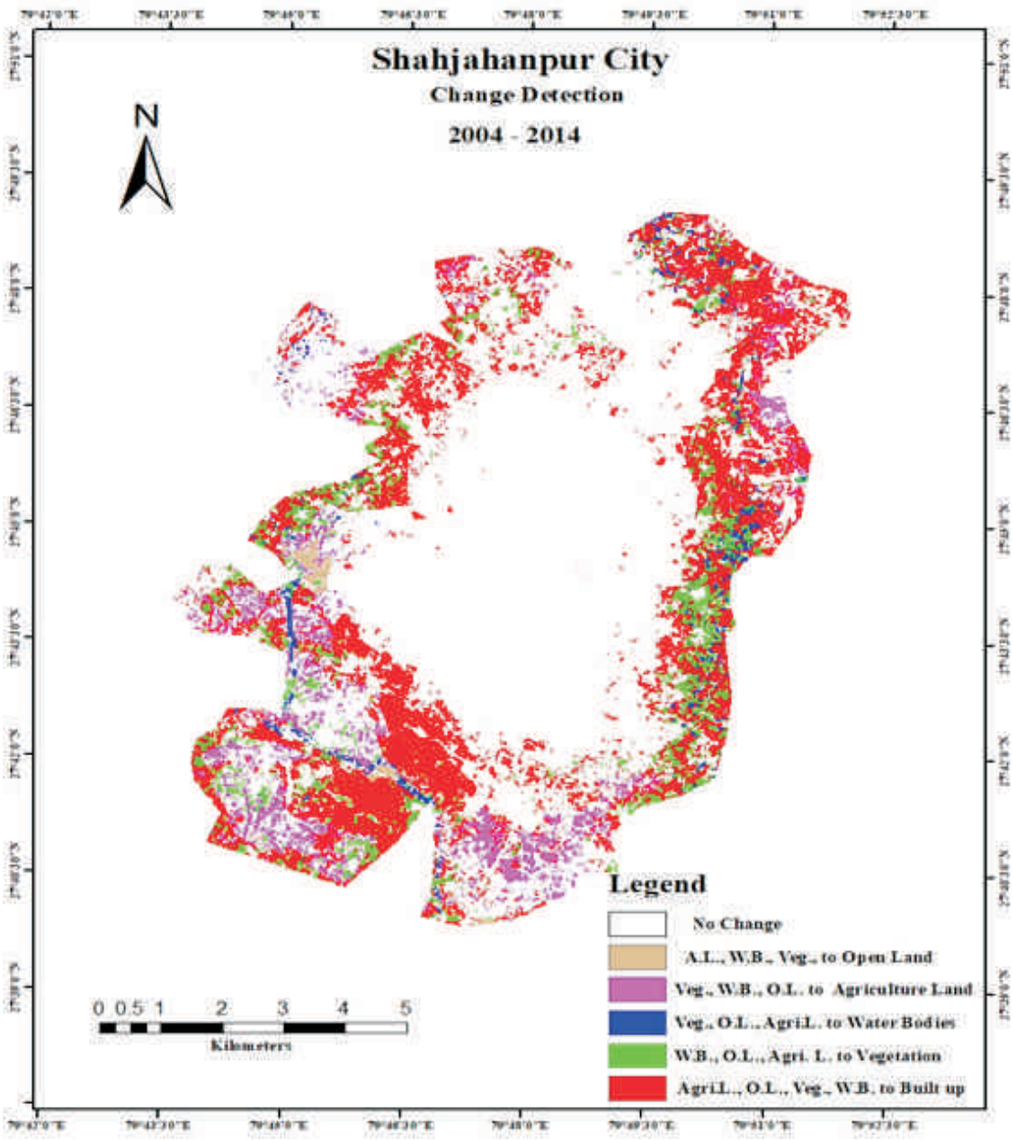


Figure 04 : Change Detection analysis of Shahjahanpur City (2004-2014)
Source: www.earthexplorer.com./Landsat4&5/ change detection map by arc GIS

period. The built-up area showed increasing trends in comparison to other phenomenon. The growth in built-up indicates significant urbanization. The dominating factors like economic growth, location, and accessibility has been observed the most important elements that enhanced the urban area. Thus, the study suggests that population growth is one of the key factors underlying land use changes.

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# DISPARITIES AND DEVELOPMENTAL INEQUALITY EVIDENCE IN HIMACHAL PRADESH: A GEOSPATIAL ANALYSIS

**Manoj Kumar, Krishna Kumar and Manjit Singh**

**ABSTRACT**

*The study aims to assess district-level disparities through a composite index to accurately depict the current scenario of the study area. Disparities in socio-economic status and infrastructure are relative concepts, making it essential to gauge backwardness in district-wise comparisons for effective budget allocation in planning and infrastructure development. To assess backwardness, indicators are used that are negatively correlated with a district's level of backwardness. This study compiles various indicators to measure backwardness district-wise, including the socio-economic backwardness index and amenities and infrastructure backwardness index. The backwardness index is calculated as a linear summation with equal weights for each component.The composite index of backwardness, utilized to determine the backwardness within the Districts of Himachal Pradesh, highlights that rural and tribal districts are economically and infrastructurally more backward compared to others.*

## Introduction

Disparity is a multidimensional phenomenon, characterized by unbalanced development that varies across regions based on socio-economic, cultural, and demographic characteristics (Dinesha, 2015; Kundu and Mondal, 2012). Regional disparity in terms of socio-economic and infrastructure development is a significant concern. It is widely acknowledged that in a large economy like India, different regions possess varying resource bases, leading to unequal growth trajectories over time (Bhattacharya and Sakthivel, 2004; Krishnaiah, et al., 1998).

Numerous studies conducted in academic and research spheres have examined inter-regional variations at different levels (country, state, district, and block), employing various methods and indicators. Regardless of the methodology used, these studies consistently demonstrate that social and economic disparities between regions have widened since independence and have intensified post-reforms (Shaban, 2006; Bhattacharya & Sakthivel, 2004; Singh, et al., 2003; Rao, et al., 1999).

Drezeand Sen (1995) also highlight the significant diversities in economic and social development among Indian states.This study tries to examine the geospatial analysis of disparities and developmental inequality in Himachal Pradesh with the help of a composite index.

## The Study area

Himachal Pradesh, spanning 55,673 square kilometers, accommodates a population of 68,56,509 as per the 2011 Census. Positioned between 30° 22'44" north to 33° 12'44" north latitude and 75° 45'44" east to 79° 04'20" east longitude, it

1. **Manoj Kumar, Ph. D Research Scholar, Discipline of Geography, School of Sciences, IGNOU, New Delhi Email: mksharmahpu@gmail.com**
2. **Dr. Krishna Kumar, Assistant Professor, Discipline of Geography, School of Sciences, IGNOU, New Delhi Corresponding email: dr.krishnakumar@ignou.ac.in**
3. **Dr. Manjit Singh, Assistant Professor, Department of Geography, CUSB (Gaya), Bihar, Email: manjit.sing.des@gmail.com**

constitutes approximately 1.69% of India's total area and hosts around 0.57% of the nation's population. The state comprises 12 districts: Bilaspur, Chamba, Hamirpur, Kangra, Kinnaur, Kullu, Lahaul-Spiti, Mandi, Shimla, Sirmaur, Solan, and Una.

Geographically, Himachal Pradesh is characterized by its hilly and mountainous terrain, distinct from the flat plains of Punjab by the Shiwalik hills. The region features mountainous ranges, hills, and valleys, with the Shiwalik ranges enclosing it to the west and south west, the Dhauladhar and Pirpanjal ranges to the northwest, and the great Himalayan range to the north. The Zanskar range marks the boundary to the north and northeast.

**Objectives**

- To prepare the district-level composite index of backwardness for Himachal Pradesh
- To compile the various indicators for measuring socio-economic disparities and developmental Inequality in Himachal Pradesh.

**Database and Research Methodology**

The paper relies entirely on secondary data sourced from various departments such as the Census of India, Health Department, Educational Department, Road and Transport Department, and Economic and Statistical Department. The study's objective regarding backwardness is examined through the application of Principal Component Analysis (PCA).

To capture various dimensions of backwardness, priority is given to selecting output indicators. However, at the district level, input indicators are also incorporated to encompass the relative gaps in infrastructure availability, socio-economic status, education, and health. To identify intra-state disparities in backwardness, a total of 34 indicators have been chosen from five primary components of development: demographic factors, economic status, educational development, health, and basic amenities and infrastructure.

Following data collection, the selection criteria for indicators have been three fold, as outlined by Bakshi, et al.,2015: data source criteria, sensitivity criteria, and correlation criteria. According to the first criterion, only indicators gathered from authentic sources with robust methodologies are considered.

The sensitivity criterion dictates that selected variables should effectively differentiate between backward and less backward regions. It's noted that indicators may be utilized in a manner negatively correlated with a district's level of backwardness in this regard.

To ensure that indicators with different units of measurement are aggregated properly, they need to be normalized to create scale-free data. This can be achieved using the formula:

$$X_{new} = (X_{max} - X_{min}) / (X - X_{min})$$

After normalization, each component's data ranges from 0 to 1, indicating the degree of backwardness, with 1 representing a high level of backwardness. The development index is then computed as a linear summation with equal weights assigned to each component. This approach, as per the Government of India Backwardness Report (2013), ensures that no component carries disproportionate weight in the overall index.

**Results and Discussion**

The population of Himachal Pradesh has changed over the past few decades, significantly influencing the state's planning and development programmes. Among the districts, Kangra has the highest population, followed by Mandi and Shimla. However, in terms of population density, Hamirpur district has the highest density, followed by Una and Bilaspur.

**Table 01: Variables and Indicators**

| Variables | Indicators | Data Source |
|---|---|---|
| Demographic | Population | Census of India |
| | Density of population (population per sq. km) | |
| | Urbanization Share (%) | |
| | % SC Population | |
| | Scheduled Tribes population (%) | |
| | Decadal Growth Rate | |
| | sex ratio (0-6) | |
| Economic Index | Per Capita Income | Economics & Statistics Department, Government of HP |
| | Percentage of Irrigated to Cultivable Area | |
| | Agriculture Production of Food Grains (in M.T.) | |
| | Himachal Pradesh Government Employees | |
| | Number of small-scale industry units | |
| | The average population per bank | |
| | Total Workers | |
| | Cultivators | |
| | Number of Tourists Visited | |
| | Horticulture Production of Fruits | |
| Social Index | Female Literacy Rate | Census of India |
| | Middle-ClassDrop-Out Rate | Economics & Statistics Department, Government of HP |
| | Secondary Schools | |
| | Number of Primary and Upper Primary schools per 10000 Population | |
| | Hospital per 1,00,000 persons .) | National Family Health Survey/ Economics & Statistics Department, Government of HP<br><br>Directorate of Health Services, Himachal Pradesh |
| | CHC/s per 80,000 persons | |
| | PHC/s Per 20,000 persons | |
| | Beds per Thousand Population | |
| | General Hospitals/ Community Health Centers/ Primary Health Centres /ESI Dispensary/ Sub - Centres | |
| | Female Infant Mortality Rate | |
| | Crime | Economics & Statistics Department, Government of HP |
| Amenities Infrastructure Index | Surface Road Kms | Census of India |
| | Hospital / Dispensaries/ CHC/ RH / PHC | |
| | Education institute | |
| | High School/ Secondary / UG College / PG College | Economics & Statistics Department, Government of HP |
| | Employment Exchange | |
| | Fire Station | |
| | Police Post and station | |
| | Post office | |
| | No of Banks | |
| | Credit Co-Operative Societies | |
| | Number of Fair Price Shops | |

**Table 02 : Demographic Profile**

| Name of District | Population | Density of population (population per sq. km) | Scheduled Tribes population (%) | Scheduled Castes population (%) | Urbanization Share (%) | Decadal Growth Rate | Sex-ratio (0-6) |
|---|---|---|---|---|---|---|---|
| Bilaspur | 3,81,956 | 327 | 2.80 | 25.92 | 6.57 | 12.05 | 900 |
| Chamba | 5,19,080 | 80 | 26.10 | 21.52 | 6.95 | 12.63 | 953 |
| Hamirpur | 4,54,768 | 407 | 0.67 | 24.02 | 6.91 | 10.19 | 887 |
| Kangra | 15,10,075 | 263 | 5.60 | 21.15 | 5.71 | 12.77 | 876 |
| Kinnaur | 84,121 | 13 | 57.95 | 17.53 | 0 | 7.39 | 963 |
| Kullu | 4,37,903 | 80 | 3.84 | 28.01 | 9.45 | 14.76 | 962 |
| Lahaul-Spiti | 31,564 | 2 | 81.44 | 7.08 | 0 | -5.00 | 1033 |
| Mandi | 9,99,777 | 253 | 1.28 | 29.38 | 6.26 | 10.92 | 916 |
| Shimla | 8,14,010 | 159 | 1.08 | 26.51 | 24.73 | 12.67 | 925 |
| Sirmaur | 5,29,855 | 188 | 2.13 | 30.34 | 10.78 | 15.54 | 928 |
| Solan | 5,80,320 | 300 | 4.42 | 28.35 | 17.60 | 15.93 | 899 |
| Una | 5,21,173 | 338 | 1.65 | 22.16 | 8.61 | 16.26 | 875 |
| H.P. | 68,64,602 | 123 | 5.71 | 25.19 | 10.03 | 12.94 | 909 |

Source: Census of India, 2011

The percentage of Scheduled Tribes population is highest in Lahaul and Spiti, followed by Kinnaur and Chamba, while the Scheduled Caste population is most prominent in Sirmour, followed by Shimla and Solan districts. Shimla, the oldest Urban Local Body in Himachal Pradesh has the highest urbanization followed by Solan and Sirmaur (Table 01).

**Social-Economic disparities in Himachal Pradesh**

The economic growth in Himachal Pradesh is primarily driven by agriculture and its allied activities, exhibiting minimal fluctuations during the nineties with a relatively stable growth rate. However, the state displays a highly uneven pattern of economic backwardness. Five districts - Shimla, Solan, Bilaspur, Hamirpur, and Kangra - exhibit low levels of economic development. Conversely, two tribal districts, Kinnaur and Lahaul-Spiti, demonstrate a high level of economic backwardness. The remaining five districts, i.e. Chamba, Kullu, Mandi, Una, and Sirmaur - display moderate levels of economic backwardness. Shimla district has the lowest level of economic backwardness, while the Lahaul-Spiti district experiences the highest level in the study area.

Furthermore, Fig. 01 outlines the status of social backwardness in the study area. Four districts - Shimla, Solan, Sirmaur, and Lahaul-Spiti - have low social status among the 12 districts in the state. However, six districts - Kinnaur, Kangra, Una, Hamirpur, Bilaspur, and Mandi - demonstrate a moderate level of social backwardness. Only two districts - Kullu and Chamba - exhibit a high level of social backwardness. Additionally, Fig. 01 indicates that Lahaul-Spiti has the lowest level of social backwardness, while Chamba district has the highest social backwardness in Himachal Pradesh.

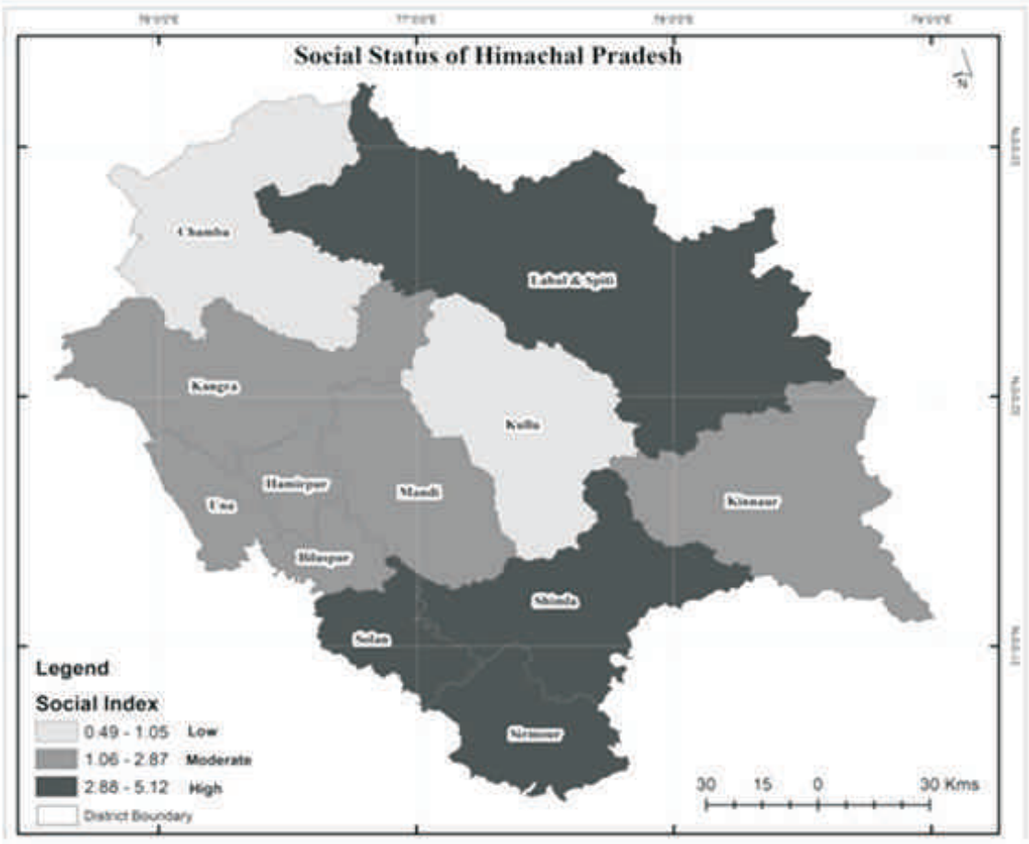


Fig. 01

**Amenities/Infrastructure Status of Himachal Pradesh.**

Access to adequate amenities and infrastructure, such as surface road kilometers, healthcare facilities, educational institutes, employment exchanges, fire station, police post and stations, post offices, bank and fair price shops, is crucial for human development. In developing countries like India, access to these amenities is equally distributed leaving the poor deprived of adequate infrastructure facilities.

Basic necessities like drinking water, sanitation, electricity, and drainage are essential for ensuring a decent quality of life. Fig. 02 illustrates that infrastructural backwardness is not evenly distributed across the study area. Only three districts, i.e. Shimla, Solan, and Kangra - exhibit low levels of infrastructural backwardness. Four districts,i.e. Chamba, Mandi, Una, Bilaspur, Hamirpur, and Sirmaur - demonstrate a moderate level of infrastructural backwardness.

The remaining three districts, two of which

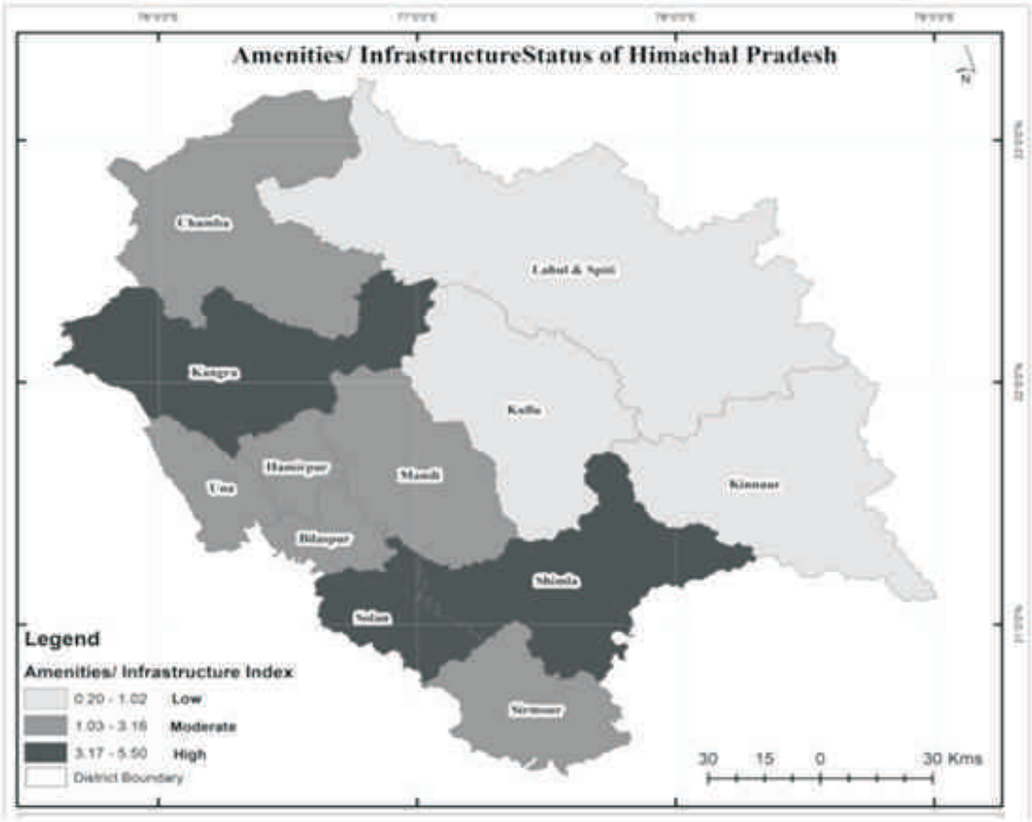


Fig. 02

are tribal regions, experience a high level of infrastructural backwardness in the state. Fig. 02 further indicates that Shimla district has the lowest infrastructural backwardness, likely due to its status as the capital district. Conversely, Lahaul-Spiti exhibits the highest level of backwardness in terms of infrastructure, attributed to its challenging topography, harsh climatic conditions, and sparsely distributed population.

To show the overall backwardness and regional development disparities, the composite index method is used which is an aggregate of economic, social, and amenities/infrastructure index scores to represent overall performance parameters. Fig.03 highlights that only two districts, Shimla and Solan, have the lowest overall backwardness in the state. Five districts - Kangra, Hamirpur, Bilaspur, Mandi, and Sirmaur - display moderate levels of overall backwardness. The remaining five districts exhibit the highest overall backwardness. Furthermore, tribal districts continue to grapple with their overall backwardness, despite districts like Shimla and Solan ranking lowest in terms of overall backwardness.

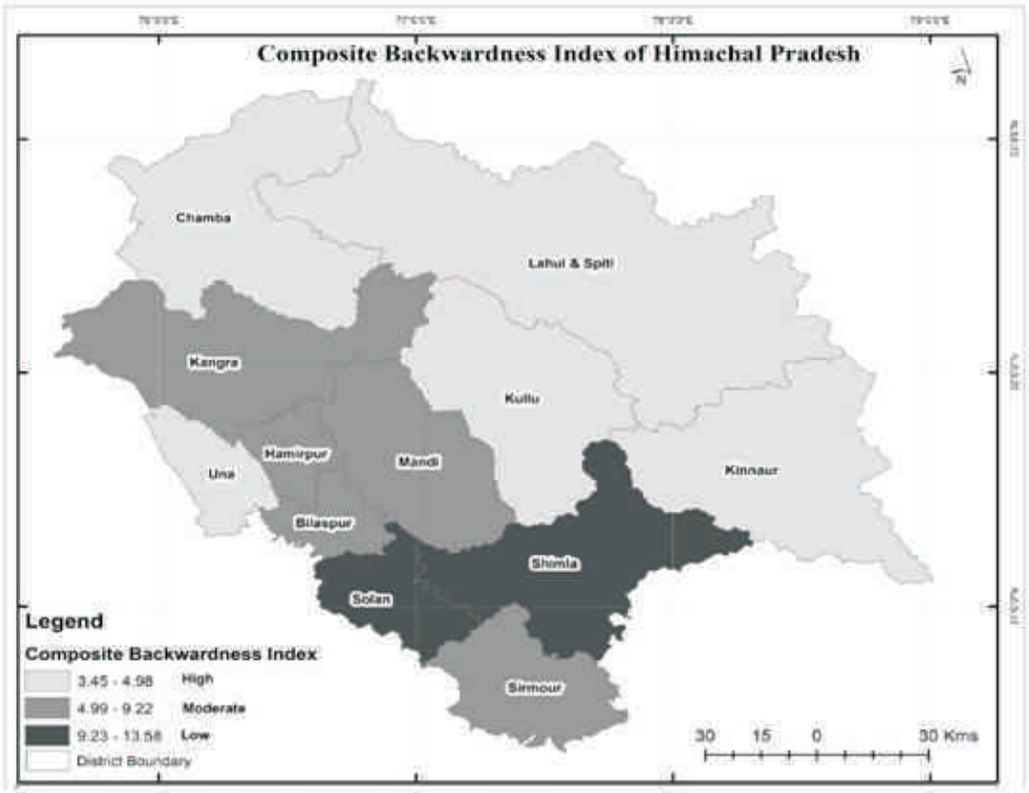


Fig. 03

**Conclusion**

The composite index shows that there is great inter-district backwardness in Himachal Pradesh which shows that the rural and tribal districts like Lahaul & Spiti, Kullu, Kinnaur, Chamba, and Una are economically and infrastructurally backward as compared to other districts. However, based on social parameters tribal districts like Lahaul & Spiti have better status as compared to the others. It is evident from the above discussions that Shimla district has the lowest backwardness and Lahaul & Spiti district has the highest overall backwardness. It is safe to conclude that irrespective of many social-economic and infrastructural development plans, the state shows significant variations in the patterns of overall development. Backwardness still exists in the maximum parts of the study area. Only a few regions have shown positive development trends in terms of overall development.

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# DISPARITY INDEX OF RURAL - URBAN LITERACY PATTERNS OF NAGPUR DISTRICT, M.S.

**Sangita R. Chandrakar**

**ABSTRACT**

*This study investigates the rural-urban literacy disparity in Nagpur District, Maharashtra, analyzing tahsil-wise data from 2001 to 2011. Utilizing district statistical handbooks and census records, the research employs the Disparity Index to quantify literacy distribution variations. Despite Maharashtra's relatively high literacy rate (82.91% in 2011), significant disparities exist between urban and rural areas, and between genders, often attributed to urban migration for education and jobs. These disparities are pronounced in Nagpur District, highlighting socio-economic challenges. By applying the Disparity Index, the study aims to provide a detailed understanding of these gaps and their implications. The findings seek to inform policies aimed at reducing literacy disparities, emphasizing the need for targeted educational strategies. Addressing these gaps is vital for equitable socio-economic development in Nagpur District, contributing to the broader goal of enhancing literacy rates and promoting inclusive growth across Maharashtra. This research underscores the importance of bridging rural-urban and gender divides in literacy to foster socio-economic advancement.*

## Introduction

Literacy, as defined by the census enumeration, refers to a person above the age of seven who can read and write with understanding in any language, regardless of formal education. It plays a crucial role in shaping society, serving as an indicator of a healthy environment and contributing to economic development. Higher literacy rates are generally associated with a stronger economy and an improved quality of life, while low literacy rates pose significant challenges to both the economy and society as a whole. Investing in universal basic services, such as health and education, is crucial for multiple reasons. Firstly, it aligns with the Sustainable Development Goals and promotes inclusive human development. Secondly, these services provide a vital insurance function by offering stability to individuals and families in the face of constant and unpredictable challenges. This sense of security encourages people to take risks and engage in experimentation. When individuals are confident that their health and education needs are met, they are more likely to explore new opportunities and pathways without the fear of jeopardizing their well-being or being pushed into a deep socio-economic decline.

Shifting culture, for good or ill, is possible and can happen quickly. Education can be a powerful tool to open the potential for new perspectives in younger generations, not just through curricula but also by envisaging schools as spaces of inclusion and diversity. Social recognition by elites of all types, from politicians and celebrities to social media influencers and community leaders, is an important mechanism for cultural change (HDR 2021/22). Literacy represents the fundamental and essential education required to eradicate poverty and overcome mental isolation. It fosters harmonious international relations and facilitates the free flow of demographic processes. The definition of literacy

**Dr. Sangita R. Chandrakar, Associate Professor, Department of Geography, Dhandai Arts & Science College, Amalner, Dist.- Jalgaon, Email:-drsangeeta.chandrakar@gmail.com, Mobile No.+919881387699**

may vary across countries based on their historical context and social development. UNESCO defines literacy as the ability to identify, understand, interpret, create, and compute written materials in various contexts (Joshi, 1999; Hassan, 2005).

Significant disparities in literacy rates exist across states and regions, as evident in India. Maharashtra stands out as a frontrunner in terms of literacy rate at the national level. According to 2011 Census of India, literacy in Maharashtra has experienced remarkable growth, rising from 27.91% in 1951 to 82.91% in 2011, surpassing the national average. Maharashtra consistently exhibits higher literacy rates compared to neighboring states such as Rajasthan, Andhra Pradesh, Chhattisgarh, Gujarat and Madhya Pradesh. However, significant variations in literacy levels can still be observed across districts within Maharashtra. For instance, the Mumbai Suburban District boasts the highest literacy rate of 90.90% among all districts in Maharashtra. In contrast, the lowest literacy rate of 63.04% is recorded in the Nandurbar District as of 2011. These statistics highlight the significant regional disparities in literacy rates across districts within Maharashtra. This research paper aims to focus on the rural-urban literacy patterns in Nagpur District between 2001 and 2011, shedding light on the regional disparities.

**The Study Area**

Nagpur district, located in eastern Maharashtra, India, lies between north latitudes 20°35' and 21°44' and east longitudes 78°15' and 79°40'. Covering an area of 9,892 square kilometers, it constitutes 3.21% of Maharashtra's total landmass. Divided into 14 talukas, the district holds historical significance as it was once part of the ancient Vidarbha kingdom, mentioned even in the Upanishads. Over time, Nagpur came under British rule in 1854 and became the capital of the Central Provinces in 1861. In 1947, it became the capital of Madhya Pradesh before being transferred to Bombay state in 1956. Finally, on May 1, 1960, Nagpur became a part of Maharashtra.

The district's terrain varies in elevation from 150 to 600 meters above mean sea level. Towards the west, the landscape showcases terraced hills formed by Deccan lavas, while the northern region extends into the ranges of the Satpura hills. The eastern and southeastern areas appear relatively flat with scattered hillocks. Wardha River and its tributaries such as Bor, Wunna, Lam, and Kar drain the western and southwestern parts, while the eastern and east-central regions are drained by the Wainganga River and its tributaries, including Kanhan, Kolar, Pench, Sur, Amb, and Nag.

The district's primary soil type is known as morand, characterized by its light, deep, black, and grey colour. It covers approximately two-thirds of the cultivated area. Small pockets of Wardha and other river valleys contain kali, a medium deep, black soil. The eastern part of the district features khard, a shallow, greyish sandy soil, while the trap hill region in the west consists of bardi, a red gravelly soil with boulders. The district's forests belong to the southern tropical deciduous type, featuring tree species such as Teak, Salai, Bija, Dhawada, and Tendu. Nagpur experiences a dry sub-humid climate with hot summers and mild winters, with around 90% of the annual rainfall occurring from June to September. Agriculture serves as the main occupation in the district, with crops and orchards occupying nearly 58% of the land. Jowar, rice, wheat, cotton, tur, linseed, chillies, and oranges are among the significant crops grown, with Nagpur renowned for its high-quality oranges. Approximately 8.3% of cultivable land is under irrigation. Nagpur boasts excellent connectivity with other major cities in India.

**Objectives**

1. To identify the literacy trends at the tahsil level.
2. To discern the spatial and temporal dimensions of the literacy gap between rural and urban areas.

**Database and Research Methodology**

This research aims to investigate the rural-urban literacy disparities in Nagpur district, Maharashtra, from 2001 to 2011 using Sopher's Disparity Index. The tahsil, which is a sub-district administrative unit with 14 divisions in the district in 2011, has been selected as the appropriate unit of analysis due to data availability. Sopher's Disparity Index is a widely used measure that calculates the disparity between two groups in terms of the logarithm of the odds ratio of possessing a particular property. The logarithm is used to mitigate the levelling off effect, which accounts for the possibility of regions with higher literacy rates showing lower disparity compared to regions with lower literacy rates, even if the gap between them is the same. The Disparity Index (Sopher D.E., 1974) has been utilized to illustrate the disparity in literacy rates between males and females. The values have been calculated for the census years of 2001 and 2011 to assess the changes over time.

Disparity Index (DI)

$$DI = Log (X_2 / X_1) + Log (100 - X_1) / (100 - X_2)$$

Where, DI = Disparity Index

$X_2$ = Percentage of Urban Literates.

$X_1$ = Percentage of Rural Literates.

i.e. $X_2 \geq X_1$

The Disparity Index (DI) technique is a valuable tool for measuring the relative disparity between two variables. A DI value of zero indicates perfect equality, while higher values indicate a greater extent of disparity and lower values indicate lower disparity.

**Results and Discussion**

**Trends of Literacy Rate**

India, the second most populous country in the world after China, is projected to surpass China's population and reach 1.6 billion by 2050. Over time, India's total population has experienced significant growth, increasing from 23.84 crores in 1901 to 121 crores in 2011. Whereas, literacy rate of India has increased from 28.30 % in 1961 to 74.04 % in 2011. That's great to hear! A literacy rate of 54.56% in the Nagpur district indicates that a significant proportion of the population in that area possesses the ability to read and write. Furthermore, with the state average being 47.18%, it suggests that Nagpur district is performing comparatively better in terms of literacy rates. This implies that efforts to promote education and literacy in Nagpur district have been somewhat successful, surpassing the average literacy rate of the state. Having a higher literacy rate can have several positive impacts on the overall development and well-being of the district's residents.

During the period from 1961 to 2011, literacy in Maharashtra consistently remained above the national average, primarily due to the improvement of educational facilities, particularly in rural areas that experienced significant growth. Maharashtra witnessed a notable increase in literacy rate from 35.08% in 1961 to 82.34% in 2011, although there were substantial regional variations. The 2011 Census of India revealed that certain districts in the country displayed high literacy rates. For instance, Mumbai Suburban recorded a literacy rate of 90.9%, followed by Nagpur at 89.52%. Mumbai City and Amaravati also showcased notable literacy rates, with 88.48% and 88.23% respectively. However, districts like Nandurbar (63.04%) and Gadchiroli (70.55%) in Maharashtra had considerably lower literacy rates due to factors such as a high concentration of tribal population, inadequate educational facilities, rugged topography, and challenging terrain compared to other parts of the state.

From 1991 to 2011, literacy in Nagpur District surpassed the state average. In 1961, the district had a literacy rate of only 35.15%. However, significant progress was made in subsequent

decades, with literacy rates reaching 73.64% in 1991, 84.00% in 2001, and 88.39% in 2011. Both male and female literacy rates showed consistent improvement over the past four decades. Notably, during the period from 2001 to 2011, a significant literacy gap was observed in Bhiwapur (8.75%), Ramtek (7.87%), and Mouda (7.37%). According to the 2011 Census of India, the highest literacy rate was observed in Nagpur (Urban) (91.92%) tahsil, attributable to its high degree of industrialization and urbanization. Conversely, the lowest literacy rate was recorded in Kuhi (78.25%) tahsil due to inadequate educational facilities.

**Patterns of Rural - Urban Literacy in Nagpur District: 2001-2011**

The study examines the concept of provincial development from the perspective of literacy rates in both rural and urban areas. Economic opportunities are seen as contributing to growth, while social opportunities are seen as enhancing humanistic values, leading to overall development in the region. To measure regional disparities in educational development, the study utilizes a disparity index based on rural-urban literacy rates. The trends in literacy rates in rural and urban areas from 2001 to 2011 are presented in Table 01. The rural-urban literacy disparity, which was 0.403 in 2001, decreased to 0.368 in 2011, indicating a positive trend. This suggests that individuals in rural areas have become more aware of the importance of education.

**Table 01 : Rural - Urban Disparities of Literacy in Nagpur District, 2001-2011**

| Sr. No. | Name of Tahsils | 2001 | | | | 2011 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rural | Urban | *Tahsil Literacy Rate (%) | Disparity Index | Rural | Urban | *Tahsil Literacy Rate (%) | Disparity Index |
| 1 | HINGANA | 78.3 | 88.4 | 82 | 0.3246 | 84.26 | 90.1 | 87.18 | 0.230 |
| 2 | KALAMESHWAR | 78.4 | 86 | 80 | 0.2284 | 83.24 | 90.68 | 85.49 | 0.292 |
| 3 | KAMPTEE | 79.6 | 87.6 | 84.4 | 0.257 | 83.99 | 89.95 | 87.57 | 0.231 |
| 4 | KATOL | 76.3 | 87.3 | 79 | 0.329 | 82.44 | 90.12 | 84.48 | 0.288 |
| 5 | MOUDA | 75.1 | NA | 75.1 | NA | 81.56 | 90.35 | 82.47 | 0.325 |
| 6 | NAGPUR (Rural) | 80.3 | 90.3 | 83.4 | 0.358 | 86.23 | 92.2 | 89.28 | 0.275 |
| 7 | NAGPUR(Urban) | NA | 89.3 | 89.3 | NA | NA | 91.92 | 91.92 | NA |
| 8 | NARKHED | 76.1 | 82.4 | 77.4 | 0.167 | 82.74 | 88.01 | 83.81 | 0.185 |
| 9 | PARSEONI | 73 | 83.1 | 76.4 | 0.259 | 80.11 | 84.47 | 81.55 | 0.130 |
| 10 | RAMTEK | 69.1 | 82.1 | 72.3 | 0.311 | 78.57 | 87.7 | 80.17 | 0.288 |
| 11 | SAVNER | 78.8 | 85.7 | 81.2 | 0.207 | 82.76 | 88.31 | 85.23 | 0.196 |
| 12 | UMRED | 73.6 | 84.6 | 77.3 | 0.294 | 80.68 | 88.12 | 83.31 | 0.249 |
| 13 | BHIWAPUR | 70.1 | NA | 70.1 | NA | 78.76 | NA | 78.76 | NA |
| 14 | KUHI | 71.9 | NA | 71.9 | NA | 78.25 | NA | 78.25 | NA |
| | **Nagpur District** | 75.6 | 88.7 | 84 | 0.403 | 81.92 | 91.37 | 88.39 | 0.368 |

Source: Calculated by the Author
NA: Not Applicable.

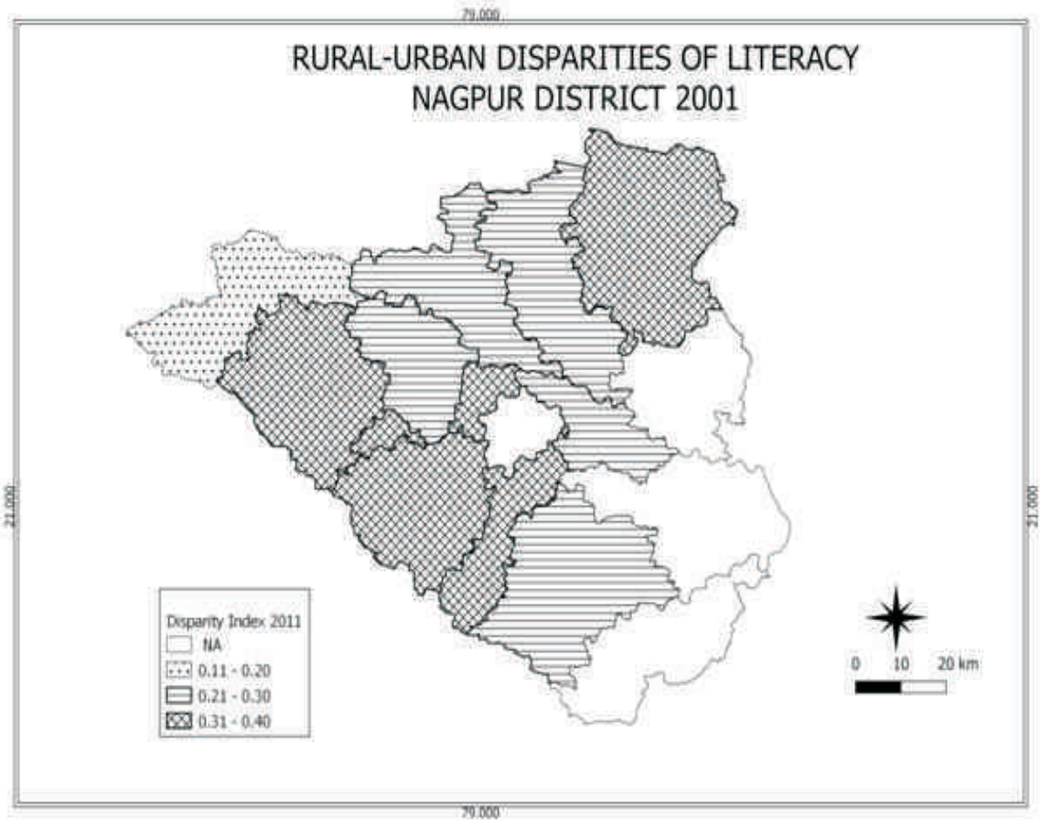


Figure 01

**Table 02 : Classes of Disparities Index of Nagpur District**

| Category | 2001 | | 2011 | |
|---|---|---|---|---|
| | Name & Number of Tahsils | Tahsils in % | Name & Number of Tahsils | Tahsils in % |
| Low DI (0.11 - 0.20) | Narkhed, (1) | 11.1 | Narkhed, Parseoni, Savner (3) | 27.3 |
| Medium DI (0.21 - 0.30) | Kalameshwar, Kamptee, Parseoni, Savner, Umred (5) | 55.6 | Hingana, Kalameshwar, Kamptee, Katol, Nagpur (Rural), Ramtek, Umred (7) | 63.6 |
| High DI (0.31 - 0.40) | Katol, Nagpur (Rural), Ramtek (3) | 33.3 | Mouda, (1) | 9.1 |
| **Total** | **09** | **100** | **11** | **100** |

Source: Calculated by the author.

The objective of this research is to analyze the spatial pattern of rural-urban literacy in Nagpur District from 2001 to 2011. The tahsil (administrative division) has been chosen as the appropriate unit for analyzing the disparity index. Nagpur District has a total of 14 tahsils, and three types of regions have been identified based on the Disparity Index, as shown in Table 02.

- Regions Reflecting Minimal Disparity Index (0.11 - 0.20)
- Regions Demonstrating Moderate Disparity Index (0.21 - 0.30)
- Regions Exhibiting Significant Disparity Index (0.31 - 0.40)

**Regions Reflecting Minimal Disparity Index (0.11 - 0.20)**

Nagpur District has made significant strides in agricultural and industrial development, resulting in a notable reduction in the rural-urban literacy gap. This positive trend is reflected in the disparity index, which measures the difference in literacy rates between rural and urban areas. In 2001, only Narkhed tahsil had a very low disparity index of (0.11-0.20), indicating a relatively small gap in literacy rates between rural and urban areas, with a disparity index of 0.167. However, by 2011, the number of tahsils

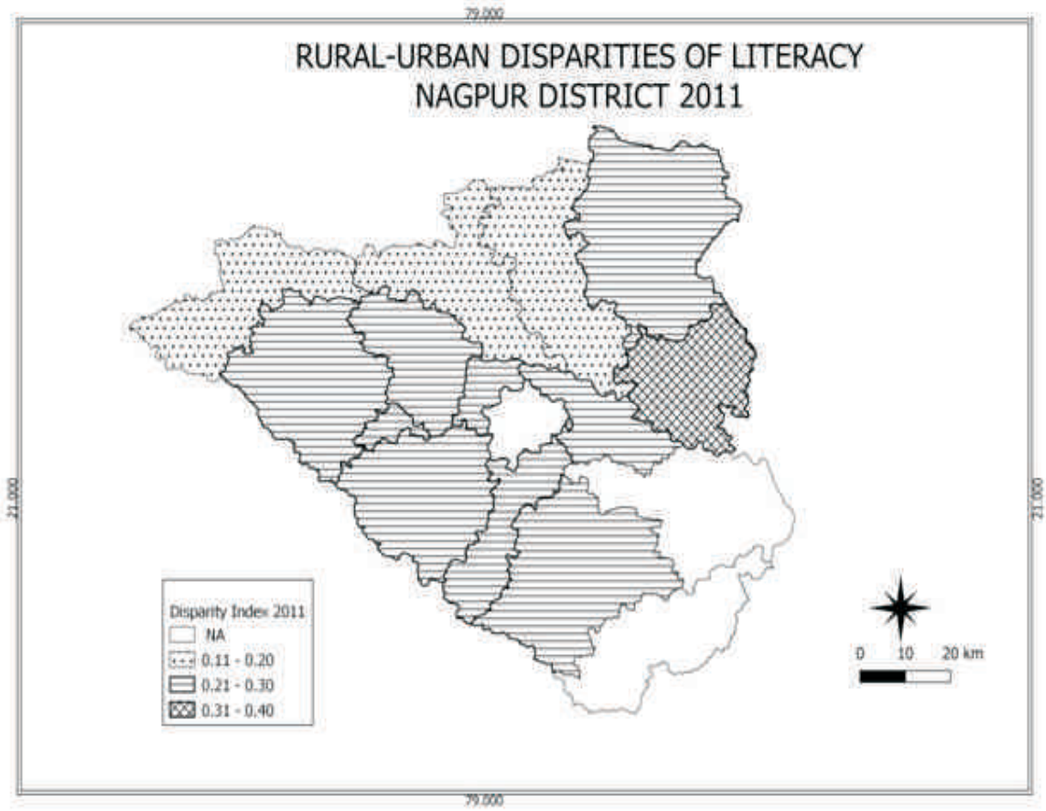


Figure 02

with a very low disparity index increased to three, including Narkhed (0.185), Parseoni (0.130), and Savner (0.196). This encouraging development can be attributed to improved access to educational facilities in these rural-urban areas and a growing awareness among the rural population about the manifold benefits of literacy.

**Regions Demonstrating Moderate Disparity Index (0.21 - 0.30)**

According to the analysis conducted in 2001, there were five tahsils that fell into this category, which included Kalmeshwar (0.2284), Kamptee (0.257), Parseoni (0.259), Savner (0.207), and Umred (0.294) tehsils, as illustrated in Figure 02. However, in 2011, the number of tahsils in this category increased to seven, as shown in Figure 03. The tahsils that were added to this category in 2011 were Hingana (0.230), Kalmeshwar (0.292), Kamptee (0.231), Katol (0.288), Nagpur (Rural) (0.275), Ramtek (0.288), and Umred (0.249).

**Regions Exhibiting Significant Disparity Index (0.31 - 0.40)**

In 2001, Katol (0.329), Nagpur (Rural) (0.358), and Ramtek (0.311) tahsils were found to have notable disparities in literacy rates between rural and urban areas, as depicted in Figure 02. In 2011, Mouda (0.335) tahsil was observed to exhibit a significant gap in literacy rates between rural and urban areas, which was attributed to insufficient educational infrastructure in rural regions. These disparities can be traced back to various factors, including inadequate educational infrastructure, delayed initiation of education in rural areas, low levels of urbanization, dependence on traditional agricultural economy, and a high concentration of socio-economically disadvantaged sections of society.

**Conclusion**

This paper delves into the existing patterns of literacy rates and disparities between rural and urban areas in Nagpur district, Maharashtra. The analysis reveals significant variations in literacy disparities among tahsils (administrative divisions) in the district. While the literacy gaps have decreased from 2001 to 2011, rural literacy rates continue to lag behind urban literacy rates in most tahsils, indicating persistent disparities. The study underscores that regions with relatively better educational facilities, higher urbanization rates, improved healthcare facilities, modernized agriculture, and efficient transportation tend to have lower rural-urban disparities in literacy. The analysis further shows that the rural-urban disparity index in 2001 and 2011 was medium to high in many tahsils, indicating substantial changes in Nagpur district over time.

The study recommends measures to address the literacy disparity, such as promoting quality employment opportunities, eliminating unequal treatment, challenging patriarchal mindsets, enhancing job prospects, creating a safe environment, ensuring fair wages, providing technology training, implementing effective government policies and initiatives, and ensuring employment security. The findings of this research hold significant importance for planners, researchers, administrators, educationists, and decision-makers, and call for immediate attention and long-term action plans to address the serious issue of literacy disparities in the study area.

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# COSTING SCENARIO OF VARIOUS KINDS OF MANUFACTURED SPORTS GOODS IN DIFFERENT CLUSTERS OF MEERUT REGION

**Anita Malik, Sudhir Kumar, Poonam Chaudhary and Kishan Lal**

**ABSTRACT**

*Sports is one of the necessities of life and will boost up the human strength and endurance in its personal development. The present study is based on costing on various sports goods that are produces in different clusters of Meerut region. The costing in Meerut sports goods industry is based on various factors such as material used, market demand, standard quality, distribution channels, exchange rate, import duty, government policies, etc. In India, Jalandhar and Meerut are the two major core areas of manufacturing different sports goods however, the above discussed parameter may vary from cluster to cluster that's why the costing of producing various goods is different. This study includes the costing on specialized rubber and wood-based sports goods that are manufactured in 9 different clusters of Meerut region. This paper emphasizes about the per unit input cost and firm price of a sport good through tabulation. and clearly illustrate the reasons behind the variation in their manufacturing cost.*

## Introduction

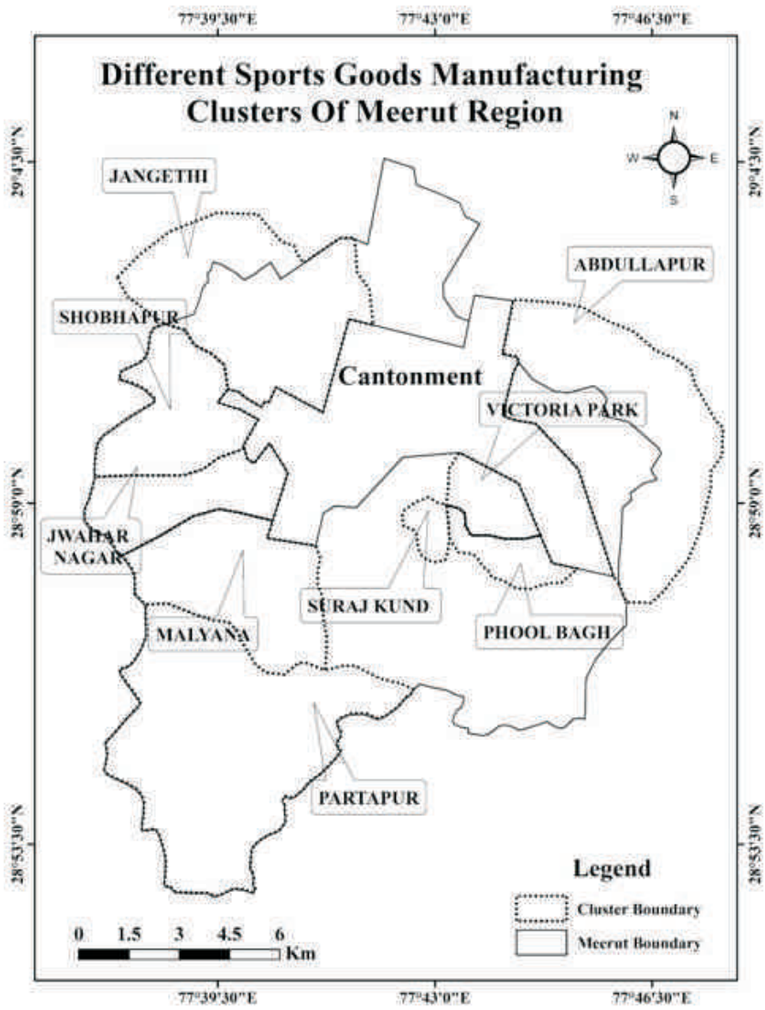
The Meerut Sports Goods Industry has built its renown significance at both the levels, domestically and internationally. Meerut is also known as sport city of India because of mass production of various kind of sports goods and equipment particularly in Cricket, Leather, Gym, sports apparel, etc. The Meerut sports goods industry has been growing for decades with many small and medium size enterprises along with the large size manufacturers contributing to its growth. Meerut sports goods industry hold the benefits from skilled labours, artisans and craftsmen who have inherited traditional techniques and expertise in manufacturing sports equipment in their specialized field. Over the past years Meerut also witnessed in technological advancement and modernization in sports goods manufacturing whether it belongs to wood based, steel & iron based, plastic based, fabric based, etc. The industry plays a vital role in generating employment opportunities to the large population of Meerut region. In the modern marketing world, if a commodity reaches the hands of ultimate consumers, it must be passed through the different marketing channels due to which an attractive or we can say that effective portion of marketing charges and margins are involved in the final cost of it. All the clusters of Meerut city don't produce the same products, different clusters produce different types of sports products which incur different input cost which includes nature and source of Raw material, quality of raw material, skillness of labour, etc. The variation in the input cost of all manufacturing sports goods also depends upon research and development, brand value, marketing value, competition, seasonality and trends.

Some renown manufacturing brands tried

1. **Prof. Anita Malik, Head, Dept. of Geography, Meerut College Meerut.**
2. **Mr. Sudhir Kumar, Research Scholar, Dept. of Geography, Meerut College Meerut, Sudhi.meerut22@gmail.com, #7248781077**
3. **Dr. Poonam Chaudhary, Associate Professor, Dept. of Geography, Meerut College Meerut.**
4. **Mr. Kishan Lal, Research Scholar, Dept. of Geography, Meerut College Meerut, Karandev272@gmail.com, #9015126708**

to make their product more demandable and that's why they use premium quality which comprises highest input cost and some SMEs (small and medium enterprises) just want to sustain in such industry and to promote only low or average quality products Costing in Meerut sports goods industry involves a comprehensive evaluation of all kind of cost components by a value chain. This research paper highlights the value of input and firm price of rubber and wood-based goods in nine different clusters.

**Sports Goods Manufacturing Clusters of Meerut Region**



**The Study Area**

The present study is based on Meerut region which includes both the city region and its Umland area. Meerut is a metropolitan city which has a vital importance during ancient, and medieval time period of the Indian history. The topography of Meerut and its surrounding areas is generally flat, characteristic of the Indo-Gangetic plains. The city is situated on the fertile plains which are formed by the Ganges River and its tributaries, that provide rich agricultural land for farming. It lies in the western part of the state of Uttar Pradesh, bordering by the districts of Ghaziabad, Baghpat, Muzaffarnagar, Bijnor, and Hapur.

**Objectives**

- To, study the input cost & firm price of different kinds of balls and wood-based sports goods in nine cluster of sports goods industry.
- To, find out the reasons behind the Average Variation in costing of various sports goods manufacturing.

**Research Methodology**

The present study is completely based on the primary data which are collected by the researcher personally with the help of interviews with the firm owners, through questionnaire and identifying basic standards such as sources of raw material, labour costing and then note a complete input cost along with the firm price of a particular product. Primary statistical technique (Average) is used to identify the average input costing of each product and its firm price. An average cost is selected through mid-value calculation which includes the pricing quality from cheap to first of a particular product so that it is very convenient to understand the quality range of the good.

**Results and Discussion**

Table 01 illustrates about the input cost and firm price of the manufacturing of various kind of balls in different clusters of Meerut region. It is clear that in all the clusters the cricket leather balls comprise a range of input cost between ₹120/piece to ₹800/piece in Phool Bagh colony cluster and in Partapur cluster respectively. The average input costing of manufacturing cricket leather balls with in the seven clusters is ₹268.57/piece. As shown in the table that there is very high and very low input cost is in Partapur and Phool Bagh colony cluster respectively. The main reason behind this is the use of various kind of raw material in manufacturing cricket leather balls along with their quality. For example, in Partapur cluster the manufacturing units use fine and high quality of cork & leather which are imported from United Kingdom and Portugal respectively. It is the most essential raw material in manufacturing of leather balls while the Phool Bagh cluster is unable to use such quality. Along with this the average firm price of manufactured goods in all the clusters is ₹336.42/piece. In the field of tennis ball, the Partapur cluster comprises highest input cost ₹20/piece because of using high quality natural rubber, latex, etc. and the lowest input cost is in Jawahar Nagar cluster ₹8/piece by the use of waste rubber scrap. The average input cost of tennis ball is ₹13.25/piece and average firm price is ₹17/piece.

The holo balls are less in demand that's why its production only comes from Maliyana and Suraj Kund clusters. The average input cost and firm price of holo balls is ₹11 &₹14 /piece respectively.

Soccer is one of the most playing sports in the world. Partapur and Suraj Kund clusters comprise high input cost which are ₹400/piece & ₹340/piece and firm price which are ₹500/piece & ₹410/piece.

The average input cost of soccer balls in four manufacturing clusters is ₹277.5/piece and the average firm price is ₹340/piece. The gap between the input cost and firm price of soccer balls in different clusters is due to the differences in their manufacturing process, and types such as Leather, Polyurethane, PVC, etc.

**Table 01 : Costing on Various Kind of Balls Manufactured in Different Clusters**

| Clusters | Phool Bagh Colony | | Jawahar Nagar | | Victoria Park | | Abdullahpur | | Jangethi | | Partapur | | Shobhapur | | Malivana | | Surai Kund | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kind of Balls | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price |
| Cricket Leather Balls | ₹120 / / Piece | ₹135 / / Piece | | | ₹200 / Piece | ₹240 / Piece | ₹150 / Piece | ₹170 / Piece | ₹180 / Piece | ₹ 210 / Piece | ₹ 800 / Piece | ₹ 1100 / Piece | ₹ 130 / Piece | ₹ 150 / Piece | - | - | ₹ 300 / Piece | ₹350 / Piece |
| Tennis Balls | - | - | ₹8 / Piece | ₹10 / Piece | - | - | - | - | - | - | ₹20 / Piece | ₹26 / Piece | - | - | ₹9 / Piece | ₹12 / Piece | ₹16 / Piece | ₹20 / Piece |
| Holo Balls | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ₹ 10 / Piece | ₹ 13 / Piece | ₹ 12 / Piece | ₹ 15 / Piece |
| Soccer Balls | ₹ 220 / Piece | ₹ 275/ Piece | - | - | - | - | - | - | ₹ 150 / Piece | ₹ 175 / Piece | ₹ 400 / Piece | ₹ 500 / Piece | - | - | - | - | ₹ 340 / Piece | ₹ 410 / Piece |
| Basket Balls | - | | - | - | - | - | - | - | - | - | ₹ 425 / Piece | ₹500 / Piece | - | - | - | - | ₹ 360 / Piece | ₹ 420 / Piece |
| Volley Balls | ₹ 250 / Piece | ₹ 275 / Piece | - | - | - | - | - | - | - | - | ₹ 350 / Piece | ₹ 390 / Piece | - | - | - | - | ₹ 340 / Piece | ₹400 / Piece |

Source: Primary Survey

The basketball is manufactured only in Partapur and Suraj Kund clusters. The average input cost in both the clusters is ₹392.5/piece, and firm price average is ₹460/piece.

Volley balls are more in demand as compared to basket balls. From all the clusters, Phool Bagh colony, Partapur and Suraj Kund manufacture volley balls. The average input cost in all the three clusters on volley balls is ₹313.33/piece and the average firm price is ₹355/piece. The gap between the input cost and firm price of volley balls in three clusters is due to the differences in their manufacturing quality, process, and types such as Leather, Polyurethane, PVC, etc.

Table 02 illustrates about the input cost and firm price of the manufacturing of basically wood-based sports goods like wise cricket bat, cricket stumps, carrom board, cricket bat handle, base bat, etc. and one especially badminton racket which includes Iron, Aluminum, carbon fiber. The manufacturing of cricket bat is totally based on selected willow (wood), for example Poplar willow, English willow, and Kashmiri willow. The above table elaborate clearly that there is highest input cost as well as firm price in two categories of bats (English willow and Kashmiri willow). the main reason behind this is because of importing English willow wood directly from United Kingdom and Kashmiri willow wood from Jammu and Kashmir which include huge amount of import duty and the working skills of labours. The poplar willow wood is mainly produced domestically that's why its input cost and firm price are low as compared to English willow and Kashmiri willow. Only Partapur and Suraj Kund cluster manufacture the Kashmiri and English willow cricket bats. The average input cost in five clusters on poplar willow bats is ₹130 /piece and the average of firm price in the same clusters is ₹156 /piece.

In the Badminton rackets manufacturing the Partapur cluster comprises high input cost and firm price which are ₹950/pair & ₹1150/pair respectively. The main cause of high input costing and firm price in Partapur is manufacturing of quality badminton rackets which are mostly made up of aluminum, carbon fiber, graphite along with this raw material charges in their manufacturing are high. The low input costing in other clusters such as Jawahar Nagar & Sobhapur is due to the manufacturing of low-quality badminton rackets which are generally made up of iron and low-quality aluminum.

Cricket stumps are manufactured only in Abdullahpur and Suraj Kund clusters. The difference between input cost and firm price in both the clusters is ₹100/dozen & ₹250/dozen respectively. the variation in costing and firms' price is because of raw material used in the manufacturing process, for example the Suraj Kund cluster promote ash wood and eucalyptus wood while Abdullahpur promotes only eucalyptus and plain rod-based stumps.

Manufacturing of Cricket bat handle is found only in Abdullahpur, Partapur & Suraj Kund clusters. The costing and firm price gap in these cluster is induced because of two qualities based, i.e., wooden strip based and wooden rod based. The Partapur & Suraj Kund clusters manufacture wooden strip based which includes imported Singapore cane wood, bamboo, etc. and the other ones are rod based which are less in price and easily available locally.

Carrom board is one of the most likely indoor games. Carrom boards are manufacturing in four clusters (Phool Bagh colony, Jawahar Nagar, Partapur and Suraj Kund) of Meerut region in which the Partapur cluster has the highest input as well as firm price cost because of the wood frame quality which is quietly made up of kikar & shesham trees. Along with this the excellence of soft ply on which the game is played is sharp costly and made up of birch & mango tree which is ordered from Kolkata and Gujarat. The average input cost and firm price in all the four clusters is ₹876.25/piece & ₹1121.25/piece.

**Table 02 : Costing on Various Kind of Wood-Based Sports Goods in Different Clusters**

| Clusters | Phool Bagh Colony | | Jawahar Nagar | | Victoria Park | | Abdullahpur | | Jangethi | | Partapur | | Shobhapur | | Maliyana | | Suraj Kund | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wood Based Goods | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price | Input | Firm Price |
| Cricket Bat<br>P. E. K<br>P- Poplar Willow<br>E- English Willow<br>K- Kashmiri Willow | P ₹110 / Piece | ₹ 130 / Piece | P ₹ 115 / Piece | ₹ 140 / Piece | P ₹ 155 / Piece | ₹ 190 / Piece | P ₹ 160 / Piece | ₹ 190 / Piece | - | - | E- ₹ 40,000 / Piece<br>K- ₹ 20,000 / Piece | E- ₹ 55,000 / Piece<br>K- ₹ 30,000 / Piece | P- ₹ 110 / Piece | ₹ 130 / Piece | - | - | K- ₹ 10,000 / Piece | K- ₹ 16,000/ Piece |
| Badminton Rackets* | - | - | ₹ 462 / Pair | ₹ 516 / Pair | - | - | - | - | - | - | ₹ 950 /pair | ₹ 1150 /pair | ₹ 310 / Pair | ₹ 355 / Pair | - | - | - | - |
| Cricket Stumps | - | - | - | - | - | - | ₹ 1100 /Dozen | ₹ 1400 /Dozen | - | - | - | - | - | - | - | - | ₹ 1200 /Dozen | ₹ 1650 /Dozen |
| Carrom Board | ₹ 1000 / Piece | ₹ 1200 / Piece | ₹ 505 / Piece | ₹ 635 / Piece | - | - | - | - | - | - | ₹ 1100 / Piece | ₹ 1500 / Piece | - | - | - | - | ₹ 900 / Piece | ₹ 1150 / Piece |
| Cricket Bat Handle | - | - | - | - | - | - | ₹ 20 / Piece | ₹ 25 / Piece | - | - | ₹ 190 / Piece | ₹ 280 / Piece | - | - | - | - | ₹ 150/ Piece | ₹ 210/ Piece |
| Base Bat | - | - | - | - | | | ₹ 65 / Piece | ₹ 90/ Piece | - | - | ₹ 260 / Piece | ₹ 410 / Piece | - | - | - | - | ₹ 200 / Piece | ₹ 330 / Piece |

Source: Primary Survey

*Badminton Rackets are not wood based, their manufacturing is based on iron, aluminum, carbon fiber, graphite etc.

The base bat is a demand vulnerable good that's why its production is very limited in Meerut manufacturing clusters such as Abdullahpur, Partapur and Suraj Kund clusters. From input cost and firm price point of view, the Abdullahpur cluster consist very low costing because of negligible demand. The manufacturers only produce low grade base bats. While in Partapur and Suraj Kund clusters they produce average quality which is supposed to be fine. The difference between Partapur and Suraj Kund clusters on input cost and firm price is ₹150/piece & ₹130/piece respectively.

**Conclusion**

From the above study, we conclude that there is a significant variation lies between the structural costing of sports goods such as rubber based, wood based. For example, in both the cases rubber-based manufacturing or wood-based manufacturing, the quality, brand positioning, competitive pricing, product innovation, economies of scale are the primary cause that fluctuates the costing scales. A firm has low input cost and another firm has high input cost of the same product is basically due to the quality of their product and the region where it is demanded. Costing competition in sports goods industry is highlighted by a complex interplay of liable factors. costing in the sports goods industry is a multifaceted process which requires careful consideration of various factors. By research and development on the differences in costing across different segments of the industry and effectively managing costs, businesses can emphasise profitability, maintain competitiveness, and deliver quality value to consumers.

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# SUSTAINABLE TRANSPORT NETWORK ANALYSIS FOR FINDING THE OPTIMAL ROUTES FOR TRAFFIC CONGESTION SITUATION IN SONIPAT CITY

**Seema and Deepak Moda**

**ABSTRACT**

*Sonipat city is experiencing rapid population and urban growth, which has created significant challenges with traffic congestion. As the size of the population and number of registered vehicles continue to rise, it is straining traffic flow and making the city more difficult to navigate. Currently, collecting data on general traffic conditions and developing management strategies relies on labour-intensive methods which makes implementing viable mitigation solutions quite costly. To address these issues, the present study utilizes Geographic Information Systems and Global Positioning Systems to analyze real-time traffic situations and recommend more affordable measures to reduce traffic congestion problems in Sonipat city. The objective is to thoroughly examine Sonipat's road network and devise optimal routes that allow for faster and more reliable mobility in the city. By specifically considering traffic congestion as the primary factor limiting travel speeds, we can accurately calculate its impact on how long it takes residents to get to their destinations.*

## Introduction

Transportation sustainability and a region's development are largely determined by a transport system's efficiency and environmental impacts (Zheng, et al., 2013). A well-designed transport system enhances accessibility and quality of commute while supporting socio-economic activity (Zheng, et al., 2013). As mobility relies mainly on roads, proper road connectivity predicts development (Gang, et al., 2008). Traffic congestion occurs when demand exceeds road capacity and seriously impacts cities (Gang, et al., 2008). Rising vehicle numbers are causing increased global traffic congestion, resulting in delay and safety issues. Traffic congestion also contributes to rising transportation costs. Effective traffic management requires techniques like congestion data collection, monitoring, and evaluation of movement control strategies (Taylor, et al., 2000). GIS applications help with road planning, mapping, accident analysis, and traffic volume analysis (Grimshaw, 2000) Shortest path analysis is required for many GIS traffic applications (Zhan and Noon, 1996). Route optimization in GIS entails finding shortest paths and maximizing route efficiency, and is critical for effective traffic management in cities (Sunday, et al., 2016). Traffic volume surveys, GPS data collection, and GIS analysis can identify transit difficulties and potential alternative routes (Sunday, et al., 2016).

This study, analyzing traffic congestion in Sonipat city using GIS techniques is important to identify optimal routes that can reduce congestion. Rapid urbanization underscores the need for efficient transport networks crucial for city development and economic growth challenged by traffic issues. This research optimizes Sonipat's mobility by characterizing current traffic scenarios and

1. **Dr. Seema, Assistant Professor, M.K.J.K College, Rohtak, Haryana**
**Mobile no.: 9728245490, E-mail: seemadahiya111@gmail.com**
2. **Deepak Moda, Research Scholar, Department of Geography, Maharshi Dayanand University, Rohtak, Haryana,**
**Mobile No.: 7988994167, E-mail: deepakmoda2017@gmail.com**

evaluating alternative routes to provide transport authorities insights for evidence-based planning and resource allocation to improve accessibility and business activities.

**The Study Area**

Sonipat is situated to the south of the National Capital Territory of Delhi. Delhi is 52 kms away by road and 44 kms away by train. The main town is five kms east of National Highway No. 1. The Municipal Committee of Sonipat was formed in 1933, with a population of 15,050 people. According to census records, the town's population grew exponentially from 1,43,922 in 1991 to 2,89,333 in 2011, marking a rise of nearly 100 per cent in 20 years. Before 2015, the total area of the municipal council of Sonipat city was 40.75 sq kms. The Government of Haryana designated Municipal Council Sonipat as a Municipal Corporation in 2015. The Geographical area of Municipal Corporation is 181.3 sq kms. For the purpose of study, municipal council area (40.75 sq kms.) has been considered.

Sonipat is now one of the most important cities in the state of Haryana because of the large number of schools and colleges that provide educational opportunities to its residents as well as students from all over the state, the city is also known as 'Education City'. As per 2011 census, the total population of the city was 2,89,333 persons. The literacy rate was 75.24 per cent and the sex ratio was 875 females per 1000 males. The city has a significant locational advantage because of its proximity to the National Capital Territory of Delhi. National Highway No 44 facilitates easy accessibility promoting high level of urbanization.

**Objectives of the Study**

The main objectives of the present study are:

1) To determine the carriage way width factor that influences traffic congestion and the alternate routes for effective traffic management; and
2) To use GIS as a tool for effective dissemination of congestion and management.

**Data Sources and Research Methodology**

This study utilizes primary and secondary data sources including topographic maps, guide maps, satellite imagery with road alignments and land use details. Road attribute data on widths and classifications is collected from public works departments. Vehicle registration data from the Regional Transport Office provides traffic analysis. Geographic Information System techniques integrate this diverse spatial and non-spatial data into a geo-database. Arc Info and ArcView software enable examination of transport network sustainability through computational analysis of infrastructure compliance to standards and visual representation of attribute and location-based data. Network analysis and modelling functions effectively develop transport system models and monitor urban development, offering valuable insights into planning and management through techniques like network analysis.

While providing valuable insights into Sonipat city traffic analysis and route optimization, the study has some limitations. The analysis relies on current road network conditions and secondary data, without considering changes over time. Only limited third party traffic data from a short timeframe was examined. A more comprehensive origin-destination survey over a longer duration could provide a more accurate assessment. Additionally, public transportation usage patterns were not included in the modelling. Infrastructure and development plans that may impact future traffic were also not factored. Continuous updates incorporating emerging transportation trends would further strengthen the findings. Despite these limitations, the study provides valuable baseline insights for transport planning using GIS in Sonipat city.

**Results and Discussion**

National highways, state highways, district roads, minor roads and express ways are all part of a network of roads that connect towns and villages across the country and within a state. Because most settlements are connected by a network of highways, and the majority of the population commutes on these roads on a daily basis, road transit is the most essential mode of transportation. Sonipat is connected to various parts of the state and country through several types of roads. It features a comprehensive road network that allows residents to commute both within and outside the city. The city is bisected by three State Highways (SH), notably SH-11, SH-14, and SH-20. These roadways have two traffic lanes. Similarly, the city's Major District Roads (MDR) connect neighboring districts, towns and villages. The current study's evaluation parameter is based on the IRC (Indian Road Congress), the PWD (Public Works Department) of Haryana, and the Ministry of Road Transport and Highways of the Government of India. The width of the road is one of the most important parameters considered in Sonipat City's transportation network infrastructure. The minimum width of the carriage way on state highways and important district roads, according to IRC requirements, should be 12 metres and 9 metres, respectively (Table 01).

**Table 01 : IRC Norms for Carriage Way Width of Roads**

| Road Classification | Lane | Width of Carriage Way (Meters) |
|---|---|---|
| State highway | Single lane | 12 |
| | Two lane | 12 |
| Major district roads | Single lane | 9 |
| | Two lane | 9 |

Source: Compiled by the researchers based on the Report of IRC 1983 and 2001

SH-20 is 6.91 kms long within the city limits. SH-11 and SH-14 are also 4.30 kms and 3.08 kms long in the city, respectively. On all of these highways, buffer analysis was used to determine the width of the road. It demonstrates that state highways in the city region are narrower than the IRC recommendations. All three state roadways in Sonipat city are narrower than the IRC's suggested criteria (Fig. 01).

Mahlana Road, Kakroi Road, Narela Road, Ganaur Road and Purkhas Road are major district roads in Sonipat. In the city limits, Mahlana Road is 2.53 kms long, Kakroi Road is 2.68 kms, Narela Road is 4 kms, Ganaur Road is 1.77 kms and Purkhas Road is 1.42 kms long (Fig. 02). With a few exceptions, the width of all of these important district roads within the city area is less than the recommended width as specified by IRC, according to the research performed utilising buffer analysis.

Sonipat city is also experiencing traffic congestion throughout the day due to a significant increase in the number of registered automobiles. From 26,742 in 2011 to 32,385 in 2015, the number of registered automobiles has increased. Aside from that, many people travel from adjacent villages, causing traffic congestion on city routes. As a result, traffic congestion poses a severe threat to the city's

overall socio-economic development and quality of life. Sonipat's current transportation system has been unable to meet the city's rapidly increasing demand, resulting in significant negative consequences on general quality of life and making the city less competitive in terms of road transportation.

**Transportation System**

Road width is a key factor in ensuring smooth traffic flow and increasing mobility. As previously stated, the width of S.H-20, S.H-11 and S.H-14 in the city is less than the IRC suggested criteria. There is limited potential of road widening, particularly in the city's center. As an alternative, traffic-congested roadways can be identified and appropriate remedies developed. Data on traffic jams and free flow speeds was gathered as part of the study using the 'here WeGo' mapping and navigation service.

**Traffic Congestion**

Slower moving traffic and resultant vehicular queuing are signs of traffic congestion. When the demand on a transportation network grows, the intersection between cars becomes narrower, slowing the flow of traffic and increasing the degree of congestion. When a large number of traffic creates a need for more space than is available, this is referred to as saturation. Circumstances that cause or aggravate traffic congestion diminish road capacity at specific sections or sites where the number of vehicles necessary for a given number of goods or persons is rapidly increasing.

Traffic flow is an important and vital aspect of the urban transportation system and planning. A 'traffic jam' occurs when all of the vehicles are entirely stopped for an extended length of time. Given the sporadic growth in traffic volume and the lack of significant improvements in road infrastructure, urban traffic has become a critical concern in Sonipat. Traffic congestion is one of the factors that drive up transportation expenses by wasting time and consuming more fuel.

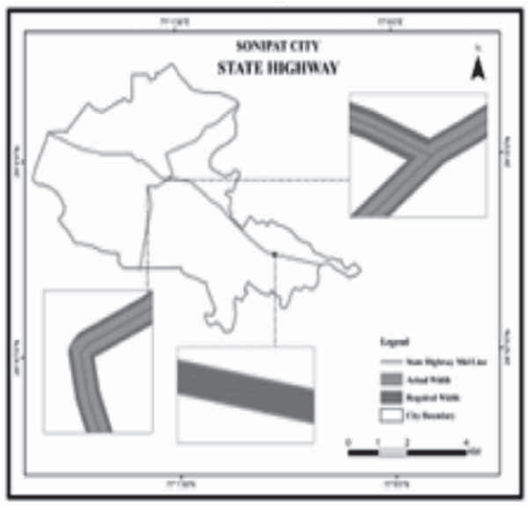


Fig. 01

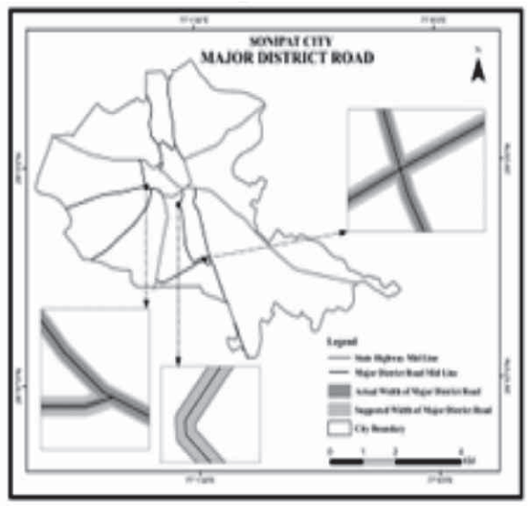


Fig. 02

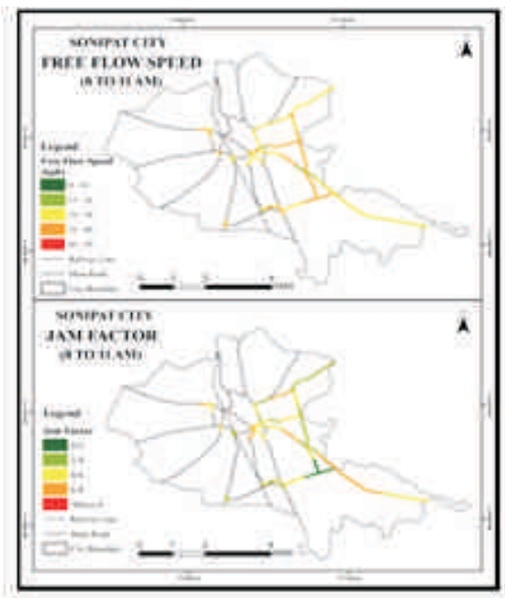


Fig. 03

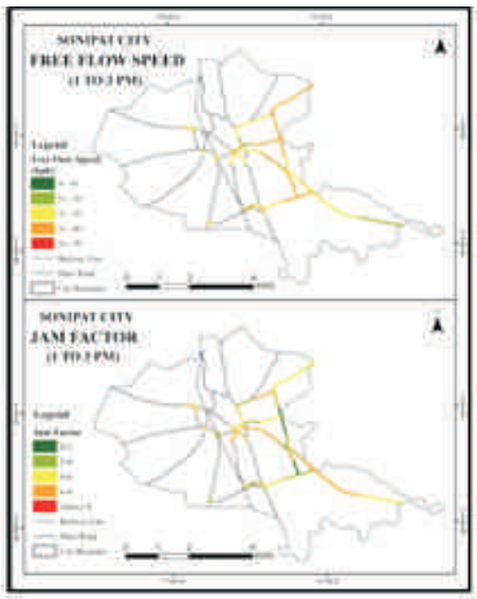


Fig. 04


Fig. 05

**Free Flow Speed (FFS)**

The term 'free-flow speed' refers to the average speed at which a driver would go if there were no traffic or other adverse conditions, such as bad weather. There are five free-flow speed categories for motor vehicles in the city, ranging from 0 to 10, 11 to 20, 21 to 30, 31 to 40, and 41 to 50 km ph.

**Traffic Jam**

A traffic jam is a transportation situation in which a lengthy line of vehicles on a route has either no mobility or is moving at a very sluggish speed. The term 'traffic jam' has become a slang term for traffic congestion in the metropolis. The number between 0.0 and 10.0 shows the expected level of trip quality. In the event of a road closure, the 'Jam Factor' should be set to ten. Whereas 10.0 indicates deteriorating quality of travel and 1.0 indicates that a Jam Factor could not be calculated.

The city's jam factor is divided into five categories: 0-2, 2-4, 4-6, 6-8, and greater than 8. The first category, 0-2, denotes very little congestion, while the second category, 2-4, indicates medium congestion, category 4-6, moderate congestion, and category 6-8, indicates severe to excessive congestion. A road closure or deterioration in travel quality is indicated by a category of 8 or higher.

According to the study, from 8 AM to 11 AM, there are some areas of the city with minor to moderate traffic jams and poor speeds; Murthal road, in the vicinity of Chauhan Park, the road connecting the Geeta Bhavan to the bus terminal, and Murthal Adda, to name a few (Fig. 03). During the same time period, certain areas have a moderate free flow and no traffic congestion like the Sector -15 outer road, Gandhi Chowk road, and Sector 12- 13 dividing road are some of these locations.

During the hours of 1 PM to 3 PM, traffic in Devi Lal Chowk, which is near the bus stop, is quite congested. There are minor to moderate traffic jams and poor free flow speeds in some parts of the city. These locations include the bus stop to Murthal Adda, Chowk road and the railway station road. Murthal road from Agrasen Chowk to Utsav Garden (Vikash Nagar), Sector 12- 13 separating road, and Sector-15 outer road, among others, have moderate free flow speed and no traffic jam during the same time period (Fig. 04). From 5 to 8 PM, various parts of the city experienced minor to moderate traffic congestion and slow free flow speeds. Railway station road, Gohana road near Chotu Ram Chowk and the state highway from Fazilpur road to Sector-7 road are some of the locations with minor congestions. Murthal road from Agrasen Chowk to Utsav Garden (Vikash Nagar), Sector 12-13 separating road, and Sector -15 outer road, among others, have moderate free flow speed and no traffic jam during the same time period (Fig. 05).

Between the hours of 8 AM and 11 AM, Sonipat city experiences heavy traffic congestion on the road sections between the bus station and the railway station. A similar situation happened on the section of road between Agersen Chowk and Devru mod. Chotu Ram Chowk and S.H.-11 near sector 12 also had heavy traffic. Between 1 and 3 PM, traffic jams are reported on roads between the bus stand and the civil hospital, on Chotu Ram Chowk, Geeta Bhawan Chowk to the railway station, near the M.C. office, on Agersen Chowk, and S.H.-11 at Fazilpur Mod. The city witnessed traffic congestion from 5 PM to 8 PM stretching from Geeta Bhawan Chowk to Jandi Mandir Road, railway station road, Kakroi Adda, and S.H.-11 near Sector-12.

Alternative routes can be employed to avoid traffic jams during certain times, such as Mehlana road, which can be used to escape traffic jams at Chotu Ram Chowk. In the same way, Shani Mandir Road can be used to get to Geeta Bhawan. Sec-14 and Sec-15 division road can be used as an alternative way to escape traffic jams at Murthal

Adda. The city's centre regions are the most popular destinations. However, there is little room for enlarging the road, particularly in the city's center areas. As a result, strategic route management may be the most practical choice for increasing and ensuring smooth movement on the roads in this portion of the city.

**Conclusions**

The study used GIS tools to analyze traffic congestion in Sonipat city and optimize its transportation network to sustainably reduce congestion. Several factors contributing to rising congestion levels are identified through analysis, with rapid population and vehicle growth outpacing road expansion. Many roads, including major highways, are narrower than IRC standards, constraining traffic accommodation. Traffic data revealed peak period congestion hot spots around bus/railway stations and junctions, helping characterize current scenarios via GIS modelling. Road width evaluation highlighted infrastructure upgrade needs, but strategic route management via alternative routes identification emerged as a more viable short-term congestion avoidance measure given space constraints.

Targeted road widening, junction improvements, integrated traffic signals, and intelligent transport solutions are recommended to reduce congestion in Sonipat city. Non-motorized connectivity also requires boosting for multi-modal mobility. While GIS efficiently integrated diverse data sets for analysis, its full potential for transport modelling and scenario forecasting remains untapped. Continuous updates will strengthen decision-making to optimize traffic flows through identified alternative routes and thereby enhance city mobility sustainably.

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# SPATIO-TEMPORAL ANALYSIS OF THEFT IN THE MANIPUR CENTRAL VALLEY

**Khwairakpam Shreeraj Singh**

**ABSTRACT**

*Theft is a survival strategy adopted by individual to acquire resources that is need for the well-being and reproductive success. It is act of taking movable property without consent, punishable under IPC Section 378 in India. The present research study, examine the spatial distribution of IPC Crime, in the Manipur Central Valley in Manipur, with special reference to the Theft. Utilising Theft data from law enforcement agencies (NCRB and Superintendent of Manipur Central Valley) and demographic data from the Census of Manipur, 2011, the research employs techniques such as Location Quotient (LQ), to analyse Theft concentration. The present study brings out that, the Theft distribution varied significantly in across different regions. With, Imphal West and Imphal East exhibit high Theft concentrations, while Bishnupur shows a decrease over the decade. Through the D.LQ (Difference in LQ) analysis, it had revealed that, in the recent decade, Thoubal including Kakching has emerged as a new hotspot for Theft with a dramatic rise.*

## Introduction

The propensity for Theft, like much other human behaviour, has deep evolutionary roots ingrained in our genetic makeup (Hooton, E.A, 1939). From an evolutionary standpoint, Theft can be a survival strategy employed by individuals to acquire resources necessary for their own well-being and reproductive success. In this light, acts of Theft may be interpret as manifestations of innate instincts geared towards maximizing individual fitness—a concept deeply rooted in Darwinian principles (Hooton, E.A, 1939). Defining from the Legal handbook (IPC), Theft is the intention to take dishonestly any movable property out of the possession of any persons consent, moves that property in order to such taking, is commit Theft. In IPC of India, Theft is punishable under the IPC Section 378 (Mishra, S.N, 2022). Over the past decade, the Central Valley in Manipur has experienced varying levels of Theft incidents with significant disparities observed across different regions. Understanding these variations is crucial for developing targeted crime prevention strategies.

The existing literature on spatial crime (including Theft) analysis studies, that provides useful insights into the methodology for analysis of variations in varied geographical context (Chainey & Ratcliffe, 2005; Lama & Rathore, 2017). Studies, that provide methodological framework for the Inequality analysis of Crime including Theft (Harries, K.D, 1974; Roa, S.V, 1981). Emile Durkheim's (1951) theory of anomie and social integration provides a foundational framework for understanding the dynamics of crime and deviance within society. Additionally, research on GIS-based crime mapping and spatial statistical techniques informs the methodological framework for conducting spatial analysis of Theft data (Anselin, et al., 2000). In Manipur, crime related studies were undertaken (Chanu, Bilashini, L., et al., 2022; Ragui, S., & Sing, T. B, 2018), but none had applied Location analysis for the study of criminal behaviour.

This study addresses the need to analyse

**Khwairakpam Shreeraj Singh, Research Scholar, Bir Tikendrajit University, Imphal West, Manipur; Email: shreerajkh@gmail.com**

the Spatio-temporal distribution of Theft and identify regions with high and low Theft concentrations. By examining the patterns of Theft, the research aims to provide insights into the factors contributing to these disparities and inform policy interventions.

**Objectives**

The study aims to assess the Spatio-temporal pattern of Theft concentration through the Location Quotient technique, compare the decadal variation in Theft's Location Quotient, analyse Theft distribution's inequality to offer insights into targeted crime prevention strategies derived from the findings.

**The Study Area**

Manipur Central Valley has a total geographical area of 2,238 $km^2$ and is located between 24°20' N to 25°0' N latitudes and 93°0' E to 94°0' E longitudes. In the opinion of some geologists, the Manipur Central Valley was the lacustrine plain of an old lake that later filled up and raised. The valley is drain by Imphal, Iril, Thoubal, and Nambul river. It experiences sub-tropical monsoon climate with average rainfall of 220 cm. (Bhattacharyya, N.N, 2006). The geography of the region provides a space for the support of 16, 33,672 population (2011 census report), and projected to be 18, 41,363 (2021) population recently (projected from the previous census record), along with diverse societal community. The Manipur Central Valley had five main towns (Central places): Imphal West, Imphal East, Thoubal, Kakching, and Bishnupur. (Singh, Nabakumar, Th, 2014).

**Database and Research Methodology**

Theft data, obtained from law enforcement agencies (NCRB; Superintendent of Police, Central District), are spatially analysed to identify inequality and concentration of their distribution in Manipur's Central Valley (Imphal East, Imphal West, Thoubal, Kakching, and Bishnupur).The demography data have collected from Census abstract of Manipur (2011). Additionally, geographical factors, including land use patterns and proximity to urban centres, had considered to understand the spatial dynamics of social crimes within the region. The primary data had collected from the field survey using personal observation and unstructured interview and discussion with the expert in the field.

The technique used for the spatial analysis of Theft in the Manipur Central Valley is Location Quotient, L.Q. It is express as, LQ = (Ti/Pi)/(Ti/Pr) where, Ti=Number of reported Theft, in a specific area (Imphal East, Imphal West, etc); Pi=Population of the specific area; Ti=Total number of Theft incidence in the Manipur Central Valley. The second technique, is calculating the difference of the LQ values. It can be express as D.LQ=LQ (P1)-LQ (Po), where, P1= LQ for the recent and Po= LQ for the Previous incidence. GIS tool and Excel had utilised for the cartography and mathematical analysis.

**Results and Discussion**

**1. Location Quotient (LQ) Analysis**

In 2011, Bishnupur, record 40 Thefts in a population of 2,37,399, results in a Theft percentage of 0.0168% and a Location Quotient (LQ) of 0.407. This indicates that Theft is less prevalent in Bishnupur compared to the regional average. In Imphal East, there were 76 Thefts in a population of 4,56,113, with a Theft percentage of 0.0167% and an LQ of 0.402. Imphal West reported 496 Thefts in a population of 5,17,992, yielding a Theft percentage of 0.0958% and a significantly higher LQ of 2.311, indicating a high concentration of Thefts. Thoubal including Kakching had 65 Thefts in a population of 4,22,168, with the lowest Theft percentage of 0.0154% and an LQ of 0.372, suggesting that Theft occurrences are the least frequent (Table 01).

Moving to 2021, the Location Quotient (LQ) of Theft for the Manipur Central Valley highlights the relative concentration of Theft incidents across different regions. Bishnupur recorded 32 Theft

incidents with a population of 2,69,482, resulting in a percentage of Theft to population of 0.0119 (1.19%) and an LQ of 0.264. Thoubal including Kakching had 103 Theft incidents, a population of 4,85,630, a Theft to the population percentage of 0.0212 (2.12%), and an LQ of 0.471. Imphal East recorded 302 Theft incidents with a population of 5,31,908, resulting in a Theft to population percentage of 0.0568 (5.68%), and an LQ of 1.260. This means that Theft in Imphal East is 1.26 times the regional average, showing a higher concentration. Imphal West had 409 Theft incidents, a population of 5,90,395, a Theft to population percentage of 0.0693 (6.93%), and an LQ of 1.537. This indicates that Theft in Imphal West is 1.54 times the regional average, showing a significantly higher concentration (Table 02).

**Table 01 : Location Quotient Calculation of Theft, 2011**

| Region | Theft | Population | Percentage of Theft to population | Theft LQ |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Bishnupur | 40 | 2,37,399 | 0.016849 | 0.406591 |
| Imphal East | 76 | 4,56,113 | 0.016663 | 0.402085 |
| Imphal West | 496 | 5,17,992 | 0.095754 | 2.310653 |
| Thoubal (Kakching) | 65 | 4,22,168 | 0.015397 | 0.371539 |
| Central Valley | 677 | 16,33,672 | 0.04144 | |

Source: Calculated from NCRB and report from superintendent of Police of Central Valley

**Table 02 : Location Quotient calculation of Theft, 2021**

| Region | Theft | Population | Percentage of Theft to population | Theft LQ |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Bishnupur | 32 | 2,69,482 | 0.011874634 | 0.263518 |
| Imphal East | 302 | 5,31,908 | 0.056776736 | 1.259971 |
| Imphal West | 409 | 5,90,395 | 0.069275572 | 1.537341 |
| Thoubal (Kakching) | 103 | 4,85,630 | 0.02120955 | 0.470676 |
| Central Valley | 846 | 18,77,416 | 0.045061936 | |

Source: Calculated from NCRB and report from superintendent of Police of Central Valley

**2. Difference in Location Quotient (LQ) Analysis**

The Difference in Location Quotient (DLQ) data for 2011-2021 reveals distinct levels of theft variation across different regions (Table 03). In Bishnupur, the Location Quotient (LQ) for Theft was 0.4066 in 2011, which decreased to 0.2635 in 2021. This represents a decadal variation of -0.1431. This decline indicates that theft incidents became less concentrated in Bishnupur over time, suggesting that the region experienced a relative decrease in theft activity compared to other parts of the Manipur Central Valley. This decline could be the result of improved law enforcement, changes in the socio-economic fabric of the area, or a shift in criminal

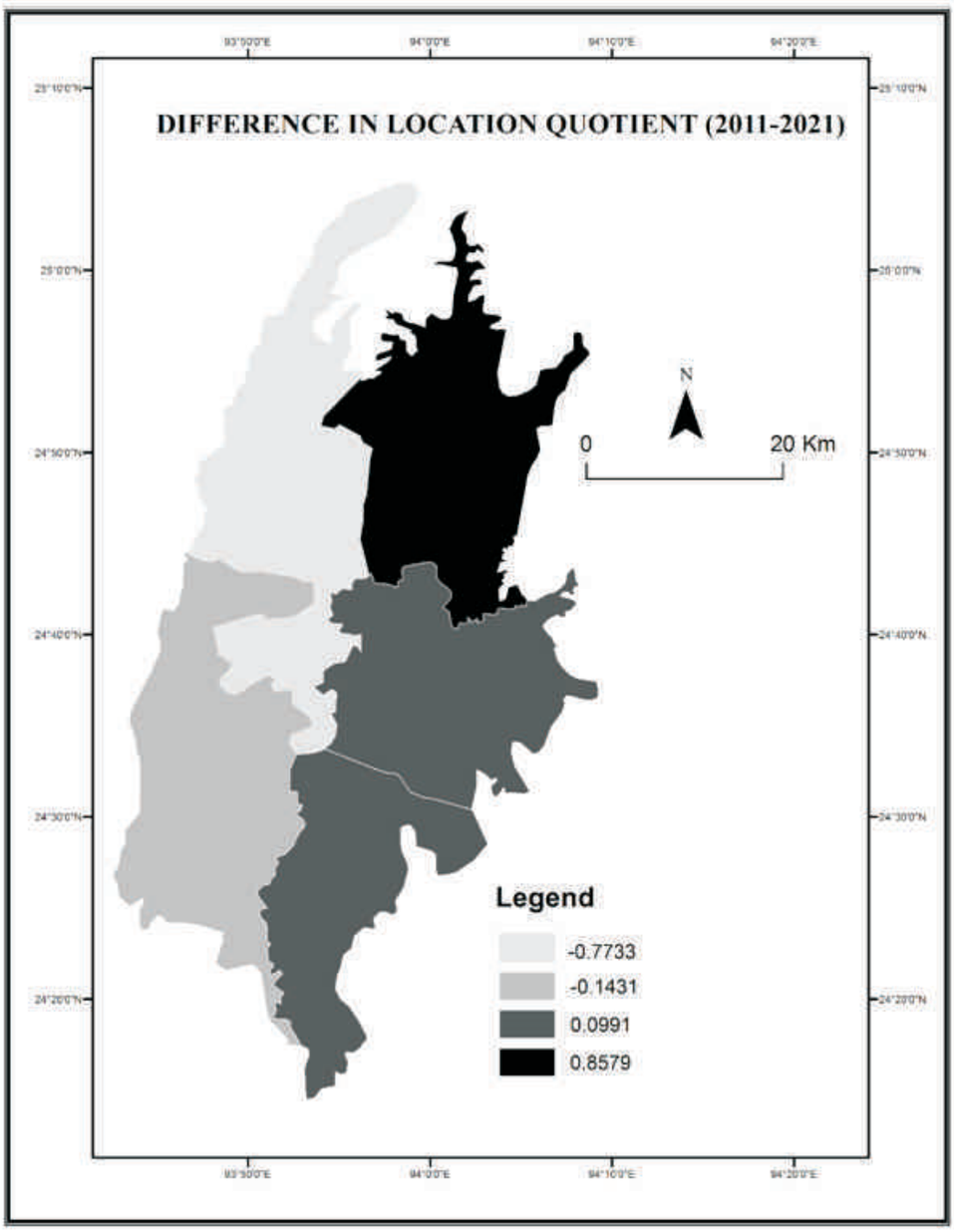
DIFFERENCE IN LOCATION QUOTIENT (2011-2021)
93°50'0"E
94°0'0"E
94°10'0"E
94°20'0"E
25°10'0"N
25°0'0"N
24°50'0"N
24°40'0"N
24°30'0"N
24°20'0"N
N
0
20 Km
Legend
-0.7733
-0.1431
0.0991
0.8579

Fig. 01

activity to other regions. Conversely, Imphal East, saw a substantial increase in theft concentration with the LQ increased from 0.4021 in 2011 to 1.2599 in 2021, showing a positive decadal variation of 0.8579. This suggests that thefts have become significantly more concentrated in Imphal East. The rise in LQ indicates that the region has emerged as a hotspot for theft incidents in recent years (Fig 01). Factors such as urbanization, economic development, and population growth may have contributed to this increase, creating conditions that favour the rise of such crimes.

Imphal West had a high LQ of 2.3107 in 2011, which decreased to 1.5373 in 2021. The decadal variation of -0.7733 indicates a significant reduction in the concentration of Theft, though it remains a high Theft area compared to the regional average, indicating that the region's share of total Theft activity has decreased over the years. This shift could be due to the migration of criminal activities to other regions or the implementation of effective crime prevention strategies. In Thoubal (Kakching including), the LQ for Theft rose dramatically from 0.3715 in 2011 to 0.4706 in 2021, with a decadal variation of 0.0991. Although the increase is modest compared to the other regions, it indicates that Theft incidents have become slightly more concentrated in Thoubal over the decade. This change suggests that the region may be experiencing some socio-economic or demographic shifts that are contributing to a gradual rise in theft activity, though it is not as pronounced as in Imphal East (Fig 01 and Table 03).

In summary, the analysis of DLQ shows distinct regional patterns in the concentration of theft incidents in the Manipur Central Valley. Imphal East stands out with a significant rise in its LQ, highlighting an increasing Theft problem. The overall region shows stability in Theft concentration, but the local variations call for focused preventive measures, especially in Thoubal (Kakching) and Imphal East, to address the rising Theft issues. This sharp rise highlights an emerging Theft problem, suggesting that the region may be experiencing new or worsening conditions that facilitate Theft, such as economic downturns or increased urbanization without corresponding security measures (Durkheim, Émile, 1951). By implementing targeted interventions, addressing socio-economic issues, and enhancing community involvement, it is possible to mitigate Theft and improve overall safety and security in the region.

**Table 03 : Difference in Location Quotient of Theft (2011-2021)**

| Region | 2011 | 2021 | DLQ |
|---|---|---|---|
| Bishnupur | 0.406591 | 0.263518 | -0.1431 |
| Imphal East | 0.402085 | 1.259971 | 0.8579 |
| Imphal West | 2.310653 | 1.537341 | -0.7733 |
| Thoubal (Kakching) | 0.371539 | 0.470676 | 0.0991 |

Source: Calculated from the LQ index of 2011 and 2021; Note: DLQ=Difference in Location Quotient.

**Conclusion**

The analysis reveals significant trends in Theft incidents across the Manipur Central Valley from 2011 to 2021. The variations in Theft rates across regions indicate differing levels of social cohesion and collective conscience. Imphal West and Imphal East showed high Theft concentrations, with Imphal East experiencing an increase over the decade. Conversely, Bishnupur saw a decrease in Theft concentration, indicating improvement.

Thoubal (including Kakching) emerged as a new hotspot, with a dramatic rise in Theft incidents. While the overall regional Theft concentration remained stable, variations between areas highlight the need for targeted interventions. Moderate inequality in Theft distribution has observed, emphasizing the importance of region-specific strategies to manage Theft effectively. This calls for focused preventive measures in Thoubal (Kakching) and Imphal East to address the rising Theft issues, while sustaining the improvements seen in Bishnupur and Imphal West.

**Acknowledgment**

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# REGIONAL DISPARITIES IN SOCIAL DEVELOPMENT OF NATIONAL CAPITAL REGION AND NON-NATIONAL CAPITAL REGION OF HARYANA

**Anamika Yadav and Vipin Kumar**

**ABSTRACT**

*Development in any region is a continuous process. During development race, some places develop rapidly while other places lag behind in the pace of development and this lead to regional disparities. An imbalance in the quality lifestyle within various geographical regions is referred to as regional disparities. This is a worldwide phenomenon common in both developed and developing nations. The current study analyses the disparities in social development across Haryana's non-NCR and NCR utilizing a composite index. The study used statistical abstract-based data from 1991, 2001, and 2011. The empirical findings show that NCR is better than non-NCR in Haryana regarding social progress. The study's results confirmed huge disparities at the district level in the state. The study indicates that low-development districts need to improve most indicators to raise their degree of social development.*

## Introduction

Development is a long-term process of change wherein the needs of the local populace are given special consideration. Economic and social growth are interdependent and both are essential to the process of development. The "quality of life" that an area's residents enjoy is the best indicator of its social development. Many scholars compare social development with the quality of life. Any regional development plan might establish priorities based on the present demographic conditions. Geographic disparities have been acknowledged as both a cause and an effect of development, having a major impact on a region's process of development.

There is a mutually beneficial relationship between social and economic progress. The social development of Haryana state has been studied by dividing it into two parts: one is NCR, and another is non-NCR. The districts falling under the NCR of the state are generally more developed than the non-NCR. According to the study, low-development districts need to improve the majority of the indicators to raise their degree of social development.

## Objectives

1. The objective of the present research is to examine geographical disparities between Haryana's non-NCR and NCR social development levels.

## The Study Area

Haryana is a primary agriculturally prosperous state of north India. Its borders are shared by Rajasthan in the southwest, Uttar Pradesh, Delhi in the east, and Himachal Pradesh and Punjab in the north. The total area of Haryana state is 44,212 $km^2$ (1.34 per cent of the country). Its latitudinal extension is 27º30' to 30º36' in north and longitudinal extension is 74º28' to 77º30' in east. For the study, Haryana is dividing into NCR, and Non-NCR. The

1. **Anamika Yadav, Principal Author, Research Scholar, School of Earth Sciences, Banasthali Vidyapith, Banasthali, Rajasthan (304022). +91-9350998419, anamika.yadav844@gmail.com**
2. **Dr. Vipin Kumar, Research Guide, Associate Professor, Chairperson, Department of Geography, Indira Gandhi University, Meerpur- Rewari (Haryana). +91-9352179081, vkaushik25@gmail.com**

concept of the National Capital Region was first mentioned in 1962 to develop a metropolitan area around Delhi to remove the increasing population pressure from capital. NCR plan was necessary to save Delhi's infrastructure from population pressure. According to the NCR Planning Board Act 1985, a total of 21 districts of the national capital along with Rajasthan, Uttar Pradesh, and Haryana were included in the NCR of India. At present, Haryana consists 45.97 % (25,327/55,083 $km^2$) of NCR area. The NCR has been expanded from time to time by the Govt. of India. Recently expansion in June 2015, the following 14 districts of Haryana state are included in NCR; Gurugram, Faridabad, Palwal, Mewat, Rewari, Mahendergarh, Jhajjar, Panipat, Bhiwani, Rohtak, Jind, Sonipat, Charkhi Dadri and Karnal, whose total area is 25,327 $km^2$, which is 57.28% of Haryana.

**Data Used and Research Methodology**

The secondary data was obtained from Haryana statistical abstracts, 1991-92, 2001-02, and 2011-12. However, some information has been obtained from other secondary sources such as Govt. reports, Research papers, etc. Usually, following 3 indicators; population growth, literacy rate, and sex ratio, have been taken to calculate levels of social development. The composite index and cartographical techniques have been applied to analyse and interpret the data to know the regional disparities in social development during 1991, 2001 and 2011. The composite index method has been used by applying the following formula: -

$$\textit{Deprivation score} = \frac{\textit{value of the district at top - value of the specific district position}}{\textit{value of the district at top - value of the district at bottom position}}$$

$$\textit{Deprivation score} = \textit{1- Deprivation score}$$

$$\textit{Deprivation Index} = \frac{\textit{Summation of developments cores of all the indicators used}}{\textit{Total Indicators}}$$

**Results and Discussion**

The research indicates that there have been discrepancies in the social development of Haryana's districts, both in the non-NCR and NCR areas. The asymmetrical levels of social development across the state's districts are a result of the uneven development. Additionally, it's been the cause of the regional disparity in social development. All the districts have been divided into three main categories to illustrate the disparities in social development-

1. Areas with High, 2. Moderate, and 3. Low Level of Social Development

**1. Areas with High Level of Social Development (Above 0.60)**

This category of districts includes development level recording composite index level (CIL) of more than 0.60 (Table 01, Table 02). Although Haryana is normally a socially developed state, regional disparities persist in various dimensions of its development, such as literacy rate, population growth, and sex ratio. In 1991, only Rewari district was in NCR & Yamunanagar district in Non- NCR with a high level of social development area (Fig. 01A). While in 2001, three districts (Gurugram, Rewari, and Rohtak) were from NCR but no district of non-NCR of Haryana (Fig. 01B), and in 2011, two districts (Rewari and Mewat) of NCR and five districts (Ambala, Sirsa, Fatehabad, Karnal, and Kurukshetra) of non-NCR (Fig. 01C) have high development due to increased urbanization, economic growth, and Infrastructure facilities.

**2. Areas with Moderate Level of Social Development (0.30-0.60)**

Maximum districts of Haryana have a moderate level of social development. The districts of Haryana NCR included in this ca tegory according to the census 1991, were Faridabad, Gurugram, Rohtak, Sonipat, and Panipat (Fig. 01A) but reduced in number in 2001, three districts viz. Faridabad,

Sonipat, and Panipat (Fig. 01B) whereas in 2011, again increased & reached upto six districts those were Faridabad, Gurugram, Palwal, Rohtak, Sonipat, and Panipat (Fig. 01C).

Most districts of Haryana included in this category were from non-NCR. As per census data, seven districts (Ambala, Bhiwani, Hisar, Kurukshetra, Mahendergarh, Sirsa, and Karnal) in 1991 (Fig. 01A) and thirteen districts (Ambala, Bhiwani, Fatehabad, Hisar, Jhajjar, Jind, Kaithal, Sirsa, Kurukshetra, Karnal, Mahendergarh, Panchkula and Yamunanagar) in 2001 (Fig. 01B) while seven districts (Bhiwani, Hisar, Jind, Kaithal, Mahendergarh, Panchkula and Yamunanagar) in 2011 (Fig. 01C) have moderate level of social development.

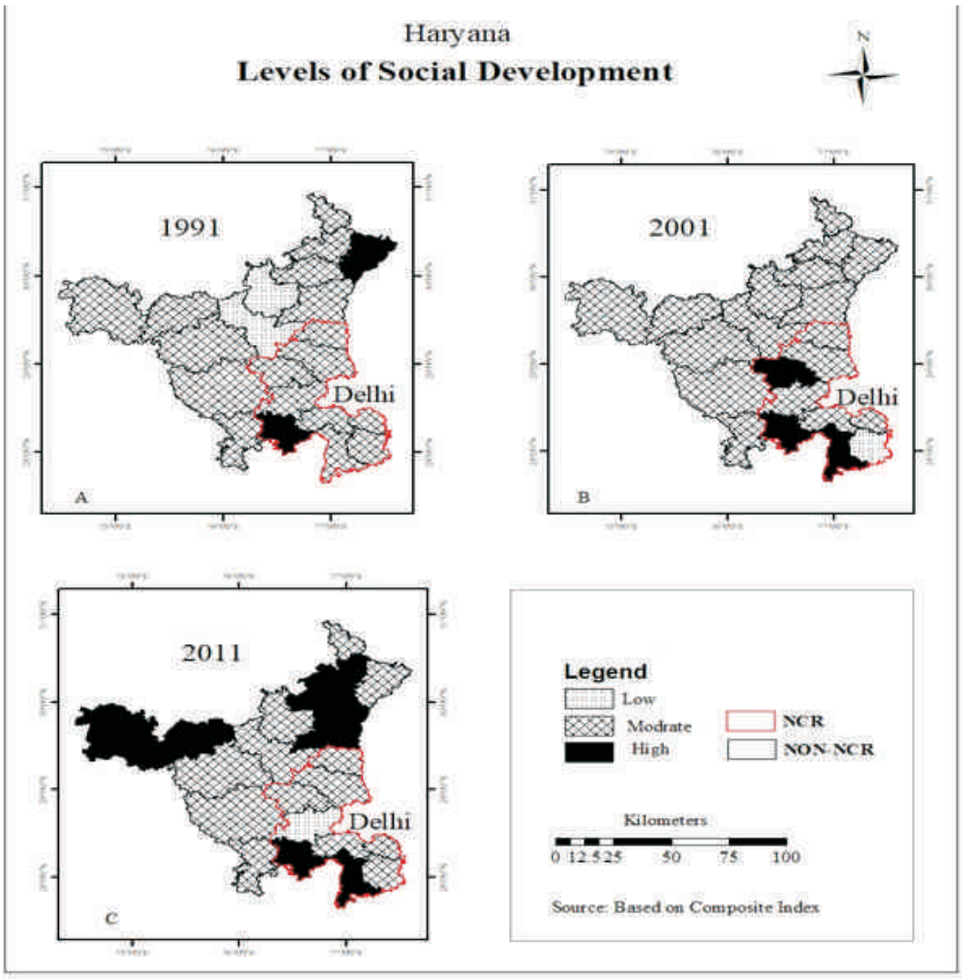


Fig. 01

**Table 01 : Composite Index of Social Development (1991, 2001 & 2011)**

| Composite index of social development (1991, 2001 & 2011) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Districts | 1991 | | | | | 2001 | | | | | 2011 | | | | | |
| | Development Score (DS) | | | | | Development Score | | | | | Development Score | | | | | |
| | SR | PG | LR | All DS | CI | SR | PG | LR | All DS | CI | SR | PG | LR | All DS | CI |
| Ambala | 0.76 | 0.00 | 1 | 1.76 | 0.59 | 0.48 | 0.34 | 0.84 | 1.66 | 0.55 | 0.59 | 0.56 | 0.79 | 1.94 | 0.65 |
| Bhiwani | 0.51 | 0.43 | 0.49 | 1.43 | 0.48 | 0.59 | 0.61 | 0.47 | 1.67 | 0.56 | 0.61 | 0.54 | 0.49 | 1.64 | 0.55 |
| Faridabad | 0 | 0.47 | 0.73 | 1.20 | 0.40 | 0.04 | 0.54 | 0.9 | 1.48 | 0.49 | 0.36 | 0.51 | 0.78 | 1.65 | 0.55 |
| Fathehabad | 0.26 | 0.43 | 0.23 | 0.92 | 0.31 | 0.65 | 0.71 | 0 | 1.36 | 0.45 | 0.91 | 0 | 0.91 | 1.82 | 0.61 |
| Gurugram | 0.44 | 0.45 | 0.43 | 1.32 | 0.44 | 0.29 | 0.55 | 1 | 1.84 | 0.61 | 0 | 0.6 | 0.72 | 1.32 | 0.44 |
| Hisar | 0.26 | 0.43 | 0.23 | 0.92 | 0.31 | 0.3 | 0.58 | 0.34 | 1.22 | 0.41 | 0.34 | 0.51 | 0.73 | 1.58 | 0.53 |
| Jhajjar | 0.22 | 0.45 | 0.83 | 1.50 | 0.50 | 0.26 | 0.63 | 0.71 | 1.6 | 0.53 | 0.16 | 0.52 | 0 | 0.68 | 0.23 |
| Jind | 0.11 | 0.40 | 0.19 | 0.70 | 0.23 | 0.31 | 0.64 | 0.2 | 1.15 | 0.38 | 0.33 | 0.53 | 0.91 | 1.77 | 0.59 |
| Kaithal | 0.26 | 0.56 | 0 | 0.82 | 0.27 | 0.32 | 1 | 0.05 | 1.37 | 0.46 | 0.51 | 0.51 | 0.57 | 1.59 | 0.53 |
| Kurukshetra | 0.52 | 0.33 | 0.68 | 1.53 | 0.51 | 0.46 | 0.34 | 0.59 | 1.39 | 0.46 | 0.65 | 0.49 | 1 | 2.14 | 0.71 |
| Mahendargarh | 0.83 | 0.34 | 0.64 | 1.81 | 0.60 | 1 | 0.21 | 0.59 | 1.8 | 0.60 | 0.78 | 0.48 | 0.52 | 1.78 | 0.59 |
| Mewat | 0.44 | 0.45 | 0.43 | 1.32 | 0.44 | 0.29 | 0.55 | 1 | 1.84 | 0.61 | 1 | 0.54 | 0.86 | 2.40 | 0.80 |
| Palwal | 0 | 0.47 | 0.73 | 1.20 | 0.40 | 0.04 | 0.54 | 0.06 | 0.64 | 0.21 | 0.5 | 0.53 | 0.5 | 1.53 | 0.51 |
| Panchkula | 0.76 | 0.00 | 1 | 1.76 | 0.59 | 0 | 0.27 | 0.79 | 1.06 | 0.35 | 0.36 | 0.54 | 0.91 | 1.81 | 0.60 |
| Rewari | 1 | 0.28 | 0.94 | 2.22 | 0.74 | 0.8 | 0.21 | 0.85 | 1.86 | 0.62 | 0.84 | 1 | 0.68 | 2.52 | 0.84 |
| Rohtak | 0.22 | 0.45 | 0.83 | 1.50 | 0.50 | 0.26 | 0.79 | 0.77 | 1.82 | 0.61 | 0.25 | 0.55 | 0.82 | 1.62 | 0.54 |
| Sirsa | 0.58 | 0.44 | 0.16 | 1.18 | 0.39 | 0.63 | 0.71 | 0.13 | 1.47 | 0.49 | 0.82 | 0.32 | 0.69 | 1.83 | 0.61 |
| Sonipat | 0.13 | 0.38 | 0.9 | 1.41 | 0.47 | 0.17 | 0.27 | 0.73 | 1.17 | 0.39 | 0.04 | 0.51 | 0.5 | 1.05 | 0.35 |
| Yamunanagar | 0.56 | 1.00 | 0.76 | 2.32 | 0.77 | 0.42 | 0 | 0.67 | 1.09 | 0.36 | 0.44 | 0.4 | 0.91 | 1.75 | 0.58 |
| Panipat | 0.25 | 0.50 | 0.53 | 1.28 | 0.43 | 0.07 | 0.61 | 0.55 | 1.23 | 0.41 | 0.19 | 0.5 | 0.62 | 1.31 | 0.44 |
| Karnal | 0.37 | 0.35 | 0.57 | 1.29 | 0.43 | 0.45 | 0 | 0.48 | 0.93 | 0.31 | 0.63 | 0.5 | 0.88 | 2.01 | 0.67 |

Legends: Development Score (DS), Sex Ratio (SR), Population Growth (PG), Literacy rate(LR), Sum up of all Development Score (All DS), Composite Index (CI). Source: Authors calculation based on data from the Statistical Department of Haryana

**Table 02 : Distribution of Haryana's Districts with Levels of Social Development**

| Number of Districts with level of Development (Composite Index 1991, 2001 and 2011) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | National Capital Region | | | Total no. of Districts | | | Non– National Capital Region | | | Total no. of Districts | | |
| | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 |
| Low (< 0.30) | - | Palwal | Jhajjar | 0 | 1 | 1 | Jind, Kaithal, | - | - | 2 | 0 | 0 |
| Moderate (0.30-0.60) | Faridabad, Gurugram, Rohtak, Sonipat, Panipat | Faridabad, Sonipat, Panipat | Faridabad, Gurugram, Palwal, Rohtak, Sonipat, Panipat | 5 | 3 | 6 | Ambala, Bhiwani, Hisar, Kurukshetra, Mahendergarh, Sirsa, Karnal | Ambala, Bhiwani, Fatehabad, Hisar, Jhajjar, Jind, Kaithal, Sirsa, Kurukshetra, Karnal, Mahendergarh, Panchkula, Yamunanagar | Bhiwani, Hisar, Jind, Kaithal, Mahendergarh, Panchkula, Yamunanagar | 7 | 13 | 7 |
| High (> 0.60) | Rewari | Gurugram, Rewari, Rohtak | Rewari, Mewat, | 1 | 3 | 2 | Yamunanagar | - | Ambala, Sirsa, Fatehabad, Karnal Kurukshetra | 1 | 0 | 5 |

(- means no district in this category)

**3. Areas with Low Level of Social Development (Below 0.30)**

This category of districts includes development level recording composite index level below 0.30 (Table 01 and Table 02). Until 1991, there was no district in this category (Fig. 01A & 01B) from NCR only Palwal in 2001 and only Jhajjar in 2011 is included in this level, from NCR region. Jind & Kaithal (Non-NCR districts) were included in this category only (Fig. 01C). The reason for the low development in these districts is strict social custom due to caste-dominated society and the patriarchal mentality of society.

**Conclusion**

The NCR of the Haryana state has seen a greater prevalence of social development. Due to the high rates of social development indicators like population, literacy rate, and sex ratio, the NCR districts have higher rates of social development than non-NCR districts. The state government needs to pay extra attention to develop, non-NCR districts. These extra attentions will reduce regional disparity and the overall progress of society. Therefore, it is required strict rules and regulations to implement necessary policies and laws, such as strict traffic rules for the betterment of social development uniformly, while flexible norms should be created in some areas, such as the necessary social infrastructure development, which may be hindered by some strict rules like forest rules. An integrated approach is required to handle all problems that will be faced in the way of social development throughout the NCR and non-NCR. Policy makers need to take a more comprehensive and integrated approach to improving the quality of facilities, such as good education, jurisdiction, labour, and employment, that guarantee a sustainable goal in the future in the NCR and non-NCR of Haryana. The state government has launched various schemes for social development, such as the Beti Bachao Beti Padhao Yojna, Mukhya Mantri Viwah Shagun Yojna, Mukhya Mantri Samajik Antarjatiya Smarasta Yojna, Ambedkar Housing Scheme for Denotified Tribes and Scheduled Castes, etc. To stop the disparities from getting more serious, intensive policy changes are required.

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# RECENT SCENARIO OF WATER SCARCITY IN INDIA: A GEOGRAPHICAL APPRAISAL

**Arti Vishnoi and Arti Yadav**

**ABSTRACT**

*Without water, we cannot imagine life on the earth. It is the most important substance for living beings. The quantity of fresh water available to the earth is very low and the demand for water increases day by day. This imbalance situation generates water scarcity condition. We need to resolve this problem by sustainable conservation and management of water. Water availability ensures food security, industrial production, and a sustainable environment. There are many factors behind this problem, for example poor management of water, less public awareness, lack of government attention, etc. We need to conserve naturally available water, and the government needs to take strict steps to protect natural water resources. According to the UN report, India is projected to be the most severely affected country in terms of water scarcity among the global urban population. Our union and state legislatives made several master plans to conserve and management of water, for example Maharashtra, Rajasthan, Andhra Pradesh, Tamil Nandu, Gujarat, Karnataka and Odisha. The focus of this paper is to analyze the factors of water scarcity in India and its present scenario of water scarcity in Indian states.*

## Introduction

"Water is the driving force of all the nature", Leonardo da Vinci. "Life on the earth without water cannot exist. Life exists wherever there is water available. All kinds of living organisms consume water for their existence. It works as a prime power that maintains the earth's ecosystem and supports various activities that are essential for living beings. Without water, there are many dangerous impacts on the earth's environment and its life, a major impact on human civilization.

Water scarcity is the lack of sufficient freshwater resources to fulfill human needs. People will use more amount of water if there is a rise in their income. The affluent section of society consumes more water for washing, cleaning, gardening, maintaining lawns, etc. The report of Water Aid in 2018 predicted that in near future water demand would rise due to the rapid growth of Indian cities. During summer months cities like Mumbai, Jaipur, Nagpur, Lucknow, and Bhatinda already freeing water rationing.

The absolute minimum requirement of domestic usage is 50 liters per person per day and the need in agriculture, industrial, and energy sectors have minimal annual per capita requirement of 1700 meter cubic. The availability falls below this threshold level. It will generate water scarcity or water shortage. Kinds of the problems originate due to water scarcity like food insecurity, water shortage, reduced industrial production, impact on economic activities, impact on energy production, risk on biodiversity, deforestation, etc. In India, monsoonal rainfall helps to fulfill most of the demand for water which is collected on the surface or underground. After 1950, there is a rapid rise in the Indian population and its

1. **Dr. Arti Vishnoi, Professor, Department of Geography, P.P.N. (P.G.) College, Kanpur, (Affiliated to Chhatrapati Shahu Ji Maharaj University, Kanpur).**
2. **Arti Yadav, Research Scholar, Department of Geography, P.P.N. (P.G.) College, Kanpur, (Affiliated to Chhatrapati Shahu Ji Maharaj University, Kanpur).**

water demand continued to rise. Due to the lack of a sustainable conservation plan, India will stand in front of a severe water shortage problem.

**Objectives**

- To focus on the factor of water scarcity.
- To discuss the present scenario of water deficit problem in India.
- To examine the problem and present the solution to the problem.
- To spread the general awareness among the people to conserve water.

**Methodology**

In this study, we aim to evaluate the recent scenario of water scarcity in India. Data serve as the primary requirement for our research. The investigation of the research objective is data-driven. The first and most important step for the researcher is to do a literature survey from various sources, for example Research Gate, Google scholar, library, Sodhganaga, etc.

Additionally, secondary data will be collected from different sources for example IMD Site, Population Census, Journal, Articles, etc. These data will be put to statistical analysis and graphically represented by the researcher.

This paper is based on the secondary data. The data is collected from various sources such as journals, articles, books, and newspapers. Water scarcity data collected from different organizations such as the government of India; NITI Ayog IWT2.0 Central Ground Water Board (CGWB), etc. The data is represented on different statistical methods, for example, charts, graphs, tables, etc.

**Concept of Water Scarcity in India.**

It is a simple concept, lack of sufficient fresh drinking water resources to meet the water demand. In other words, the total amount of water that is naturally available varies according to the supply or demand of water. Per capita availability is about 1614 $m^3$ per year. Due to rise in population may reduce the per capita water availability to 1137 $m^3$. Water demand depends on population growth and its size, level of economic growth, etc. Polluted water also considers the absence of access to water. There are two types of water scarcity: Physical water scarcity and economic water scarcity. Physical water scarcity generates those regions where there is not enough water to fulfill the demands, for example, dry parts or arid regions of the country. Water scarcity problems arise due to the lack of investment in infrastructure to extract water from underground water sources or rivers, etc. So many components contributed to generating this kind of water scarcity problem, for example, climate changes, overuse, increased water demands, etc. Climate change would affect the world's ground water reservoirs directly due to changes in the pattern of water level or indirectly increase demand, especially in the irrigation sector (World Bank, 2018). In the last century, water demand has been growing at more than twice the rate of population increases. In India, more than 1.1 million people lack access to potable drinking water (UNICEF, 2013). Due to the rise in population and its water demand, the cost and effort to build & maintain access to water increases. India accounts for 65% groundwater supply for irrigation purposes. This large amount of water used in the agriculture sector is the key to economic growth in this country. By 2030, in India, the water demand will increase twice the supply of water. As per the report of the Ministry of Water Resource, GOI, the per capita water availability will remain constant until 2021.

But in 2025 and 2050 per capita water availability will descend to nearly 36% and 60%. This will be due to rapid population growth, as compared to its availability. It is due to adequate water demand

not only for drinking purposes but also for economic growth and development in different sectors in India. The 20th Report of the National Commission on Integrated on Water Management predicted that the water demand will rise till 2050, the demand for water across all sectors is estimated to be 710 BCM in 2010, 843 BCM in 2025, and 1180 BCM in 2050. However, the availability of usable water remains constant at 1122 BCM for the years 2010, 2025 and 2050 (Table 01).

**Table 01 : Water Demand Projection.**

| Particulars | Water demand in $km^3$ or BCM | | |
|---|---|---|---|
| Year | 2010 | 2025 | 2050 |
| Water Demand From All Sector | 710 | 843 | 1180 |
| Irrigation | 557 | 611 | 807 |
| Drinking Water | 43 | 62 | 111 |
| Industry | 37 | 67 | 81 |
| Energy | 19 | 33 | 70 |
| Other | 54 | 70 | 111 |
| Availability of Usable Water | 1,122 | 1,122 | 1,122 |
| Excess/ Shortfall | 412 | 279 | -58 |

Source: National Commission on Integrated Water Management, 1999)

**Factors Contribute to Generate Water Scarcity Problem.**

India is blessed with monsoon (June to September) and retreating monsoon (September to December) rainfall, occurs more than 75% in India. This short period of high-volume rainfall results in high volume run-off generated flooding conditions in some parts of India, like Bihar, Himachal Pradesh, Punjab, Delhi, and Haryana. Many regions face water shortage problems for the rest of the year. Drought-prone regions like southeastern Maharashtra, Northern Karnataka, Andhra Pradesh, Odisha, Gujarat, Telangana, and Rajasthan facing water shortage problem. Underground water is the major source of fresh water in Indian cities because a larger amount of water runs out during the rainy season due to a lack of infrastructure or the absence of a sufficient water system.

India gets enough rainfall in the monsoon season but due to its physiographical factor's rainfall varies from region-to-region in India for example average rainfall in India is 1,170m with a wide gap between 100m in Rajasthan region to 1000m in Mawsynram (East Khasi hills) in Meghalaya.

Groundwater is the major source of water in India. It is used to compensate for unsuitable rainfall. Its per capita availability is about 1614 $m^3$ per year. Due to rise in population, the per capita water availability may reduce to 1137 $m^3$ approx. The day-to-day rapid increase in dependency on groundwater drastically reduces the underground water level. During the summer season, excessive use of underground water causes a rapid reduction in water levels in some parts of India like Punjab, Western UP, hard rock plateau area of Central and South India, some parts of coastal areas, etc. According to the Climate Model and Representative Concentration Pathway (RCP) scenario, the current groundwater depletion rate is an average from 1.62-4.45-time. Approx 60% of irrigated agriculture depends on groundwater because Indian agriculture is based on irrigation. Due to the erratic nature of rainfall. Farmers unsustainably extract groundwater which declines arable land and impact economic growth. Over utilization of underground water causes an increase in the concentration of metal, solids, salt, and other chemicals.

**Table 02 : Various Uses of Water in India.**

| Year | Domestic | Irrigation | Industry | Energy | Other |
|---|---|---|---|---|---|
| 2000 | 6.6 | 85.3 | 1.3 | 0.3 | 6.5 |
| 2025 | 6.7 | 83.3 | 2.1 | 1.4 | 6.6 |
| 2050 | 7 | 74.1 | 4.4 | 9 | 5.5 |

Source: Central Groundwater Board

According to the Central Groundwater Board, more than 60% of water used for irrigation purposes comes from groundwater, accounting for over 80% of total water usage in India. Domestic use of water has increased from approximately 6.6% in 2000 to 7% in 2050. However, in the industrial sector, gradual use of water has increased by 1.3% in 2000, 2.1% in 2025 and is projected to reach 4.4% by 2050. A large proportion of water will be used in energy production by 2050, because India is moving towards renewable resources. The water supply comes from groundwater sources over-exploited by farmers, leading to a decline in groundwater levels and generating devastating effects across a large part of the country.

Table 03 presents the population and per capita water availability in India until 2050. In 1951, when the population was 361 million, the per capita water availability was 5,177 $m^3$ per year, however by 2011, with a population of 1,210 million, the per capita water availability reduced to 1,545 $m^3$. Based on this trend, we can estimate that in 2025 and 2050 the per capita water availability will be 1341$m^3$ and 1140$m^3$ respectively. If India is unable to fulfill future water demand across different sectors, such as agriculture, industrial, and domestic use, it will be facing acute water scarcity. Most of the urban areas face water shortage conditions due to continued migration and excessive demand for water.

**TABLE 03 : PERCAPITA AVAILABILITY OF WATER.**

| year | Population (million) | Per capita water availability($m^{3/year}$) | % Change from the previous year |
|---|---|---|---|
| 1951 | 361 | 5,177 | |
| 1955 | 395 | 4,732 | -8.59 |
| 1991 | 846 | 2,209 | -53.31 |
| 2001 | 1,027 | 1,816 | -17.92 |
| 2011 | 1,210 | 1,545 | -14.92 |
| 2025 | 1,394 | 1,341 | -26.37 |
| 2050 | 1,640 | 1,140 | -14.98 |

SOURCE: - GOVERNMENT OF INDIA, 2009.

**Present Scenario Of Water Scarcity Problem In India**

India has a 4% world water resource but after 2011, it was moved towords the water-stressed condition due to climate change, excessive water demand, rapid population increase, etc. India uses 65% of its groundwater for irrigation purposes and 80% of water demand, in rural areas.

In 2004, India used 58% of its net available groundwater which increased to 62% in 2014 (Ministry of Water Resource, Government of India 2017). Lack of restriction on the volume of Groundwater extraction and availability of subsidized power in the agriculture sector, a large-scale farmer in north-western and peninsular India uses ground water inefficiently (Kumar, 2019). Due to urban sprawl, cities like Hyderabad, and Bangalore lost their water bodies. Under groundwater declines due to changes in land use and land cover (Ram chandraiah and Prasad, 2004). Hyderabad and Chennai lost their water bodies due to overcrowding and uncontrolled development. In a major part of India, groundwater is declining because people are utilizing underground water for irrigation purposes, especially in those places that are far from surface water sources like rivers (Wyrwoll 2012). The major rivers of India like the Ganga and the Yamuna suffer from water pollution such as domestic sewages, industrial water, and harmful chemical substances, putting pressure on groundwater sources (Ibid and Sengupta, 2019). The northwest region of India, like Haryana and Punjab also known as the bread basket of India, comes under the water threat condition because these regions, crops are water-intensive, for example, wheat and rice.

Water trains and tankers help the battle of Latur's worst drought. Due to severe water extraction of groundwater soon Delhi, Punjab, Haryana, and Rajasthan are pushed toward the harrowing shortage of water.

According to Central Ground Water Board analysis, 56% of the wells, which are analysed to keep a table on groundwater level, showed a decline in its level in 2013 as compared to an average of the preceding 10 years (2003-2013). CGWB concludes after analysing 10,219 wells across the county. It found that 5,699 wells had reported a decline. It also finds that the agriculture sector is the biggest user of

water. In several states well water levels decline, for example Tamil Nadu, Punjab, Kerala, Karnataka, Meghalaya, Haryana, West Bengal, and Delhi. Irrigation accounts for nearly 90% of total groundwater used. Its share is much higher in agriculture-heavy states, for example Uttar Pradesh, Punjab, MP, etc. The lack of a rational water policy led to boundless water extraction of groundwater in these regions.

As per the report of NITI Ayog, composite water index (FY 16-17) fast attempt Pan-India set of metrics that measured different dimensions of water management. This study ranked 24, in how well they managed their water, states Gujarat, Madhya Pradesh, and Andhra Pradesh manage water resources effectively. These states come under the high-performance index. Himanchal Pradesh, Punjab, Maharashtra, Telangana, Karnataka, Tamil Nadu come under medium performance index. Rajasthan, Uttar Pradesh, Delhi, Bihar, Chhattisgarh, Odisha, Assam, Meghalaya, etc. come under low performance. These states have a big river system and natural sources of water but have poor water management, they come under low performance. These states need to learn better water management from high performance states develop to such kinds of schemes and projects, for example, Neeru Chettu in Andhra Pradesh, and Sujalam Sufalam Abhiyan in MP that help to develop better water management for our present and future generations.

Uttar Pradesh and Madhya Pradesh are large in terms of population as compared to their area. Around UP and MP dozens of states face severe, or complex water-stressed problems. Karnataka, Maharashtra, Bihar, Gujarat, and Rajasthan are the states facing water challenges. In India, the Bundelkhand region spread over the 13 districts of Uttar Pradesh and Madhya Pradesh worst hit by the water crisis.

According to the NITI Ayog report, since 2018 states of India have faced severe water shortage conditions, like Maharashtra, Gujarat, Uttar Pradesh, Jharkhand, Andhra Pradesh, Delhi, Karnataka, and Rajasthan. In the year 2019, NITI Ayog reported that in India 600 million people were water deprived due to the unpleasant condition of water shortage in its history. This report also included 21 cities like Delhi, Chennai, Bangalore, and Hyderabad which probably exhausted their underground water resources. The agriculture sector is the main consumer of water in India. 80 to 90 per cent of rural people's fresh drinking water needs depend on underground water. Between 2007 to 2017, 60% ground water level declined in India, 90% was used for irrigation purposes. Central groundwater board collaborates with state/UT periodically to assess the groundwater level pan India. As per the assessment, out of a total of 6,881 units in the country,1186 units in state / UTs have been categorized as over-exploited, where annual groundwater extraction is more than annual extractable groundwater resource.

Ground water levels continue to decline due to dependency on underground water in India. Farmers in arid regions with erratic nature of rainfall, farmers dependency increases on underground water. Indian government subsidizes the electric pumps and places. No limits on the volume of groundwater they extract, this will create a problem of excessive water use and strained electric grids. India stands in a highly vulnerable situation.

**Government Initiatives**

In the year 1980, according to the National Perspective Plan for water transfer from surplus basin to deficit basin, the National Water Development Agency identified 30 such river links. Ken-Betwa River interlinking was first project and began the groundwork. It began work on four priority links and this project was completed in 8 years. The project will provide the benefits to water-stressed regions. In 2019, the state government of Uttar Pradesh launched a project, which provides piped water

supply to homes in Bundelkhand and Vindhya region. The aim of this project is to participate in ground water management in 78 districts of seven states.

Many states already done work in the field of water conservation for example Mukhyamantri Jal Swavlamban Abhiyan in Rajasthan, Jalyukt shibar in Maharashtra, Sujalam Sufalam Abhiyan in Gujarat; Mission Kakatiyain Telangana, Neeru Chettu in Andhra Pradesh, Jal Jeevan Hariyali in Bihar, Jal hi Jeevan in Haryana. In 2019, government of India launched Jal Shakti Abhiyan (JSA). It is a time-bounded campaign mission to improve water availability and improve water stressed blocks of 256 districts in India. These districts were selected based on the groundwater extraction level as per the CGWB information. Later, the Government of India extended this mission and on 21 December, 2020 launched "JSA-II-Catch the Rain". The government of India has launched Atal Bhujal Yojana, a central sector scheme for 80 water-stressed districts in seven states Haryana, Gujarat, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, and Uttar Pradesh. The purpose of this scheme is sustainable water conservation and its management. The Central Government supports to construction of water harvesting and conservation work for MANREGA and Pradhan Mantri Krishi Sinchayee Yojana.

**Suggestions**

The water scarcity problem develops when the wide gap between water demand and supply occurs. It has a great impact on human life, for example poverty, migration, diseases, loss of biodiversity, hunger, food insecurity, lack of access to water, etc. Water Conservation and management of naturally available water help to way forward from this water scarcity through construction of Dam, desalination, rainwater harvesting, and rejuvenating old water conservation methods that are based or region to region, climate and physiographic conditions. These methods help to meet the demand for water for different human needs, for example, agriculture, industrial, and domestic purposes. Conservation involves both water-saving technology and behavioral decisions. These techniques provide a good quantity and quality of water which helps to fulfill the water demand of people.

We need to provide general awareness among the people so they can conserve and manage the water and fix this kind of water scarcity problem.

**Some prominent suggestions to resolve the water scarcity problem**

1) A country like India which is based on monsoonal rainfall, will face severe impacts of inadequate rainfall. Water management practices should be encouraged on a large scale for better availability of water especially in city regions, for example Bangalore, Delhi, etc.

2) Interlinking project is a large-scale project; we transfer excess water from the region to drought-prone areas. That way, we control floods and drought conditions at both same times, for example, Ken-Betwa, Tapi- Narmada, Godavari-Krishna, Pennar -Cauvery, etc.

3) At the ground level, we need to decentralize the management of water at the community level. Delwara in Rajasthan and Cuttack in Odisha.

4) For the better management of surface water at the local level we need corporations among the different states. For example, Delhi, Haryana, and Uttar Pradesh for Yamuna River; Kerala, Tamil Nandu, Karnataka and Puducherry for Cauvery, etc.

5) Need a changing cropping pattern and crop diversification in India, like zero budget, Natural farming, and organic farming. For example in Sikkim and Karnataka, etc.

6) Rejuvenate old water harvesting practices which were practiced in old times in different parts of India, for example kund, Taanka,

Jhalara in Rajasthan, Eir in Tamil Nandu, etc.

7) The desalination method helps to increase freshwater availability on earth. In which removing dissolving salt and minerals from sea water or saline underground water.

8) Water recycling refers to reusing water for appropriate purposes, for example, gardening, agriculture, industrial, etc. Water conservation refers to using a lesser amount of water.

9) A dam and reservoir create an artificial lake constructed by humans. These structures are built behind the dam in rivers that can collect water for the dry season. It helps to fulfill urban water demand, reduce flooding conditions, generate electricity, etc.

10) Rainwater harvesting is a vital tool for arid regions to get enough rainfall during the rainy season. This helps to reduce soil erosion, reduce flooding conditions, reduce desertification, enhance forestation, etc.

**Conclusion**

Worldwide water scarcity has become a major problem of human society. In last few decades, water scarcity has increased due to the rapid rise in population, climate change, over-consumption, deforestation, etc. We Need to use our source of water sustainably and conserve it for future generations. India has three major sources of water river, underground water, and rainwater but lack of proper water management and conservation of water many large parts of India face water scarcity. Several regions of northwest and south India face water scarcity from time to time.

Threatening water scarcity in India, we need to conserve water sources which are available around the settlement such as lakes and water bodies (Dutta Singh, and Prasad 2010). Wetlands located around the cities are economically valuable. Encroachment of water bodies and wetland river beds should be prevent. Government should work on water Management and conservation practices and people's contribution towards sustainable use of water and conservation, more importantly to reduce these kinds of issues. This study will provide insight into water scarcity-related problems. How is this water shortage problem generated, what are factors that contributes to it and how it affects living organisms? With the help of this study, now we understand how important for us to sustainably conserve and management of water. How to reduce this water shortage problem and parallelly fulfill the water demand?

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# IMPACT ASSESSMENT OF ANGANWADI SERVICES ON RURAL DEVELOPMENT IN JAKHNIDHAR BLOCK, TEHRI GARHWAL (UTTARAKHAND)

**Raiz Ahmed, Rajesh Bhatt and Anita Rudola**

**ABSTRACT**

*Rural Anganwadi services are the backbone of rural healthcare and childcare development in India. Anganwadi centres make available a combined package of facilities including supplementary nutrition, basic healthcare, and pre-school education in rural areas. The integrated child development schemes are one of the largest community-rich programmes that provide integrated packages for the child below 6 years and pregnant and lactating mothers in different areas through Anganwadi workers. Anganwadi Services plays a vital role in reducing the stress level and fatigue of the mother by contributing to their nurturing small child. Nutritional level throughout the initial phase of life mostly influences the general health and development of children to achieve the milestone of life. These centres also teach mothers about the importance of nutrition and health, empowering them to better care for their child. In this study an attempt has been made to understand the impact for Anganwadi services on the rural household for the development and also analyse the awareness, knowledge, role and responsibilities of Anganwadi workers in rural area of Tehri Garhwal, Uttarakhand. The primary survey was conducted and collected the information of 15 selected villages and 33 Anganwadi centres from Jakhnidhar block in Tehri Garhwal District of Uttarakhand through population basis 165 respondents sample used for analysis of data.*

## Introduction

Anganwadi centers give women the wisdom of participation in the community. It provides a chance to participate in various activities in rural areas. In other words, it extends the social value and time to develop the healthy relations with neighbours, and attend the occasion without any hesitation with other women in the Anganwadi centres. Healthy environment and healthy nutrition are important to develop the physical appearance of every child. This basic nutrition helps the child to grow strong physically and mentally that sustained at a very young age and more likely to be the healthy adult. Anganwadi services established the key source of communication between the government and the rural people through the Anganwadi workers that teach the parents, aware about basic health services, benefits and child development in rural area. The major challenges for the Anganwadi works are shortage of infrastructure such as non-availability of government building, separate kitchen and toilet and availability of clean drinking water facilities in rural area. Supplementary nutrition is not sufficient for the growth of children, providing of other basic facilities is necessary which reduce the mental pressure of parents towards their children (Navuluri, et al., 2020).

Anganwadi centres provide the nutrition and health care services to children and mothers through counselling, door to door counselling, pre-

1. **Raiz Ahmed, Research Scholar, Department of Geography, School of Earth Science, HNB Garhwal (A Central) University,Srinagar, Garhwal, Uttarakhand.**
2. **Dr. Rajesh Bhatt, Assistant Professor, Department of Geography, Himwant Kavi Chandra Kunwar Bartwal Rajkiya Mahavidyalaya, Nagnath Pokhari, Chamoli, Uttarakhand (India)**
3. **Prof. Anita Rudola, Professor, Department of Geography, School of Earth Science, HNB Garhwal, A central university, Srinagar, Garhwal, Uttarakhand**

school education, supply of health and medical facilities, immunization and rich source of nutrition. The knowledge gap between the rural and urban is complex in nature, urban services provide better services as compared to rural area (Bhattarai, et al., 2017). For the improvement in the Anganwadi centres bring new technology on it to deal various problem of health, morality, child protection, etc (Bhatnagar & Bhadra, 2015). The function of Anganwadi workers is not distribution of services only, but need to develop and improve the satisfaction level of the mothers and children (Rehman, et al., 2017). Most of Anganwadi centres have less working space but maintenance of register, basic kit and equipment are better in many centres (Baseer, et al., 2021)

**The Study Area**

Jakhnidhar block is located in the Tehri Garhwal district of Uttarakhand. It is situated at 30°20'16" N latitude and 78°30'55" E longitude. It is an important part of the local governance structure and plays a crucial role in the development and administration of its local community. There are a total of 151 villages in the Jakhanidar community block of Tehri Garhwal. Total population is 47,520 with a male population of 21,897 and a female population of 25,623. The literacy rate of Jakhnidhar block is 74.98%. The climate has been pleasant and minor change in temperate throughout the years. The maximum temperature rises to about 37°C in June and July, and the minimum temperature falls to about -2°C in December and January. In Jakhnidhar, there is a diversity of flora and fauna. Tropical and dry deciduous forests are found in this area. The topography is mountainous, with flowering valleys and small grassland.

**Objectives**

1. To analyse the availability of services in Anganwadi centres for children and mothers.

2. To analyse the perception and awareness of Anganwadi services on rural development.

**Research Methodology**

This study is based on the primary survey which was conducted in the Jakhnidhar block of Tehri Garhwal district of Uttarakhand. The data is collected through the questionaries and door to door survey to understand the impact of Anganwadi services on rural household. A total 165 samples collected in 15 villages and 33 AWWc survey on the population basis. Villages are divided on the three categories (High, Medium and Low population) on the basis of purposive sampling method.

**Data Analysis**

For the analysis of data, we use Jamovi open-source statistical software and Microsoft excel software. Total 165 samples were finalised for analysis of data to understand the impact of Anganwadi services on socio-economic condition of the respondents in rural landscape and also analyse the impact of services on rural development considering the indicators like 0-3 years children, 3-6 years children, and pregnant women and nursing mothers.

For the first three factor, we use the one-way Anova statistical method and observed that result is statistically significant and have a positive impact on services and rural development because p value less than 0.05. In this method, we calculated p-value, variance, standard deviation and mean standard error.

In people perspective on the Anganwadi services and rural development, we calculate the z-score value and percentage. Higher the value means people perception is positive and lower the means people perception is less on the services. To calculate the z-score given formula is to be used.

$$Z = \frac{x - \mu}{\sigma}$$

Where, z = Standard score

$x$ = observed value

$\mu$ = Mean of the sample

σ = Standard Deviation of the sample

**Results and Discussion**

**Socio-Economic Status of Respondent in The Study Area**

The socio-economic condition in rural areas progressively changes over time. It represents the household condition and standard of living in society. Major indicators of socio-economic status are education, income, family type, etc., which signifies the structure of society. To understand the status of the socio-economic condition, the age group of the respondents was divided into three categories, as shown in Table 01 below (young, middle, and old age groups). The mean value of the age group is 55.00, and the standard deviation is near about 20.00, as shown in Table 01.

**Table 01 : Socio-Economic Status of Respondent**

| Attribute | Groups | Frequency | Percentage | Mean | STED |
|---|---|---|---|---|---|
| **Age** (years) | < 30 (young) | 35 | 21.21 | 55.00 | 20.000 |
| | 31-41 (Middle) | 75 | 45.45 | | |
| | 41 above (old) | 55 | 33.33 | | |
| **Educational Qualification** | Primary | 32 | 19.39 | 27.50 | 9.225 |
| | Secondary | 35 | 21.21 | | |
| | Sr. Secondary | 30 | 18.18 | | |
| | Graduate | 25 | 15.15 | | |
| | Professional | 10 | 6.06 | | |
| | Illiterate | 33 | 20.00 | | |
| **Monthly Income** (Rs.) | < 5000 | 65 | 39.39 | 33.00 | 24.176 |
| | 10,000-20000 | 52 | 31.51 | | |
| | 20,000-30,000 | 23 | 13.93 | | |
| | 30,000-40,000 | 15 | 9.09 | | |
| | Above 40,000 | 10 | 6.06 | | |
| **Family type** | Joint | 98 | 59.39 | 82.50 | 21.92 |
| | Single | 67 | 40.60 | | |

Source: - Data Based on Primary Survey

Education is one of the most powerful tools for socio-economic development. As per the survey, most of the respondent's qualifications are secondary, which represents 21.21 per cent, and other educational categories show the minor proportions of the respondents. The mean value of the education qualification of the respondents was 27.50, which is very low. As far as income is concerned, 39.39% of respondents belong to the less than Rs. 5,000 monthly income group, while 31.51% belong to the Rs. 10,000–20,000 monthly income group, and other income groups show a minor respondents' percentage. The mean value of monthly income is 33.00, as shown in the table. Most people prefer to live in a joint family, which shows 59.39% and a mean value of 82.50, which is very high.

**Impact And Availability of Anganwadi Services For 0-3 Years Children on Rural Development.**

Children are the backbone of a country, and their protection is the greatest concern for economic and political stability (Srivastava, et al., 2012). Anganwadi services are provided for the children below 3 years to reduce health instability, such as proper health nutrition, routine check-ups for illness, and supplementary feeding to monitor the growth of the child on a daily basis. This study analyses the impact of available Anganwadi services on children under 3 years old. As shown in Table 02 below, for health checkup, the p value is 0.02, and for immunization, the p value is 0.01, supplementary feeding (0.04), and take-home ratio in service, the p value is 0.02, which shows that there is a statistically significant relationship between the Anganwadi services and rural development. In the case of growth monitoring and basic treatment of minor illnesses, the p values (0.36 and 0.27), respectively, are greater than 0.05, which indicates there is no statistically significant relation with services.

**Table 02 : Anganwadi Services Below 3 Years of Age.**

| Sr. No | Anganwadi Services | Standard deviation | Variance | P value | Std. Error |
|---|---|---|---|---|---|
| 1 | check up | 25.02 | .626 | 0.02 | 9.14 |
| 2 | Immunization | 27.29 | .745 | 0.01 | 9.96 |
| 3 | Basic treatment for illness | 23.65 | .560 | 0.27 | 8.63 |
| 4 | Supplementary feeding | 32.61 | .106 | 0.04 | 11.91 |
| 5 | Growth monitoring | 29.77 | .887 | 0.36 | 10.87 |
| 6 | Take home ration | 35.80 | .128 | 0.02 | 13.07 |

Source: - Data Based on Primary Survey
**p < 0.05, is statistically significant

**Available Anganwadi Services For 3-6 Years Children**

Anganwadi services are intended to improve the nutritional and health status of children in the age group of 0–6 years and encourage optimal growth and progress (Shanawaz, et al., 2013). Anganwadi services for children 3-6 years are health checkups, immunizations, basic treatment for illness, supplementary feeding, growth monitoring, pre-school education, health and nutrition education, and early childhood care to stabilize the nutrition and health status of children. In Anganwadi centers, the growth and progress of children are monitored on a daily basis through various parameters such as indoor and outdoor activities, play with cards and charts, identification of symbols and alphabets, etc. to develop the whole physical appearance and mind for better thinking. These services play a major role in the whole development of the children, especially in the hilly area. As shown in Table 03, all these services are statistically significant because p <0.05 indicates that services have a good impact on children and rural development, except for the three services of immunization, growth monitoring, and health and nutrition education, which have p values of 0.32, 0.43 and 0.31 respectively.

**Anganwadi Services for Pregnant Women and Nursing Mothers**

These services are provided for women to reduce the stress level of pregnant and nursing mothers for family welfare, post-natal care, breast feeding, immunization, and prevention of some common communicable diseases during pregnancy such as malaria, tuberculosis, iron

**Table 03 : Anganwadi Services For 3–6-Year-Old Children.**

| Sr. No | Services | Standard Deviation | Kurtosis | Skewness | P-value | Confidence Level | Standard Error | F-Critical |
|---|---|---|---|---|---|---|---|---|
| 1 | Health checks up | 21.68 | -2.342 | 0.269 | 0.01** | 26.92 | 9.70 | 2.313 |
| | Immunization Services | 12.04 | -0.945 | 0.601 | 0.32** | 14.95 | 5.39 | |
| 3 | Basic treatment for minor illness | 23.35 | 1.212 | 1.183 | 0.02** | 28.99 | 10.44 | |
| 4 | Supplementary feeding | 25.33 | -2.600 | 0.542 | 0.01** | 31.45 | 11.33 | |
| 5 | Growth monitoring | 23.10 | 2.457 | 1.392 | 0.43 | 28.68 | 10.33 | |
| 6 | Pre-school education | 19.12 | -0.123 | 0.656 | 0.00** | 23.74 | 8.55 | |
| 7 | Health and nutrition education | 17.28 | -1.701 | 0.720 | 0.31 | 21.45 | 7.73 | |
| 8 | Early child hood care | 26.58 | 1.114 | 1.136 | 0.00** | 33.00 | 11.89 | |

Source: -Data Based on Primary Survey

**p < 0.05, is statistically significant and positive impact on services rural development

deficiency, weaning, and supplementary feeding, as well as improvement in the psychological level and children's nutritional care and balanced diet. In table 04, it is shown that the p-value and skewness of services indicate that if p < 0.05, there is a statistically significant and positive impact of Anganwadi services on the pregnant and nursing mothers in the study area. The p-values for the services of health check-ups (0.024), immunization services (0.043), referral services (0.013), and take-home ration services (0.004), as shown in the table below, are very significant and have a positive impact on mothers and rural development. On the other hand, only one service, health and nutrition education (0.321) for mothers showed a value above 0.05, which is not significant with the analysis result. This indicates that there is no statistically significant and positive relationship between this service and mothers.

**People Perception and Awareness on Anganwadi Services**

People's perceptions are most important for analysing the impact of Anganwadi services at the gross root level. People have a positive response to Anganwadi services and are much more aware of them. To analyse the people's perception and awareness, z-score techniques are used. A higher z-score indicates a higher people's perception, and a lower z-score indicates a lesser people's perception, as shown in Table 05. The value of the z-score is higher for infrastructure (1.33), awareness (1.35), development in children (1.42), cleanliness and hygiene for children (1.69), home-based skill training (1.40), interest in outdoor and indoor activities for children (1.25), and play equipment (1.59), which indicates people's perceptions of these indicators are higher and more satisfied, as shown in the table. The lower value of the z-score indicates less positive impact on rural development (0.47), children's

**Table 04 : Anganwadi Services for Pregnant Women and Nursing Mothers**

| Sr. No | Anganwadi Services | Standard Deviation | Range | Skewness | Confidence Level | Standard Error | P-value |
|---|---|---|---|---|---|---|---|
| 1 | Health check up | 16.16 | 41 | 0.78 | 20.06 | 7.22 | 0.024** |
| 2 | Immunization services | 8.43 | 21 | 0.68 | 10.46 | 3.77 | 0.043** |
| 3 | Health and nutrition education | 17.28 | 40 | 0.72 | 21.45 | 7.73 | 0.321 |
| 4 | Referral services | 23.10 | 61 | 1.39 | 28.68 | 10.33 | 0.013** |
| 5 | Take home ration | 27.65 | 65 | 1.07 | 34.33 | 12.37 | 0.004** |

Source: - Data Based on Primary Survey

**p < 0.05, is statistically significant and positive impact on services rural development

interest (0.84), birth preparedness (0.31), and promoting breast feeding (0.30), which depicts people's perceptions of these indicators being lower, as shown in the table. On the other hand, only two indicators have a negative z-score value: health and nutrition education (-0.62) and meeting on a routine basis (-0.26), as shown in table 05.

**Table 05 : People's Perceptions and Awareness of Anganwadi Services.**

| Sr. No | Statement | Percentage (%) | Z-Score |
|---|---|---|---|
| 1 | Are Anganwadi services have positive impact on rural development | 27.87 | 0.47 |
| 2 | AWSs increase your children's interest | 30.3 | 0.84 |
| 3 | Are you satisfied with the infrastructure of Anganwadi centres | 40.00 | 1.33 |
| 4 | Are you aware about Anganwadi services | 41.21 | 1.35 |
| 5 | Are you seen development in your child | 44.85 | 1.42 |
| 6 | AWW workers provide you health and nutrition education | 19.39 | -0.62 |
| 7 | Are you worried about clean and hygiene of your children in Anganwadi centres | 46.06 | 1.69 |
| 8 | Home based skill training provide to you | 33.33 | 1.40 |
| 9 | Counsel women on birth preparedness | 21.82 | 0.31 |
| 10 | Are Anganwadi works take interest of outdoor and indoor activities for your children | 31.52 | 1.25 |
| 11 | Play equipment/material provided to your children | 40.6 | 1.59 |
| 12 | Are Anganwadi services Promote breastfeeding in your area | 24.24 | 0.30 |
| 13 | Are you invited to the meetings on routine basis. | 18.18 | -0.26 |

Source: - Data based on primary survey,

**Conclusion and Suggestions**

Anganwadi services have a positive and statistically significant impact on the beneficiaries and rural development in this study. P-values have a strong relationship between the services and considered variables. In 0–3 years, Anganwadi services indicate positive responses, except for basic treatment for illness and growth monitoring, which are not significant. For the past 3–6 years, the available Anganwadi services have been quite good; the p value has a positive relationship with the services. Pregnant and nursing mothers lack of health and nutrition education services. People's perceptions are very positive and relevant to the Anganwadi services, infrastructure, living space, children's care development and cleanliness, service awareness, home-based skill training for women, counselling for women on birth preparedness, outdoor and indoor children's activities, playing materials and equipment, and the promotion of breast feeding for mothers. Most people are satisfied with the available Anganwadi services and eager to admit their children to Anganwadi services for child care and pre-school education. Anganwadi services have a positive and statistically significant impact on the beneficiaries and rural development in this study. P-values have a strong relationship between the services and considered variables. Significant and positive value of z-score on people perception lies (1.69 to 0.30) which indicates that services positively impact on rural develop and rural children care.

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# RURAL INFRASTRUCTURAL FACILITIES AND LEVEL OF DEVELOPMENT IN FLOODPLAIN ZONES OF MIDDLE GANGA PLAIN

**Dinesh Kumar, Kavita Mishra and Kumar Amit**

**ABSTRACT**

*This paper deals with the distribution of rural infrastructural facilities and the spatial pattern of the level of development in the Middle Ganga Plain. The level of infrastructure development is related to the socio-economic development of any region, which determines the standard of living for humans. The objectives of the study have been to analyze the disparities in infrastructure development and its correlation with floodplain zones in the Jaunpur district. This study has been mainly based on secondary data collected from the different offices. As a result, 21.31 per cent area of the district, which includes Dharmapur, Jalalpur, Dobhi, Muftiganj, Mahrajganj, and Sirkoni blocks, scored a high level of infrastructure development. The farthest blocks from Jaunpur city scored the lowest level of development, namely Barsathi, Shahganj, Badlapur, Ramnagar, Baksha, Khuthan, Rampur, Karanjakala, and Machhalishahar with 48.77 per cent, while the rest of the blocks fall into the medium category and cover 29.92 per cent.*

## Introduction

Socio-economic infrastructure and its sufficient availability, equal distribution, proper development, and sustainable use are essential for resolving regional problems, maintaining accurate direction and speed of the development process, and minimizing spatial disparities. These facts are more important when the presence of these services is in the context of rural development because the availability of sufficient infrastructure is significant for maintaining the rate of rural development (Tiwari, 2010). Rural infrastructure is not only the main element for rural development; it also plays a vital role in the success of any developmental programme considered significant for minimizing rural poverty. The level of life style and rural economic conditions are considered significant for rural infrastructure. It increases productivity and growth in agricultural development and generates employment (Kumar, 2006).

The study area is a part of the Ganga Gomati Plain which is suffering from less availability of infrastructure and this infrastructure is distributed unevenly. In this study, it has been found that how the infrastructure can be distributed in a plain area and whether there is any correlation between the geomorphology and infrastructure distribution and development.

On the basis of several variables, we have made an attempt to study the inter-block disparity of different areas by using the composite Z score.

## The Study Area

Jaunpur district is located in Eastern Uttar Pradesh in the Middle Ganga Plain, extending from $25^{o}26'$ N to $26^{o}11'$ N and $82^{o}8'$ E to $83^{o}5'$ E. The district

1. **Dr. Dinesh Kumar, Assistant Professor, Department of Geography, Government M. G. M. Postgraduate College, Itarsi, M.P., India,Email Id: kumardinesh.bhu2014@gmail.com**
2. **Dr. Kavita Mishra, Assistant Professor, Department of Geography, University of Allahabad(Central University), Prayagraj, U.P., India,Email Id: kavita.geography@gmail.com**
3. **Dr. Kumar Amit,Associate Professor, Department of Geography, Dayanand Anglo- Vedic (PG) College, Kanpur, Uttar Pradesh, India (Corresponding Author), Email Id: amit.13august@gmail.com**

has a total area of 4,038 km$^2$ and a population of 44,94,204 people (Census, 2011). Eight rivers flow in the district, including Gomati, Sai, Tambura, Gangi, Pili, Basuhi, Mongar, and Varuna. The Gomati and Sai rivers flow in the central part of the district.

Jaunpur can be divided physiographically into five regions: the northern tract, the central tract (between Gomati and Sai River), the southern tract (between Sai and Varuna River), the new alluvium of Gomati, and the new alluvium of Sai river. The topography of the district is mostly plain, with slight undulation seen in areas near rivers. The area is sloping towards the southeast, with relief ranging from 77 to 89 meters above mean sea level. Two basic soil types, clay (Matiyar) and loam (Domat), cover the region. Jaunpur, Kerakat, and a few areas of Shahganj Tehsil have loamy soil. Shahganj, Machhalishahar, and Kerakat Tehsil are areas with clay soil.

The glory of Jaunpur city, situated on the Adi Ganga Gomti and its serene banks, served as the principal hallowed ground for the meditations and contemplations of Sages, Rishis, and Maharshis (such as Maharishi Jamdagni and Parashuram) (District Census Handbook, 2011). The district, known as Shiraj-e Hind (the city of excellent scholars) during the English era, has been exalted with extremely rich and developed education. Despite having a very rich historical and cultural heritage, there are regional differences in the degree of socio-economic growth because of geographical variations in space and unequal involvement in the plan implementation process.

**Objectives**

The major objectives of the study are as follows:

1. To measure the level of infrastructure development in Jaunpur District.
2. To analyze the inter-block disparities in the level of development and correlate the infrastructural development with floodplain zones.

**Database and Research Methodology**

The present study is exclusively based on secondary data, collected from different sources like the primary census abstract of Uttar Pradesh (2011), the District Census Handbook, Agriculture Report from Krishi Bhavan, Zila Sankhikiya Patrika from Vikas Bhavan, and different websites. Measure of the level of development and disparities have been attempted with the help of Z score and Inter Correlation Matrix methods. Formula of Z score is given below -

$$Zij = \frac{xi - \overline{X}}{SD}$$

Where,

Zij = Standard score of the observation of j block

Xi = Original value of i indicator

X= Means value of i indicator.

SD = Standard Division of i indicator

Further composite standard score has been computed to show the regional disparities in the levels of development of the blocks by using the following formula:

$$CSS = \frac{\Sigma\, Zij}{N}$$

Where,

CSS= Composite Standard Score

Zij= Z-score of i indicator of j blocks

N= Total no. of Indicators

Microsoft Excel and Arc GIS 10.2 software have been used for computation and cartographic presentation of regional variation and correlation.

**Results and Discussion**

The availability of rural infrastructure services in the study area has been discussed using the overlaying method. The layer of different infrastructure has been overlayed on the flood plain zones (Active Channel, New Flood Plain Zone I, New

Floodplain Zone II, Old Floodplain Zone I, Old Flood Plain Zone II, and Depressed Low Land) of the study area (Figure 01). Figure 01 clearly shows the distribution of infrastructure. Most of the infrastructure is available in New Flood Plain Zone I, New Floodplain Zone II, Old Floodplain Zone I, and Old Flood Plain Zone II. We can be categorized into two types of infrastructure: social infrastructure and economic infrastructure. In social infrastructure, we include education and health facilities; on the other hand, financial, communicational, transport, electricity, and other agricultural infrastructure are included in economic infrastructure.

**Social Infrastructure**

**Educational Facilities**

The progress and development of any nation have depended upon the level of education of its civilians (Shukla, 2010). In the study area, there are many types of educational institutions. There were 3,522 primary schools in 2016. In 2016, there were a total of 85 primary schools per lakh population. Now, most of the villages have primary schools to fulfill the objectives of Sarva Siksha Abhiyan and School Chale Hum. There were 1,673 upper primary schools in 2016, and they were distributed unevenly throughout the study area. There are 579 secondary schools, with an uneven distribution. In the study area, there are 14 higher secondary schools per lakh population. Higher education is very important for the population's development. In the study area, there are 143 graduate colleges, 26 post graduate colleges, and one university named Veer Bahadur Singh Purvanchal University, Jaunpur. When we talk about the human skill development, vocational institutions play an important role in human development. There are 95 vocational institutions in the study area related to ITI, polytechnics, and medical colleges. Veer Bahadur Singh Purvanchal University is a vocational education hub with a Master in Business Administration, a Master in Computer Application, a Pharmacist, etc. So, it is clear that educational infrastructure plays the most important role in the development of human efficiency in the context of the development of any region. The density of educational facilities in the district is very low, from the perspective of every 10,000 people.

**Health Facilities**

The meaning of health is related to the mental and physical health of man, and without good health, the person will behave resistant to socio-economic development (Singh and Singh, 1992). The district does not have sufficient facilities for health institutions. Here are only moderate types of health institutions, like allopathic hospitals, ayurvedic hospitals, Unani hospitals, homeopathic hospitals, allopathic dispensaries, ayurvedic dispensaries, unani dispensaries, homeopathic dispensaries, maternity and child welfare centers, maternity homes, child welfare centers, primary health centers, community hospitals, primary health sub-centers, family welfare centers, and one sadar hospital. Most of the district population has been dependent on the health service of Varanasi because of Sir Sundar Lal Hospital, and many super specialty hospitals are available there. The population concentration has also influenced the distribution of health facilities. The blocks of the old floodplain zone denoting a higher population concentration with a lower number of medical units and beds per lakh population. If we compare, it lowers in the new floodplain zone and because of the transport facility. Allopathic hospital is a modern health facility that is based on science and chemical medicines. Ayurvedic hospitals are the oldest method of healing in Indian history. Many Sages provide treatment to patients using natural resources, such as herbal medicines. There are 35 ayurvedic hospitals in the district, which are not evenly distributed. The homeopathic hospital is also a traditional model hospital system. A total of 15 homeopathic hospitals

are available in the district. Jaunpur district has 257 maternity and child welfare centers. The Nyay panchayat primary health centre provides moderate-level services. These hospitals have one or two doctors and eight to ten bed facility. A block contains three to four primary health centers. Only Kerakat, Machhalishahar, and Rampur have five primary health centers. Community Hospital has block-level hospitals in health facilities. These hospitals have three to five doctors with more than ten beds, and these hospitals have patient admission facilities. Because of the high population concentration, the Shahganj block has two community hospitals. A total of 22 community hospitals were counted in the district, and most of the community hospitals were situated at the block headquarters. Primary health centers are higher-level treatment centers. A total of ten PHCs are noted in the district. This type of hospital exists only in Shahganj, Khuthan, Karanjakala, and Baksha Sikrara, Dharmapur, Rampur, Muftiganj, Jalalpur. These are the second-level health hospitals in the district, while first-level hospitals like district hospital, namely Sadar hospital, are situated in Jaunpur city.

**Economical Infrastructure**

**Transport**

The availability of transport facilities is essential for rural development because through them, we can easily access social and economic services and connect with higher service centres for economic and social development. The district has five types of roads: national highways, state highways, district roads, metalled roads, and unmetalled roads (Pagadandi). National highway 31 connects Jaunpur to Varanasi and Jaunpur to Sultanpur, with a length of 66.49 km in Jaunpur district and a four-lane facility. The national highway has been affected by the major river in the floodplain area. There are four state highways (SH) that connect one district to another, namely SH 5, SH 7, SH 34, and SH 36. SH 5 connects Sant Ravidas Nagar to Jaunpur, and SH 7 connects Prayagraj to Shahganj. SH 43 connects Azamgarh to Shahganj, and SH 36 connects Pratapgarh to Mugara Badshahpur, with a total length of 332.24 km. Several district highways connect a third-level service centre to another third-level service centre, with a length of 219 km. Metal roads connect one market to another. These types of roads have a total length of 2,376.41 km. These roads are affected by the grass-root-level geomorphology and the river characteristics. Unmetalled roads are low-level roads found in villages for connecting villages and hamlets, with a length of 1,607.42 km. These roads were also affected by grass-root-level geomorphology.

**The Road Connectivity Index (RCI)**

RCI is used to determine the density and quality of the road. To calculate this index, we assign the weight of the different types of roads based on the ratio of different roads from high to low-category roads. Like village, roads assign one and national highways assign 23.5 because if a national highway is 1 km, then the village road is 23.5 km, and the calculation of the connectivity index follows the formula.

Road connectivity index of jth block = length of NH * width of NH + length of SH * width of SH + length of district road * width of district road + length of village road * width of village road.

Road connectivity index shows Badlapur, Sirkoni, Shahganj, Mungra Badshahpur and Baksha have a maximum value, which shows that the maximum number and kilometre are in this category, while Karanjakala shows that these blocks have higher transport facilities, while Rampur, Ramnagar, Khuthan, Dobhi, Barsathi, Dharmapur, Mahrajganj, and Muftiganj have a low road connectivity index value.

In the Jaunpur district, there are five rail networks with four junctions, namely Jaunpur,

Shahganj, Janghai and Zafarabad with 238.68 km. Most of the rail networks have a single line, while Varanasi to Sultanpur via Jaunpur city has a double railway line. Varanasi, Allahabad, Azamgarh, Sultanpur, Pratapgarh, and Gazipur are well connected by rail.

**Communicational Infrastructure**

Communicational infrastructure is an inescapable element of social and economic development in any area. In this study, we considered the post office and telephone as communicational infrastructure. Nowadays, mobile is also evaluated as the best mode of communication for voice, video call, and document sending, but there is no authentic data on mobile services, and almost every family has a mobile, so we have not considered mobile service. The post office is the traditional, modern medium to communicate with a person, but it's very important to send a hard copy to anyone, so the significance of the post office has continued. In the district, 391 post offices are accounted for.

**Financial Facilities**

The financial facilities help to develop the rural area's economy and human resources. Financial institutions, in the study area, are mainly related to nationalized banks, regional rural bank, district co-operative banks, primary agricultural credit societies, and land development banks. Different banks have evolved their approaches and criteria pertaining to financial support for solving the problems of rural development. In the study area, there are four types of banks: commercial banks (173), co-operative commercial banks (26), agricultural credit societies (202), and other regional banks (148). The Union Bank of India is the district's leading bank, but other banks also provide banking services. The banking services in the district are not better because server problems arise at any time, and the bank employees' behavior is also not good compared to urban banks. Another problem is that moderators hack the loaning system of the bank, and without their help, no one can get a loan from the bank. The charges of the moderators are also high for providing loans to villagers, so rural people leave their idea of loans. The Agricultural Credit Co-operative Society provides members with short-term loans for agricultural inputs. The establishment of primary agricultural co-operative societies is made at the Nyay panchayat level to provide the simple convenience of loans. In the district, there are 202 Agricultural Credit Co-operative Societies, and only five have one per lakh population. The pattern of electricity services has also changed from time to time. In the present time, there are 14 hours of power supply in a rural area, but low voltage and interruptions in electricity service are the main problems with electricity. In 2001 alone, 42.28 per cent of the villages were electrified, and in 2016, it increased to 73.10 per cent. There is tremendous growth in the use of electricity in pump sets and for domestic purposes. Scheduled caste (SC) hamlet is the symbol of the undeveloped region, and it is always neglected in the development process, so an electrified SC hamlet is an indicator of development. 9.23% of SC hamlets are electrified. Mahrajganj, Suithakala, Mariyahu, Dharmapur, Mungra Badshahpur, and Muftiganj blocks are noted by this facility at more than 10%, while the rest of the blocks are found in low-facility hamlets.

**Level of Infrastructure Development**

The level of infrastructure development is related to the socio-economic development of a region, which determines the standard of living for humans. All the facilities that are human needs for living standards, economic development, and non-economic activities are included in this sector, like educational facilities, health facilities, financial facilities, communication and transport facilities, etc. All these facilities under this class require human

resources to be developed in any area, and these human resources further improve these facilities. Infrastructure plays a vital role in the development of any area, so it is also necessary to measure the development level of all these facilities.

On the basis of this level of development, we find out how strong the establishment of infrastructure is in an area and how weak it is, so by strengthening the infrastructure, we can improve the development of the regions. Based on the flood plain, its different positions are found in different zones. Like at the time of observation, we find out that NFZ I and II are not very suitable for infrastructure because of the annual flood situation and undulating surface, while OFZ I and OFZ II have the best and better position for the infrastructure, and the logged area and Paleochannel also perform as a negative factor for infrastructure development because this zone has a low altitude zone with the water logging problem and the best agriculture land. In NFZ I and II, the electricity and transport facilities are also in weak condition. Most of the metalled roads fall under the local geomorphology of the study area, NH and railway line buildup in OFZ I and OFZ II in the compression of other zones. Other infrastructure facilities like educational facilities, health facilities, financial facilities, and communication have mostly been found along with the roads and service centers.

The Z score method has been used to measure the development level in the study area, which is based on the 8 types with 46 subtypes of facilities like education, health, communication, transport, finance, electricity, service centers, and others. Measurement of the level of development and disparities has been attempted with the help of the Z score. With the help of the mean ± ½ SD, we divide the whole district into three parts: high, medium, and low. The 21.31 per cent area of the district, namely which includes Dharmapur, Jalalpur, Dobhi, Muftiganj, Mahrajganj, and Sirkoni blocks, scores a high level of infrastructure development due to better infrastructure because of the physical characteristics of the blocks. The far away blocks from Jaunpur city scored the lowest level of development, namely Barsathi, Shahganj, Badlapur, Ramnagar, Baksha, Khuthan, Rampur, Karanjakala, and Machhalishahar, with 48.77 per cent, while the rest of the blocks fall into the medium category and cover 29.92 per cent. As we analyzed, which blocks have a high percentage of OFZ and less per cent of Wetland, NFZ, and Paleochannels, we counted in high-developed blocks like Mahrajganj and Dobhi, but Dharmapur, Jalalpur, Muftiganj, and Sirkoni blocks have high development with the effect of Jaunpur city and the National Highway with the connectivity of Varanasi District.

Which blocks have a mixed area of all the zones that are categorised in the moderate category, namely Mariyahu, Sikrara, Kerakat, Sujanganj, and Mungra Badshahpur, and which blocks have a high percentage of NFZ I and II like Badlapur, Baksha, Khuthan, Karanjakala, and wetland, Paleochannels like Barsathi, Shahganj, Ramnagar, Rampur, and Machhalishahar fall into the low-developed blocks as the form of infrastructure development (Figure 02).

**Correlation between Floodplain Zones and Infrastructural Development**

The land form has a direct relationship with the study area's infrastructure. It is found that the creation of infrastructure is not easily done in some zones or features, like in a wetland or a new flood plain, due to water logging, bumpy land, flood effects, etc. The impact assessment of flood plain zones on infrastructure development has been attempted, taking into account the weights of flood plain zones as an independent variable (x) and infrastructural development as a dependent variable (y). The weights assigned for NFZ I, NFZ II, OFZ I, OFZ II, Paleo-channel, and Depressed Low Land are 1.5, 3.5, 4.5, 5, -2, and -3.5, respectively, due to flood-affected and highly undulating terrain, moderately undulating terrain, and erosional activity. Flat terrain, no erosion,

**Table 01 : Development Level of Different Infrastructure Facilities, 2016**

| Block | Ed | He | Co | Tr | Fi | El | SC | Ot | CS |
|---|---|---|---|---|---|---|---|---|---|
| Suithkala | -0.45 | 0.35 | -0.62 | 0.21 | -0.40 | 0.75 | -0.10 | -0.01 | 0.06 |
| Shahganj | -0.99 | -0.02 | -0.33 | 0.84 | -0.16 | -0.10 | 0.16 | -0.66 | -0.20 |
| Khuthan | -0.76 | -0.17 | 0.45 | -0.49 | -0.17 | -0.77 | -0.01 | -0.24 | -0.28 |
| Karanjakala | -0.51 | -0.53 | -0.11 | -0.14 | -0.06 | -0.46 | -0.15 | -0.22 | -0.36 |
| Badlapur | -0.32 | -0.48 | -0.39 | 0.33 | 0.15 | 0.00 | 0.00 | -0.24 | -0.25 |
| Mahrajganj | 0.72 | -0.19 | 0.17 | 0.25 | -0.18 | 0.81 | 0.00 | 1.14 | 0.28 |
| Baksha | -0.49 | -0.44 | -0.71 | 0.20 | -0.63 | -0.28 | 0.10 | 0.32 | -0.27 |
| Sujanganj | -0.23 | 0.11 | -0.15 | -0.42 | -0.61 | 1.22 | -0.16 | -0.09 | -0.06 |
| M. Badshahpur | 0.35 | -0.14 | -0.61 | 0.26 | 0.13 | 0.02 | -0.05 | -0.52 | -0.10 |
| Machhalishahr | 0.14 | -0.54 | -0.63 | -0.59 | 0.32 | -0.27 | 0.06 | -0.78 | -0.42 |
| Mariahu | 0.57 | -0.45 | -0.11 | -0.32 | 0.31 | 0.61 | 0.15 | 0.72 | 0.04 |
| Barsathi | -0.12 | -0.31 | 0.25 | 0.00 | -0.39 | -0.53 | -0.14 | -0.09 | -0.19 |
| Sikrara | 0.55 | -0.09 | -0.35 | 0.04 | 0.20 | 0.18 | 0.00 | -0.22 | 0.00 |
| Dharampur | 0.80 | 0.43 | 1.21 | 0.84 | 1.10 | -0.24 | 0.09 | 0.95 | 0.69 |
| Ramnagar | -0.51 | -0.29 | 0.13 | -1.18 | -0.48 | -0.30 | -0.05 | 0.57 | -0.26 |
| Rampur | -1.05 | 0.09 | 0.53 | -0.66 | -0.54 | -0.20 | -0.04 | -0.66 | -0.31 |
| Muftiganj | 0.54 | 0.78 | -0.16 | 0.11 | -0.48 | -0.61 | -0.03 | 0.15 | 0.33 |
| Jalalpur | 0.95 | 1.06 | 0.61 | 0.62 | -0.33 | 0.53 | -0.03 | -0.31 | 0.59 |
| Kerakat | 0.27 | 0.01 | -0.03 | -0.27 | 0.20 | 0.22 | 0.04 | -0.18 | 0.00 |
| Dobhi | 0.18 | 0.92 | 0.38 | -0.07 | 1.04 | -0.06 | -0.05 | 0.11 | 0.51 |
| Sirkoni | 0.37 | -0.12 | 0.48 | 0.43 | 0.98 | -0.50 | 0.22 | 0.27 | 0.19 |

Sources: Calculated by Researcher
Ed- Education,He- Health, Co- communication, Tr- Transport, Fi- Finance, El- Electricity, SC- Service Centre, Ot- Other, CS- Composite Score.

mostly agricultural land, solid soil structure are best for agricultural land, lower area and water logging, low lying area, chemical weathering, respectively. The blockwise score value of different flood plain zones has been computed by multiplying the weighted score of concern zones with the per cent share of that zone in a particular block (Table 02). The composite weighted score for each block has been calculated by the following formula:

WV ith = (Percent area of NFZ I x 1.5) + (Per cent area of NFZ II x 3.5) + (Per cent area of OFZ Ix 4.5) + (Per cent area of OFZ II x 5) + (Per cent area of Paleochannel x -2) + (Per cent area of Wetland x -3.5)

Whereas, WVith = Weightage Value of ith block
NFZ = New Flood plain Zone
OFZ = Old Flood plain Zone

The correlation analysis indicates that infrastructure development (Composite score, table 01) is positively related (r = 0.40) to flood plain zones (Weighted score, table 02). In other words, a better geomorphological condition provides a better opportunity for infrastructure development (Figure 02). Recent developments in technology for creating infrastructure like roads, buildings, etc. have made it possible to build such works at high cost in waterlogged areas or paleochannel zones, but these

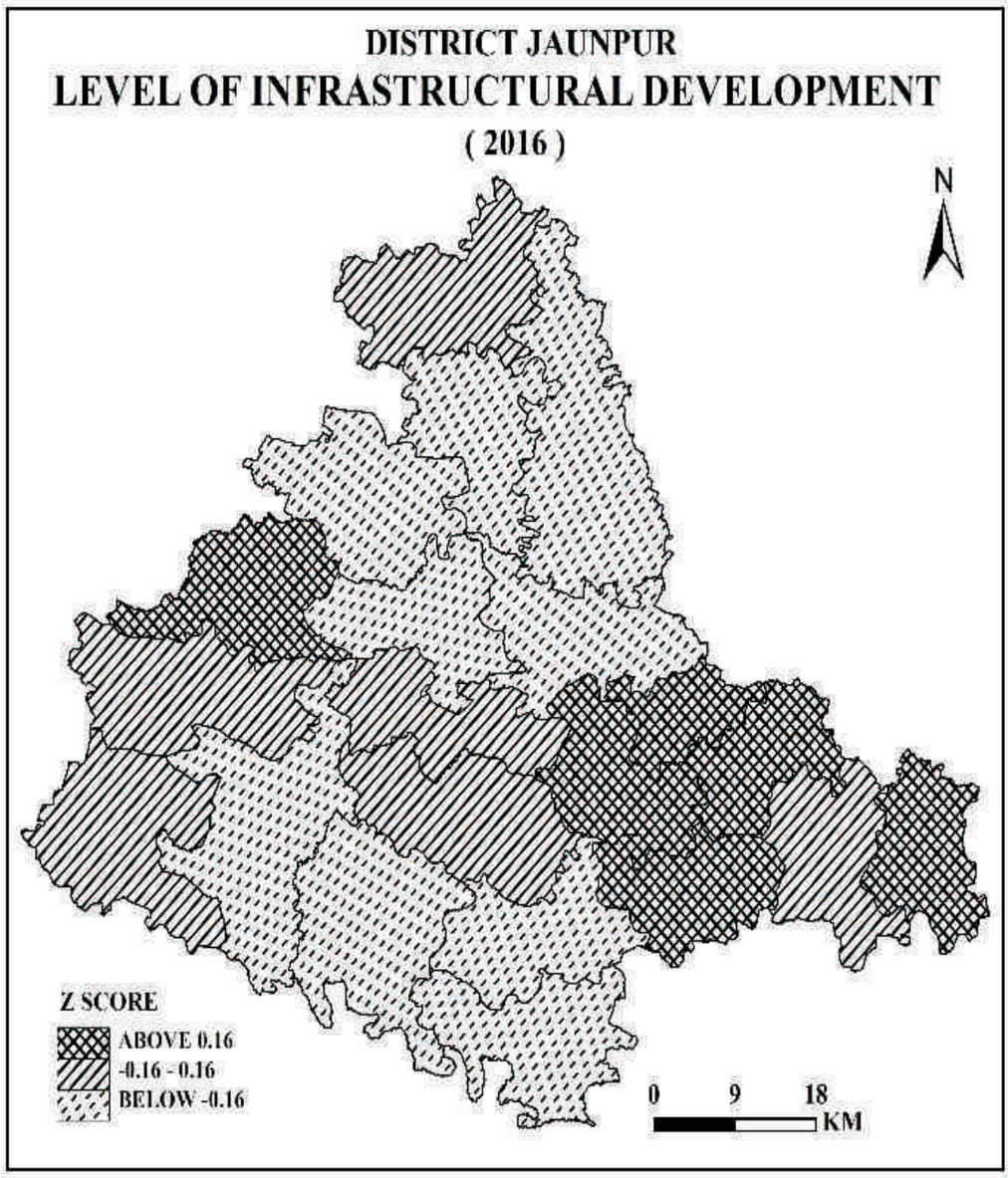
DISTRICT JAUNPUR
LEVEL OF INFRASTRUCTURAL DEVELOPMENT
( 2016 )
N
Z SCORE
ABOVE 0.16
-0.16 - 0.16
BELOW -0.16
0
9
18
KM

Fig. 01

Table 02 : Blockwise Weighted Value for the Infrastructure of Different Floodplain Zones, 2016

| Block | NFZ I score | NFZ II score | OFZ I score | OFZ II score | PC Score | DLL score | Weighted Score |
|---|---|---|---|---|---|---|---|
| Suithakala | 0.00 | 2.49 | 250.18 | 201.23 | -5.74 | -2.02 | 360.64 |
| Shahganj | 0.00 | 0.12 | 45.78 | 348.60 | -15.53 | -43.08 | 252.39 |
| Khuthan | 1.29 | 66.28 | 250.42 | 100.00 | -4.25 | -6.18 | 325.67 |
| Karanjakala | 1.60 | 77.84 | 178.87 | 127.74 | -6.94 | -24.42 | 276.54 |
| Badlapur | 3.34 | 97.81 | 265.99 | 34.04 | -5.41 | 0.00 | 315.68 |
| Mahrajganj | 4.34 | 86.42 | 145.50 | 190.62 | -2.17 | 0.00 | 313.96 |
| Baksha | 4.35 | 110.11 | 274.92 | 7.03 | -4.07 | 0.00 | 313.08 |
| Sujanganj | 5.25 | 41.15 | 182.03 | 161.72 | -9.57 | -23.12 | 284.03 |
| M. Badshahpur | 0.44 | 0.00 | 221.10 | 232.61 | -1.09 | -11.90 | 352.31 |
| Machhalishahar | 1.59 | 2.99 | 108.31 | 290.88 | -6.78 | -42.16 | 275.18 |
| Mariyahu | 1.26 | 29.44 | 107.56 | 247.26 | -7.62 | -46.70 | 255.85 |
| Barsathi | 3.18 | 19.24 | 230.67 | 177.59 | -6.80 | -2.75 | 337.49 |
| Sikrara | 4.29 | 90.45 | 203.17 | 94.03 | -9.44 | -6.56 | 292.49 |
| Dharmapur | 1.11 | 76.12 | 164.14 | 183.17 | -3.56 | -4.44 | 314.05 |
| Ramnagar | 2.28 | 15.68 | 183.92 | 175.21 | -6.81 | -50.17 | 264.54 |
| Rampur | 3.53 | 35.33 | 239.09 | 138.46 | -4.65 | -11.45 | 323.13 |
| Muftiganj | 22.60 | 6.29 | 99.14 | 289.04 | -4.03 | -1.01 | 306.52 |
| Jalalpur | 3.94 | 46.20 | 207.36 | 166.32 | -2.05 | -11.51 | 322.17 |
| Kerakat | 3.71 | 105.15 | 134.69 | 173.88 | -2.47 | 0.00 | 302.77 |
| Dobhi | 2.62 | 65.46 | 330.26 | 19.61 | -3.01 | 0.00 | 344.94 |
| Sirkoni | 6.82 | 132.30 | 236.93 | 0.00 | -5.73 | -0.04 | 287.86 |

Source : Calculated by the Researcher

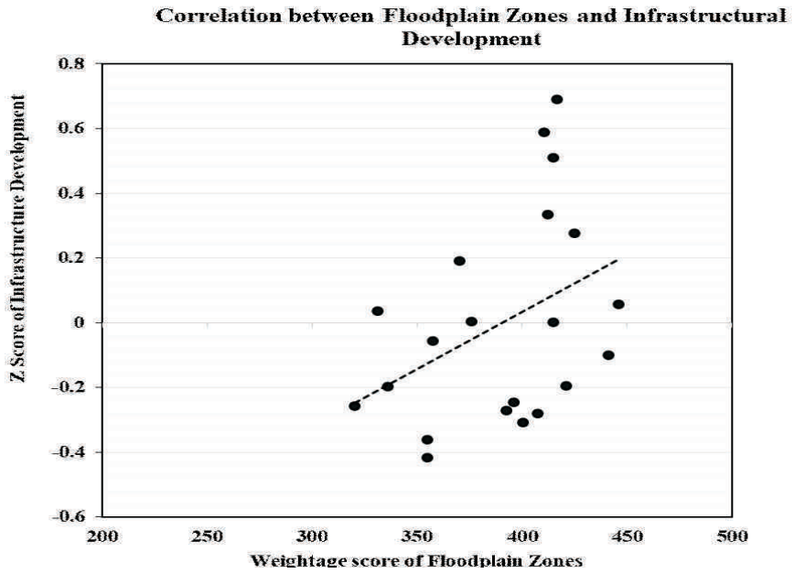


Fig. 02

are not beneficial in the long term and put forward many problems, including hazardous conditions and damage to assets.

**Conclusion**

On the basis of infrastructural indices, it is seen that there is diversity in infrastructural distribution and development. The NFZ I and II are not very suitable for infrastructure because of the every-year flood situation and undulating surface, while OFZ I and OFZ II have the best and better position for the infrastructure, and the water logged area and paleochannel also perform as a negative factor for infrastructure development because this zone has a low altitude zone with the water logging problem and the best agriculture land. The electricity and transport facilities are also in weak condition in NFZ I and II. Most of the metalled roads fall under the local geomorphology of the study area, like NH and railway line buildup in OFZ I and OFZ II in the compression of other zones. The 21.31 per cent area of districts scores a high level of infrastructure development due to better infrastructure because of the physical characteristics of the blocks. The farthest blocks from the center has been scored at a low level of development with 48.77 per cent, while the rest of the blocks fall into the medium category and cover 29.92 per cent. The correlation analysis indicates that infrastructure development is related to flood plain zones.

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# IMPACT OF NATIONAL RURAL HEALTH MISSION ON HEALTHCARE FACILITIES IN HARYANA

**Mukesh Kumar**

**ABSTRACT**

*The Indian government started many programmes to provide healthcare facility to all poor and rural people. The National Rural Health Mission (NRHM) is also one of them. The Government of India launched this programme on 12th April 2005 to provide comprehensive and effective primary healthcare to the unprivileged and vulnerable sections of the society especially women and children by improving access availability and quality of public health services. Study found that there is no improvement in female infant mortality rate between 2000 and 2005; but after 2005 it declined with 21 points between 2005 and 2010. It shows that National Rural Health Mission worked behind this improvement. Institutional deliveries increase nearly three times in Haryana from 2005-06 to 2011-12. It is a significant achievement which Haryana state gains after starting NRHM programme.*

## Introduction

Health is regarded as a vital component in the growth and development of any country. In the level of health and in measures for health improvement the developing countries lag far behind from the rest of the world. There is a serious shortage of hospitals, doctors, nurses and medicines in the developing countries. Akhtar (1993) observed that in a developing country, like India, one of the serious laps in the planning process has been the lack of understanding of spatial or regional structure of healthcare system. Ansari, et. al. (2012) has also indicated that Haryana (a developed state) has also same lacuna at district level. Health not only determines the social well being and quality of life of the people in an area, but also regulates the opportunities available to them for participation in economic activities (Hassan and Daspattanayak, 2008).

The Indian government started many programmes to provide healthcare facility to all poor and rural people. The National Rural Health Mission (NRHM) is also one of them. The Government of India launched this programme on 12th April 2005 to provide comprehensive and effective primary health care to the unprivileged and vulnerable sections of the society especially women and children by improving access availability and quality of public health services.

## The Study Area

Haryana is one of the developed states of India which is located in northern plain. It has an area of 44,212 $km^2$ which extends from $27^0$ 39' to $30^0$ 55' 05" North Latitudes and $74^0$ 27' 08" to $77^0$ 36' 05" East Longitudes. Haryana state has 2.09 per cent of India's population while it has 1.35 per cent of total area. Total population of Haryana is 2,53,51,462 out of which 1,65,09,359 persons reside in rural areas and 88,42,103 persons in urban areas (Census, 2011).

## Objectives

Present study has the following objectives:

- To find out the impact of National Rural Health Mission on healthcare facilities in Haryana.

**Dr. Mukesh Kumar, Assistant Professor in Geography, Government College for Women, Badhra, Charkhi Dadri, Haryana**
**e-mail- geosheoran88@gmail.com, Mob. No. 7015895034**

- To find out spatial pattern of healthcare center in Haryana.

**Database and Research Methodology**

Present study is based on purely secondary data which has been obtained from various data sources viz; SRS, Census of India, NRHM office Panchkula and Health Department of Haryana. This study discussed about the impact of NRHM on health and healthcare facilities, so it is purely descriptive. To show the spatial distribution of new established healthcare center in Haryana, map is prepared by Arc GIS Software.

**Results and Discussion**

**Impact of NRHM on Infant Mortality Rate (IMR)**

Table 01 shows the trends of infant mortality rate (IMR) in Haryana and in India from 2001 to 2010. It shows that infant mortality rate decline with 17 points in Haryana from 2001 to 2010. But if we see further break up in it, it reveals that from 2001 to 2005 IMR decline only 5 points; and between 2005 and 2010 it declined with 12 points. It can be concluded that there is an impact of National Rural Health Mission (NRHM) on IMR, because NRHM has been introduce in 2005. Rural infant mortality rate in Haryana also decline with 17 points in this period from 68 to 51. Urban IMR has been declined with 16 points. Female IMR has been decline more than male IMR in Haryana. Female IMR was 70 in 2000 and it was also 70 in 2005; so there is no improvement in female IMR in this period. While it declined with 21 points between 2005 and 2010. It shows that there is a clear cut impact of NRHM on female IMR. Infant mortality rate in India has been declined from 66 in 2000 to 47 in 2010. It reveals that IMR in India as a whole decline more than Haryana. Infant mortality rate in rural has been declined more than urban areas.

**Table 01 : Infant Mortality Rate in Haryana and India, 2001-10**

| | Haryana | | | | | India | | |
|---|---|---|---|---|---|---|---|---|
| Year | Total | Rural | Urban | Male | Female | Total | Rural | Urban |
| 2001 | 65 | 68 | 54 | 63 | 70 | 66 | 72 | 42 |
| 2002 | 62 | N.A | N.A | 54 | 73 | 63 | 69 | 40 |
| 2003 | 59 | 61 | 49 | 54 | 65 | 60 | 66 | 38 |
| 2004 | 61 | 66 | 47 | 55 | 68 | 58 | 64 | 40 |
| 2005 | 60 | 64 | 45 | 51 | 70 | 58 | 64 | 40 |
| 2006 | 57 | 62 | 45 | 57 | 58 | 57 | 62 | 39 |
| 2007 | 55 | 60 | 44 | 55 | 56 | 55 | 61 | 37 |
| 2008 | 54 | 58 | 43 | 51 | 57 | 53 | 58 | 36 |
| 2009 | 51 | 54 | 41 | 48 | 53 | 50 | 55 | 34 |
| 2010 | 48 | 51 | 38 | 46 | 49 | 47 | 51 | 31 |

Source: Sample Registration System, Registrar General, India

**Impact of NRHM on Institutional Delivery:**

Institutional deliveries or facility-based births are often promoted for reducing maternal and neo-natal mortality. Yet, many women in low and middle income countries, including India, continue to deliver babies at home without the presence of a skilled attendant. One-fifth of the 2,87,000 maternal deaths worldwide in 2010 occurred in India (WHO 2012). India is very likely to miss the Millennium Development Goal (MDG) for maternal mortality. The current Maternal Mortality Ratio (MMR) in India is 212, whereas the country's target in this respect, as per the MDGs, is 109 by 2015. MMR in Haryana is 153 during 2007-09 (SRS, 2009).

**Table 02 : Institutional Deliveries in Haryana from 2005-06 to 2011-12**

| Year | Institutional Deliveries |
|---|---|
| 2005-06 | 1,68,000 |
| 2006-07 | 2,16,000 |
| 2007-08 | 2,75,000 |
| 2008-09 | 3,18,000 |
| 2009-10 | 3,58,000 |
| 2010-11 | 4,02,404 |
| 2011-12 | 4,30,784 |

Source: Compiled by Researcher based on NRHM Office Haryana, Panchkula

Besides reducing maternal and neo-natal mortality, institutional deliveries are also believed to improve health-seeking behaviour and practices in the period following childbirth. Children born at a health facility are more likely to be vaccinated and breast fed (Odiit and Amuge 2003).

Institutional deliveries increased in Haryana from 2005-06 to 2011-12. There were 1,68,000 deliveries conducted in health institution in Haryana during 2005-06. These institutional deliveries increased from 1,68,000 to 4,30,784 between 2005-06 to 2011-12. Within 7 years institutional deliveries increased more than 2.5 times in Haryana. It shows that there is a drastic change in institutional deliveries after the implementation of NRHM programme and ASHA plays a crucial role in this. Table 02 implies that institutional deliveries in Haryana are continuously increasing.

**Janani Suraksha Yojana (JSY) Scheme under NRHM**

Women face various barriers to visiting a health facility to seek delivery care. These include cost of care, access to clinics, cultural factors, quality of care, and a lack of health awareness (Kumar, et. al, 2012). To relax the financial barrier, the government of India launched the Janani Suraksha Yojana (JSY) in 2005. JSY is a conditional cash transfer programme that provides a cash incentive to women who give birth at public health facilities. Rural women receive Rs.1,400 and urban women receive Rs.1,000 upon delivery at a public health facility. All services provided at the public health facility are free of charge.

Janani Suraksha Yojana (JSY) scheme is a safe motherhood intervention under the National Rural Health Mission (NRHM) being implemented with the objective of reducing maternal and neo-natal mortality by promoting institutional delivery among the poor pregnant women. It tries to achieve this by promoting institutional delivery, making available quality maternal care during pregnancy, delivery and in the immediate post-delivery period along with appropriate referral and transport assistance. JSY is a 100 % centrally sponsored scheme and it integrates cash assistance with delivery and post-delivery care. The success of the scheme would be determined by the increase in institutional delivery among the poor families.

The Ministry of Health and Family Welfare has relaxed eligibility parameters for the Janani Suraksha Yojana (JSY), which provides financial assistance to mothers for institutional deliveries. Now, Below Party Line (BPL) women can access JSY benefits irrespective of their age and number of children. (The Hindu, New Delhi, May 22, 2013)

There were only 1000 JSY beneficiaries during 2005-06 in Haryana. Next year these beneficiaries increase rapidly and they reached 22,966. During 2011-12 there were 66,084 JSY beneficiaries in Haryana. There are 2,99,221 women in Haryana who received benefit from JSY scheme till 2011-12. It shows that Janani Surakshya Yojna (JSY) beneficiaries in Haryana are increasing continuously after implementation of National Rural Health Mission.

**Impact of NRHM on Healthcare Infrastructure**

Table 03 shows new health centers established in Haryana during 1999-2005 and 2005-

2010. It reveals that there are only 14 health centers established during 1999 and 2005. Out of these 14, 5 were PHCs and 9 were CHCs. No Sub center established in Haryana in this period. While on the other hand there are 109 health centers established between 2005 and 2010. There are 16 hospitals, 25 CHCs, 36 PHCs and 32 SCs new started during 2005-10. It shows that NRHM has made significant on infrastructure development.

**Table 03 : New Health Centers Established in Haryana during 1999-2005 and 2005-2010**

| Name of Health Center | 1999-2005 | 2005-2010 |
|---|---|---|
| Hospital | 0 | 16 |
| CHC | 9 | 25 |
| PHC | 5 | 36 |
| SC | 0 | 32 |
| Total | 14 | 109 |

Source: http://haryanahealth.nic.in/menudesc.aspx?page=225

Figure 01 represents the location of new established health center in Haryana during 1999-2005. It shows that there are only 8 districts where new health center established. Four health centers are established in Jind district which are highest in Haryana. Three health centers established in Sirsa district, two in Sonipat district and one each in Panchkula, Karnal, Bhiwani, Mahendragarh and Rewari districts. This figure also shows that out of 14, 7 health centers are situated in Sirsa and Jind district, while 7 health centers are established in rest districts. It seems that there is a political impact on this, because at that time Shri Om Prakash Chautala was the Chief Minister of Haryana, who generally fought election from these two districts.

Figure 02 shows the distribution of new established health centers in Haryana during 2006-2010. This reveals that there is every district have new established health center. But it varies from one district to another district. 15 new health centers are established in Sirsa districts which are highest in all districts, but most of them are Sub Centers. Highest five CHCs are established in Rohtak district, while highest PHCs are established in Jhajjar district. These two districts come under Rohtak Parliamentary Constituency. During this period M.P from this constituency is Shri Deepender Singh Hooda, who is son of Chief Minister Bhupender Singh Hooda. So, this is the main reason of being highest CHCs and PHCs in these districts.

**Impact of NRHM on Healthcare Manpower**

Present study reveals that number of doctors at PHCs and Specialists at CHCs decreased in Haryana after NRHM. ANMs at sub centers and PHCs and nursing staff at PHCs and CHCs increased nearly two times in six years. Pharmacists at PHC and CHCs are decreased from 2005 to 2011; while lab technicians at PHCs and CHCs increased. There are 121 posts of doctors at PHCs and 212 posts of specialists at CHCs are laying vacant in Haryana in 2011. Above 850 posts of ANMs at SCs and PHCs and nursing staff at PHCs and CHCs are also laying vacant. 159 posts of Pharmacists and lab technicians are laying vacant in Haryana. It concluded that there is no improvement in the position of first and second class officer but improvement is noticed in other posts.

The actual position of healthcare centers in Haryana. It shows that there is a shortfall of 1,639 SCs, 210 PHCs and 55 CHCs in the state, which contribute 39 %, 32 % and 34 % of healthcare centers

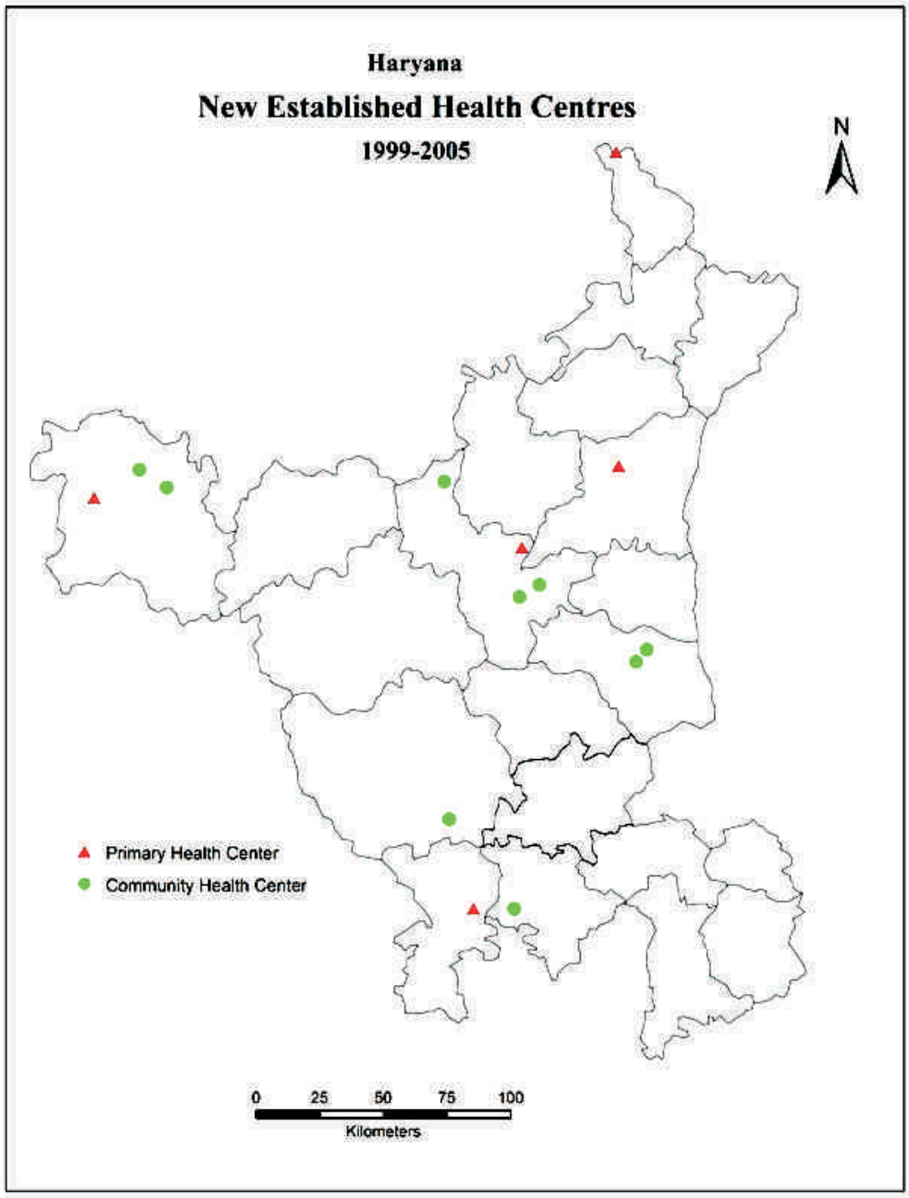
Haryana
New Established Health Centres
1999-2005
N
Primary Health Center
Community Health Center
0 25 50 75 100
Kilometers

Fig. 01

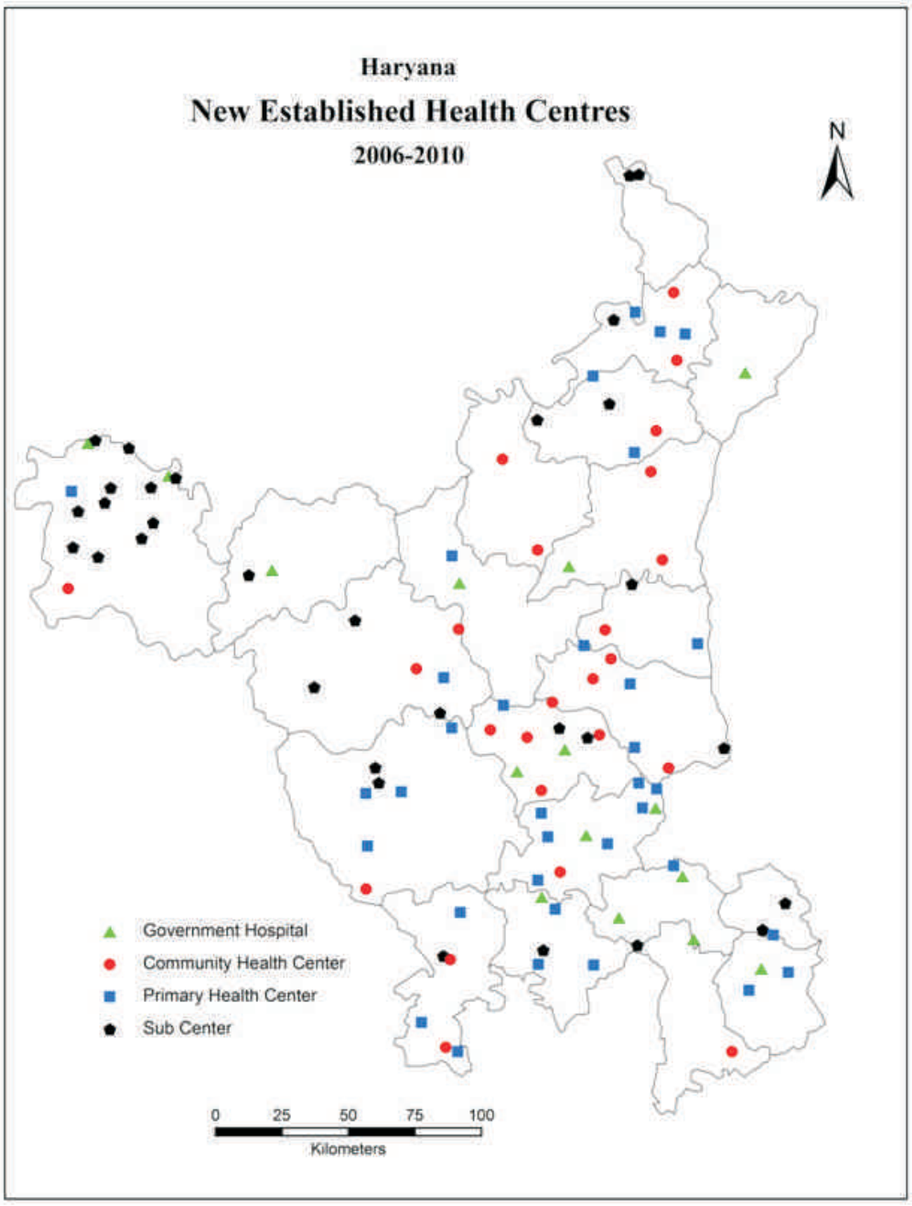
Haryana
New Established Health Centres
2006-2010
N
Government Hospital
Community Health Center
Primary Health Center
Sub Center
0 25 50 75 100
Kilometers

Fig. 02

respectively. It reveals that there is a need to grow infrastructure rapidly in the state.

**Table 04 : Availability and Shortfall of Healthcare Manpower in Haryana, 2012**

| S. No | Medical Staff | Required | In position | Shortfall |
|---|---|---|---|---|
| 1 | Health worker (Female)/ANM at Sub Centres & PHCs | 2,967 | 4,973 | * |
| 2 | Health Worker (Male) at Sub Centres | 2,520 | 1,682 | 838 |
| 3 | Health Assistant (Female)/LHV at PHCs | 447 | 398 | 49 |
| 4 | Health Assistant (Male) at PHCs | 447 | 503 | * |
| 5 | Doctor at PHCs | 447 | 342 | 105 |
| 6 | Obstetricians & Gynecologists at CHCs | 109 | 11 | 98 |
| 7 | Pediatricians at CHCs | 109 | 10 | 99 |
| 8 | Total specialists at CHCs | 436 | 29 | 407 |
| 9 | Radiographers at CHCs | 109 | 142 | * |
| 10 | Pharmacist at PHCs & CHCs | 556 | 880 | * |
| 11 | Laboratory Technicians at PHCs & CHCs | 556 | 394 | 162 |
| 12 | Nursing Staff at PHCs & CHCs | 1,210 | 1,698 | * |

Source: RHS Bulletin, March 2012, M/O Health & F.W., GOI *Surplus staff

Along with healthcare infrastructure, there is also shortage of healthcare manpower in the state. There is a shortfall of 838 male health worker, 49 female health assistant at PHCs, 105 doctors at PHCs, 98 Obstetricians & Gynecologists at CHCs, 99 Pediatricians at CHCs and 162 Laboratory Technicians at PHCs & CHCs in the state. On the basis of table 04, it is found that there is acute shortage of healthcare infrastructure and healthcare manpower in the state.

**Conclusion**

The National Rural Health Mission programme started by Indian government in April 2005 in India to improve maternal and child health. IMR declined significantly in Haryana after introduction of NRHM. Rural infant mortality rate declined more than urban infant mortality and female infant mortality rate declined more than male infant mortality rate in Haryana. There is no improvement in female infant mortality rate between 2000 and 2005; but after 2005 it declined with 21 points between 2005 and 2010. It shows that National Rural Health Mission worked behind this improvement. Institutional deliveries increase nearly three times in Haryana from 2005-06 to 2011-12. It is a significant achievement which Haryana state gains after starting NRHM programme. Janani Suraksha Yojana has been also successful in Haryana. Polio eradicated from Haryana in 2011. Health infrastructure is also improved in Haryana after NRHM. Only 14 new health center established in Haryana between 1999 and 2005; while 109 new health center established in Haryana in between 2005 and 2010. No doubt, that Haryana made significant progress after the implementation of NRHM but there is still need to improve the healthcare infrastructure and man power in the state.

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**I.S.S.N. - 0975-4903**

# SPATIAL PATTERNS OF FDI APPROVALS UNDER THE UPA-II GOVERNMENT

**Priyanka Kumari and Sachinder Singh**

**ABSTRACT**

*The present study is about analysing the spatial patterns of Foreign Direct Investment (FDI) approvals, per capita FDI approvals and the socio-economic correlates of per capita FDI approvals during the government of United Progressive Alliance (UPA) – II from 2009-10 to 2013-14. The statistical relationships between selected eight socio-economic variables and per capita FDI approvals were calculated with the help of correlation and regression techniques. The study concludes that the patterns of FDI approvals had a regional bias towards the Coastal States/Union Territories (UTs) of India, while the Hinterland States/UTs remained much behind. The patterns of per capita FDI approvals were found to positive and statistically significant with population density, road density (r = 0.57), and railway density (r = 0.50).*

## Introduction

India had adopted a mixed economy model after getting independence in 1947. Today, it is the world's largest democracy, largest country in terms of population and the fifth-largest economy in terms of gross domestic product (GDP). In terms of economic framework, from mixed economy model, the country adopted liberal economic model after 1991 economic crisis. The liberal measures that were initiated during that period were liberalization, privatization and globalization. There after different governments have continued with liberalization of Indian economy in one perspective or the other. Keeping in view of this fact, it would be interesting and academically enriching exercise to analyse the patterns of foreign direct investment (FDI) under a particular political regime in India.

## Objectives

The main objectives of the present study was to analyze the spatial patterns of FDI approvals, and per capita FDI approvals during the government of UPA-II, i.e., 2009-10 to 2013-14. The data on FDI approvals through the government route were taken into consideration. In addition to spatial analysis of FDI approvals, and per capita FDI approvals, statistical relationships between different socio-economic variables and per capita FDI approvals were also calculated and analysed.

## Data base And Research Methodology

The data for the present study were obtained from secondary sources like, Census of India (2011), Reserve Bank of India (2015-16), (2016-17), Department of Industrial Policy and Promotion, National Crime Records Bureau (2011), Ministry of Road Transport and Highways (2013), and Ministry of Statistics and Programme Implementation (2016). The data were taken at the unit of State and UT. For the purpose of broad analysis, states/UTs having coastal boundaries were categorised as Coastal states/UTs and rest as Hinterland states/UTs.

The mapping techniques of pie diagram and choropleth method were used for showing the patterns of FDI approvals and per capita FDI approvals respectively. The techniques of correlation

1. **Priyanka Kumari, Research Scholar, Dept. of Geography, M.D. University, Rohtak and Asst. Professor, G.C. Nahar (Rewari), Ph. No. 9416349387.**
2. **Prof. Sachinder Singh, Professor, Dept. of Geography, M .D. University, Rohtak, Ph. No. 7988283800.**

and regression were used to analyse the socio-economic correlates of the patterns of per capita FDI approvals. These correlates were statistically verified also. The eight socio-economic variables taken for the purpose were: population density (persons per sq. km.), per capita Net State Domestic Product (at constant price in Rs.), state's own tax revenue as per cent of NSDP, urban growth rate, crime rate (total cognizable crimes including IPC and SLL in per lakh population), road density (total length of roads per 100 sq. km.), railway density (railway route per 100 sq. km.), and poverty rate (in per cent). In order to maintain consistency in the statistical analysis, Dadra and Nagar Haveli was excluded from the correlation and regression analysis as data on state's Own Tax Revenue as per cent of NSDP, Per Capita NSPD, Road Density and Railway Density were not available in its case.

**FDI APPROVALS UNDER THE UPA-II**

UPA – II was the central and left parties' alliance. It was led by the Indian National Congress and included various regional parties such as All India Trinamool Congress (AITC), Nationalist Congress Party (NCP), Dravida Munnetra Kazhagam, Indian Union Muslim League and Jammu and Kashmir National Conference (JKNC). It came into power in the 2009 parliamentary election under the leadership of Dr. Manmohan Singh.

In order to ease the flow of foreign capital across the country, the government had initiated various steps such as building of infrastructure projects, i.e., DMIC (Delhi Mumbai Industrial Corridor), to build an industrial railway between Delhi and Mumbai and four smart cities and many other industrial cities for attaining high economic growth and development of ports. Such projects worked as impetus for attracting foreign investment into the country. It was also considered by the government that manufacturing thrust was also needed for the advancement of the economy. This had led to the setting up of a National Investment and Manufacturing Zone (NIMZ)– the green field industrial township or the development of Delhi-Mumbai Industrial Corridor as a world level manufacturing and investment hub to give an impulse for growth in manufacturing. Beside it, the government had reformed the land bill, which made it easier to take land for the establishment of factories and eased labour laws. Efforts were also made to relax the permission procedure for Single Retail Brands (Mitra, 2017, p.205). Apart from the infrastructure development projects, UPA-II economic policies were also concentrated on developing the manufacturing sector. In addition, the government had unlocked the traditionally state-controlled sectors to the private sector and public-private sectors. Another reform that took place during the government was the retail sector. In 2012, the government had allowed 51 % FDI in multi-brand sector with the condition that 30 % of their products should be purchased from Small and Medium Enterprises, and 50 per cent of the total FDI funds would be invested in the infrastructure, i.e., storage, logistic and other market-related infrastructure. The government in addition to the above mentioned infrastructure and retail sectors had also modified the FDI regulations pertaining to the banking, pharmaceutical, and power exchange industries. In the banking private sector, it allowed 49 to 74 % through government route. Upto 100 % FDI was allowed in brown field investments (i.e. investments in existing companies) in pharmaceuticals under the government approval route (Dept. of Industrial Policy and Promotion, 2011). In the power exchange, up to 49 % of FDI and FII (Foreign Institutional Investor) were permitted (Dept. of Industrial Policy and Promotion, 2012). The government had permitted up to 100% FDI in single brand retail projects in accordance with the reforms (Dept. of Industrial Policy and Promotion, 2012).

**Patterns of FDI Approvals**

From 2009-10 to 2013-14, UPA –II government had approved US $ 16,556.05 million FDI in the country. The State/UTS wise data on FDI approvals during this phase clearly reveals that

**Table 01 : FDI Approvals and Per Capita FDI Approvals during UPA -II Phase (2009-10 to 2013-14)**

| State/UTs | FDI Approvals in US $ million<br><br>(figures in brackets indicate per cent of the total) | Per Capita FDI Approvals (In US $) |
|---|---|---|
| **A) Coastal State/UTs** | **14571.73 (88.01)** | **25.99** |
| (i) Maharashtra | 9682.15 (58.48) | 86.16 |
| (ii) Tamil Nadu | 1572.41 (9.50) | 21.79 |
| (iii) Gujarat | 1232.08 (7.44) | 20.39 |
| (iv) Karnataka | 1175.01 (7.10) | 19.23 |
| (v) Kerala | 234.88 (1.42) | 7.03 |
| (vi) Andhra Pradesh | 438.07 (2.65) | 5.18 |
| (vii) West Bengal | 224.07 (1.35) | 2.45 |
| (viii) Odisha | 13.03 (0.08) | 0.31 |
| (ix) Goa | 0.03 (0.00) | 0.02 |
| (x) Daman and Diu | Nil | Nil |
| (xi) Pondicherry | Nil | Nil |
| (xii) Andaman and Nicobar | Nil | Nil |
| (xiii) Lakshadweep | Nil | Nil |
| **B) Hinterland States/UTs** | **1984.32 (11.99)** | **3.05** |
| (i) Dadra and Nagar Haveli | 94.3 (0.57) | 274.36 |
| (ii) Delhi | 1356.73 (8.19) | 80.82 |
| (iii) Uttarakhand | 155.46 (0.94) | 15.41 |
| (iv) Haryana | 132.32 (0.80) | 5.22 |
| (v) Madhya Pradesh | 69.05 (0.42) | 0.95 |
| (vi) Tripura | 3.34 (0.02) | 0.91 |
| (vii) Bihar | 90.4 (0.55) | 0.87 |
| (viii) Uttar Pradesh | 79.65 (0.48) | 0.40 |
| (ix) Punjab | 2.73 (0.02) | 0.10 |
| (x) Himachal Pradesh | 0.34 (0.00) | 0.05 |
| (xi)Chhattisgarh | Nil | Nil |
| (xii) Rajasthan | Nil | Nil |
| (xiii) Chandigarh | Nil | Nil |
| (xiv)Jharkhand | Nil | Nil |
| (xv) Manipur | Nil | Nil |
| (xvi) Meghalaya | Nil | Nil |
| (xvii) Mizoram | Nil | Nil |
| (xviii) Assam | Nil | Nil |
| (xix) Arunachal Pradesh | Nil | Nil |
| (xx) Sikkim | Nil | Nil |
| (xxi)Nagaland | Nil | Nil |
| (xxii) Jammu and Kashmir | Nil | Nil |
| **TOTAL** | **16556.05** | **13.67** |

Source: FDI Data Cell, Department of Industrial Policy and Promotion (now known as DPIIT)
Per Capita FDI approvals were calculated by the researcher on the basis of Census of India (2011) population.

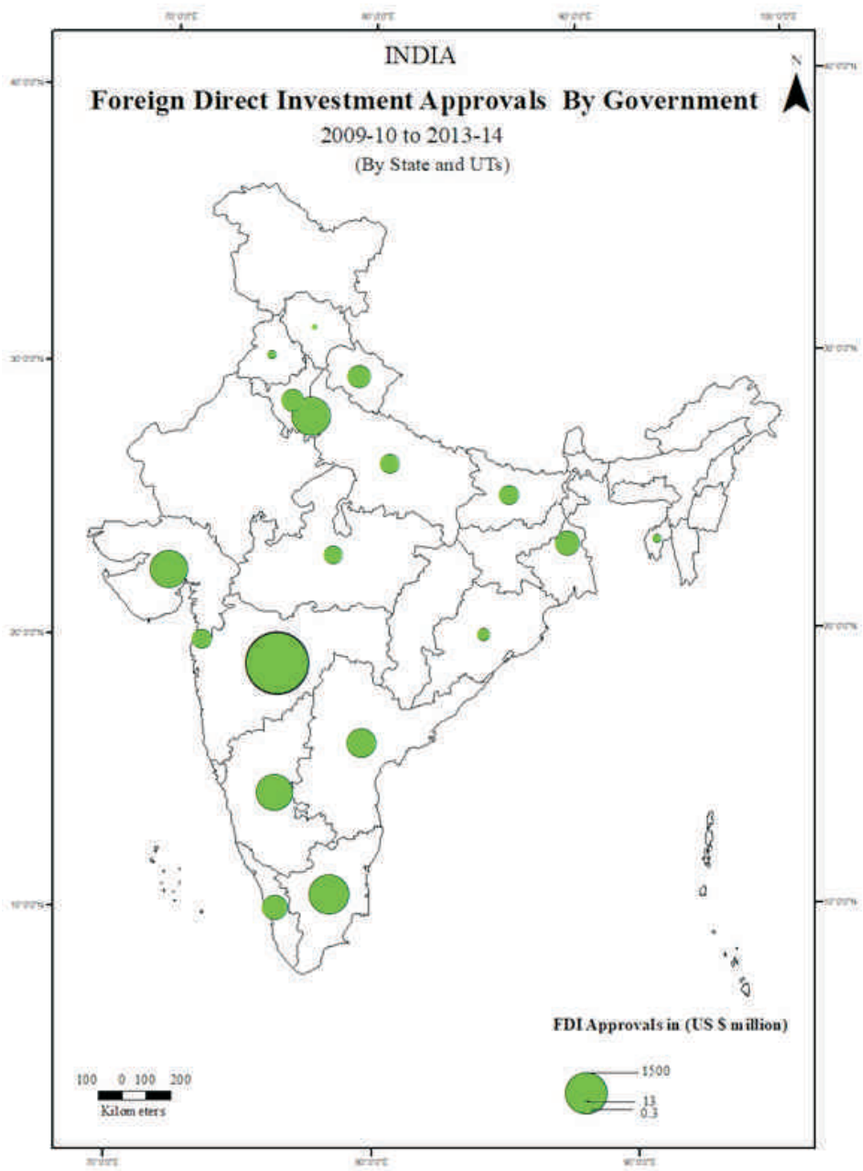
INDIA
Foreign Direct Investment Approvals By Government
2009-10 to 2013-14
(By State and UTs)
N
FDI Approvals in (US $ million)
1500
13
0.3
100 0 100 200
Kilometers

Fig. 02

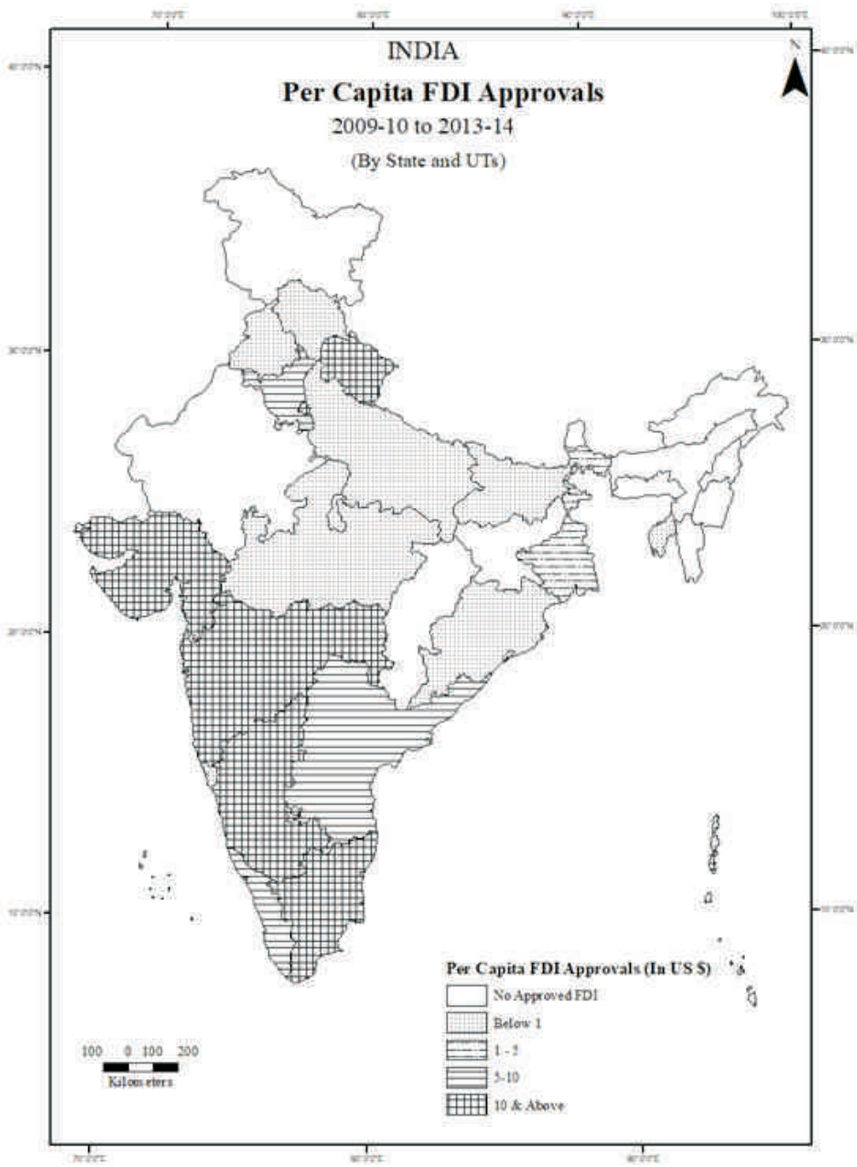
INDIA
Per Capita FDI Approvals
2009-10 to 2013-14
(By State and UTs)
N
Per Capita FDI Approvals (In US $)
No Approved FDI
Below 1
1 - 5
5-10
10 & Above
100 0 100 200
Kilometers

Fig. 01

**Table 02 : Correlation and Regression results with per capita FDI Approvals during UPA II**

| Sr. No. | Variables | r | $r^2$ | t value | Y' |
|---|---|---|---|---|---|
| **1** | Population density (persons per sq. km.) | 0.61 | 0.37 | 3.09* | 8.056+0.006x |
| **2** | Per Capita Net State Domestic Product (at constant price in Rs.) | 0.43 | 0.18 | 1.90 | -4.663+0.0004x |
| **3** | **State's Own Tax Revenue as per cent of NSDP** | -0.04 | 0.0016 | -0.16 | 18.54-0.28x |
| **4** | Urban Growth Rate (in per cent) | -0.21 | 0.044 | -0.86 | 25.83-0.297x |
| **5** | Crime Rate (Indian panel code and special local laws in per lakh population) | -0.03 | 0.0009 | -0.12 | 16.14-0.002x |
| **6** | Road Density (total length of roads per 100 sq. km.) (March, 2012) | 0.57 | 0.32 | 2.77* | 5.42+0.032x |
| **7** | Railway Density (Railway route per 100 sq. km.) (March 2012) | 0.50 | 0.25 | 2.31* | -0.15+5.044x |
| **8** | Poverty Rate (in per cent) | -0.16 | 0.025 | -0.65 | 22.01 -0.43x |

Source: Calculated by Researcher on the basis of data from RBI Various Reports (2015-16), (2016-17) National Crime Records Bureau (2011) and Census of India (2011), Ministry of Road Transport and Highways (2013), and Ministry of Statistics and Programme Implementation (2016).

*Statistically significant at 0.05 (two tailed value--2.12)

majority of the FDI approvals (88.01 per cent) were in respect of the Coastal States/UTs, whereas, the Hinterland States/UTs, could attract only 11.99 per cent of the total FDI approvals (Fig. 01, and Table 01). Among all the states/UTs, the top eight gainers (with one per cent or more approvals) in terms of FDI approvals were: Maharashtra (58.48 per cent), Tamil Nadu (9.50 per cent), Delhi (8.19 per cent), Gujarat (7.44 per cent), Karnataka (7.10 per cent), Andhra Pradesh (2.65 per cent), Kerala (1.42 per cent) and West Bengal (1.35 Per cent). It is important here to highlight the fact that of all the top eight States/UTs in terms of FDI approvals, seven were Coastal States/UTs. The only exception was Delhi. The state of Maharashtra alone had obtained more FDI approvals than all the Hinterland States/UTs. It was surprising to note that large size territorial states like Rajasthan, Jammu and Kashmir, and poverty ridden states of Chhattisgarh and Jharkhand failed to get any FDI approval. In addition, majority of the north-eastern states also failed to get any FDI approval.

**Patterns of Per Capita FDI approvals**

The data analysis shows that the spatial patterns of FDI approvals and Per Capita FDI approvals broadly reveals almost a similar picture in case of Coastal and Hinterland States mainly (Fig. 01 and 02). With the exception of Dadra and Nagar Haveli, and Delhi, the per capita FDI approvals remained higher in the Coastal states. Among the coastal states, it was against Maharashtra with per capita FDI approvals of US $86.16 which gained the top position. It was followed by Tamil Nadu, Gujarat and Karnataka. In overall perspective, the per capita FDI approvals ranged from US $ 0.02 in the case of Goa to US $ 274.86 in the case of Dadra and Nagar Haveli (Table 01).

**Socio Economic Correlates of FDI Approvals**

The statistical relationship between per capita FDI approvals and the selected eight socio-economic variables has revealed that the patterns of per capita FDI approvals were positively related with population density (r = 0.61), Road density (r = 0.57), Railway density (r = 0.50) and per capita Net State Domestic Product (r = 0.43). Barring the latter, i.e. the per capita Net State Domestic Product, the relationships were statistically significant at 0.05 level. The relationship were found to be negative and statistically insignificant with Urban growth rate (r = - 0.21), Poverty rate (r = - 0.16), State's Own Tax Revenue as per cent of NSDP (r = - 0.04), and Crime rate (r = -0.03). The regression analysis in terms of its slope analysis indicates the maximum positive change in the patterns of FDI approvals as a result of Railway density (b = 5.044) (Table 02).

**CONCLUSION**

The above analysis on the spatial patterns of FDI approvals, and per capita FDI approvals during the political regime of UPA-II government reveals the fact that such approvals were not homogenously distributed across different states/UTs of India. Rather such approvals were largely confined to the coastal states and more specifically in respect of Maharashtra, Tamil Nadu and Gujarat. The Hinterland states/UTs on the other hand could attract only small amount of FDI approvals. Among the Hinterland states/UTs, Delhi was the exception. It can be linked to better transport network such as road and railway and regional leader's efforts to attract investors into their states.

The statistical analysis in terms of correlation and regression has revealed the patterns of per capita FDI approvals were positively related with population density, road density, railway density and per capita NSDP. All the above correlation values were to be statistically significant except in the case of per capita NSDP. The relationships were found to be negative and statistically insignificant with poverty rates, crime rate, and state's own tax revenue as per cent of NSDP and urban growth.

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# REGIONAL INEQUALITIES IN THE STATUS OF WOMEN: A CASE STUDY OF BIHAR

**Sadaf and Naushaba Naseem Ahmed**

**ABSTRACT**

*Gender inequality remains a significant concern in today's world, and India, including the state of Bihar, is no exception. It refers to the social inequality and unequal distribution of opportunities among genders. The status of women plays a crucial role in the socio-economic development of any society. This paper aims to analyze the gender disparities and their impact on the present status of women in Bihar. It also investigates the root causes behind the widening gender disparities over time.The study is based on secondary data obtained from the census of India for the years 2001 and 2011. The data includes information on sex ratio, population growth, literacy rates, and occupational patterns. The status of women has been evaluated using the standardized Z score method, and ArcGIS 10.8 has been utilized for map creation. The findings of the study reveal a concerning increase in gender disparities, particularly at early age groups, over the years. The study's conclusion underscores the urgent need to address these disparities and work towards achieving gender equality in Bihar.*

## Introduction

Gender equality is crucial phenomena that requires in achieving the goals of human development. For overall societal development it is very important that men and women should have enjoy similar opportunities and benefits (Gupta, 2021). Gender equality has been granted in the constitutions of many countries, yet women are facing inequality in domains of education, nutrition, health, work and political participation (Rustagi, 2008). However, the Millennium Development Goals (MDGs), specified in the 2000 millennium summit of the United Nations (UN), is another global initiative, which identifies gender equality and empowerment for achieving all other seven goals as well, unfortunately gender inequality can be seen in every aspect of the society.

Gender equality and women empowerment are linked with the socio-economic development but many parts of the world are considered as low developed region because of lack of gender equality and women empowerment (Varshney and Mir, 2016). All though India's economic growth is increasing very fast, yet the problem of gender disparity still exists. Country is ranked low on various gender inequality related measures such as educational attainment, health status, work participation, wage parity and political empowerment due to several factors such as lack of awareness and ingrained patriarchal norms, social norms and cultural practices.

Bihar is one of the least developed states of country and it ranks low in several development indicators, gender disparity is one of them. State performs poorly on women empowerment and gender disparity measures despite many policies implemented by the government. Census 2011 shows the child sex ratio among children of 0-6 years is 935 in Bihar. This data tells for itself and demands urgent and efficient solutions for improving status of women.

1. **Sadaf, Assistant professor, P.G. Department of Geography, Veer Kunwar Singh University, Ara, Bihar Email: sadafmalik849@gmail.com, 7417222631**
2. **Naushaba Naseem Ahmed, Assistant Professor, Women's College, Geography Section, Aligarh Muslim University Aligarh, Uttar Pradesh**

**The Study Area**

Bihar is a state in eastern India and located between 21°58'10" N to 27°31'15" N latitude and between 83°19'50" E to 88°17'40" E longitude. It is the third-largest state by population. It is contiguous with Uttar Pradesh to its west, Nepal to the north, the northern part of West Bengal to the east, with Jharkhand to the south. The Bihar plain is divided by the river Ganges, which flows from west to east. The state is divided into nine divisions and 38 districts, for administrative purposes. Bihar has 12 Municipal Corporations, 49 Nagar Parishads, and 80 Nagar Panchayats.

**Objectives**

**These are the following objectives**

1. To investigate regional inequalities in the sex structure of Bihar.
2. To examine spatio-temporal variations in the status of women of the state.

**Data Base and Research Methodology**

The present study is based on secondary sources of data (fig.01). Data regarding population growth, sex ratio, literacy and occupational structure have been obtained from Census of India 2001 and 2011.

**Z score method**

The status of women has been evaluated using the standardized Z score method

$$z_{ij} = \frac{x_i j - \overline{x} j}{\sigma_j}$$

Where, Zij = standard score of the observation,

Xi = original value of the observation

X= mean value for all the values of X and

σ = **standard deviation of X**

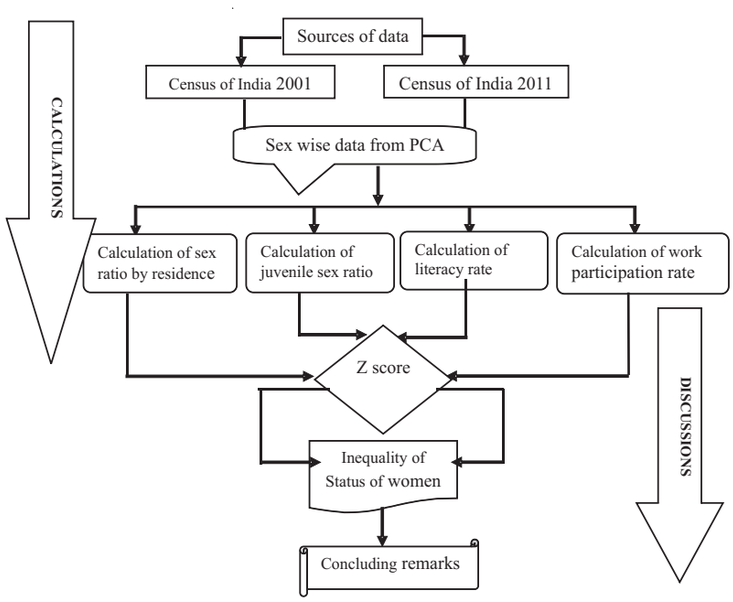


Fig 01: Flowchart of the methodology of the study

**Results and discussion**

**Inter District Variations in Sex Ratio**

The sex ratio in the state of Bihar remains below the national average. Among the districts, Siwan stands out with the highest point difference in sex ratio, recording 1031 in 2001 and 988 in 2011 (Table 01). Additionally, Vaishali has experienced a significant decline of approximately 25 points since 2001. Several other districts, namely Muzaffarpur, Lakhisarai, Samastipur, Begusarai, Madhubani, and Saran, have also witnessed a substantial downward trend in their sex ratios.However, it is worth noting that some districts have made notable progress in improving their sex ratios. Districts like Patna, Buxar, Gopalganj, Kaimur, Kishanganj, and Sheikhpura have shown commendable improvement in this regard.

**Inter-District Variations in Sex Ratio by Residence**

The analysis of Table 01, which focuses on the male-female ratio by place of residence in Bihar from 2001 to 2011, reveals significant fluctuations in the sex ratio across districts. Notably, Siwan witnessed a substantial decline in sex ratio specifically in rural areas. Several other districts, including Gopalganj, Vaishali, Muzaffarpur, Lakhisarai, Samastipur, Begusarai, Madhubani, and Saran, also experienced considerable variations in rural sex ratios during this period. However, there were some positive developments in certain districts. Sitamarhi and Buxar showed an improvement in rural sex ratios, while only Sitamarhi exhibited a negative trend in urban areas. Gopalganj and Kishanganj stood out for achieving significant improvements in urban sex ratios. These findings indicate that, overall, the sex ratio in rural areas of Bihar is better than in urban areas. However, it is concerning that the trend of sex ratio in rural areas has experienced a rapid decline. This can be attributed to the high volume of migration from rural Bihar to other states in search of job opportunities. In summary, the data suggests that while rural areas in Bihar generally exhibit a more favourable sex ratio compared to urban areas, there has been a worrisome downward trend in rural sex ratios. This trend can be attributed to the significant outflow of migration from rural Bihar in pursuit of employment opportunities in other states.

**Juvenile Sex Ratio of Bihar**

Level of sex ratio for age group (0-6) calculated for the years of 2001 and 2011. The ratio among children (0-6) found comparatively high in Gaya, Purnia and Bhagalpur in 2001 and Gopalganj, Kishanganj and Saran in 2011. Normally, juvenile sex ratio is continuously falling in most of the districts of the state except in Gopalganj, Jehanabad, Kishanganj, Saran, Supaul and Siwan. Siwan, Gopalganj, Supaul, Saran, Kishanganj and Jehanabad show positive sex ratio. Bhagalpur, Banka, Begusarai, Kishanganj, Purnia, Khagaria, Vaishali, Katihar Araria, Bhojpur, East and West Champaran shows negative child sex ratio.

**Inter District Variations in Literacy Rate**

In terms of total literacy rate, Rohtas emerged as the district with the highest position in 2011, whereas Patna held the top position in 2001. Conversely, Kishanganj had the lowest literacy rate in 2001, while Purnia witnessed a significant population of low-literate individuals in 2011. The analysis of the male-female literacy gap reveals that Buxar recorded a high gap in 2001, indicating a significant difference in literacy rates between males and females. In 2011, this gap was notably high in Madhubani. On the other hand, Gaya had a low literacy rate in 2001, while Bhagalpur witnessed a low literacy rate in 2011. In summary, Rohtas led in terms of total literacy rate in 2011, with Patna taking the top spot in 2001 (table 02). Kishanganj had the lowest literacy rate in 2001, while Purnia faced challenges with a considerable population of low-literate individuals in 2011. Buxar had a high male-female literacy gap in 2001, which was surpassed by Madhubani in 2011. Gaya had a low literacy rate in 2001, while Bhagalpur struggled with low literacy rates in 2011. These findings

**Table 01 : Number of Females to Males in the Districts, Sex Ratio by Residence**

| Districts | Sex Ratio | | Rural Sex Ratio | | Urban Sex Ratio | |
|---|---|---|---|---|---|---|
| | **2001** | **2011** | **2001** | **2011** | **2001** | **2011** |
| Araria | 913 | 921 | 917 | 923 | 867 | 895 |
| Arwal | - | 928 | | 929 | | 916 |
| Aurangabad | 934 | 926 | 937 | 928 | 899 | 909 |
| Banka | 908 | 907 | 909 | 908 | 868 | 875 |
| Begusarai | 912 | 895 | 914 | 896 | 870 | 891 |
| Bhagalpur | 876 | 880 | 878 | 880 | 866 | 881 |
| Bhojpur | 902 | 907 | 911 | 910 | 843 | 892 |
| Buxar | 899 | 922 | 902 | 925 | 871 | 893 |
| Darbhanga | 914 | 911 | 917 | 912 | 878 | 903 |
| East Champaran | 897 | 902 | 900 | 903 | 855 | 884 |
| Gaya | 938 | 937 | 948 | 943 | 878 | 901 |
| Gopalganj | **1001** | **1021** | 1006 | 969 | 928 | 1025 |
| Jamui | 918 | 922 | 922 | 923 | 876 | 905 |
| Jehanabad | 929 | 922 | 933 | 926 | 879 | 893 |
| Khagaria | 885 | 886 | 888 | 887 | 842 | 874 |
| Kishanganj | 936 | 950 | 945 | 952 | 863 | 926 |
| Kaimur | 902 | 920 | 905 | 921 | 832 | 889 |
| Katihar | 919 | 919 | 924 | 921 | 869 | 893 |
| Lakhisarai | 921 | 902 | 927 | 903 | 883 | 895 |
| Madhubani | 942 | 926 | 944 | 928 | 893 | 899 |
| Munger | 872 | 876 | 875 | 884 | 866 | 873 |
| Madhepura | 915 | 911 | 919 | 912 | 838 | 890 |
| Muzaffarpur | 920 | 900 | 926 | 901 | 865 | 889 |
| Nalanda | 914 | 922 | 917 | 924 | 896 | 913 |
| Patna | 873 | 897 | 893 | 904 | 844 | 887 |
| Purnia | 915 | 921 | 921 | 923 | 851 | 907 |
| Rohtas | 909 | 918 | 913 | 921 | 885 | 899 |
| Saharsa | 910 | 906 | 916 | 908 | 848 | 879 |
| Samastipur | 928 | 911 | 930 | 911 | 879 | 901 |
| Sheohar | 885 | 893 | 886 | 893 | 879 | 889 |
| Sheikhpura | 918 | 930 | 924 | 936 | 883 | 900 |
| Saran | 966 | 954 | 974 | 958 | 890 | 912 |
| Sitamarhi | 892 | 899 | 861 | 900 | 894 | 876 |
| Supaul | 920 | 929 | 923 | 931 | 876 | 892 |
| Siwan | 1031 | 988 | 1040 | 993 | 899 | 917 |
| Vaishali | 920 | 895 | 923 | 895 | 889 | 890 |
| West Champaran | 897 | 902 | 900 | 903 | 855 | 884 |

Source: Computed by researcher on the basis of data collected from Census of India 2001 and 2011

highlight the importance of targeted efforts to improve literacy rates, bridge gender gaps, and address specific challenges faced by different districts in Bihar.

**Table 02 : Inter District Variations in Male-Female Literacy in Bihar (2001-2011)**

| District | 2001 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | Total | Male | Female | Total | Male | Female |
| Araria | 35.00 | 46.00 | 22.00 | 54.00 | 62.00 | 44.00 |
| Arwal | | | | 67.00 | 79.00 | 55.00 |
| Aurangabad | 57.00 | 71.00 | 42.00 | 70.3 | 80.11 | 59.7 |
| Banka | 42.7 | 55.29 | 28.67 | 58.17 | 67.62 | 47.7 |
| Begusarai | 47.98 | 59.13 | 35.64 | 63.87 | 71.58 | 55.2 |
| Bhagalpur | 49.5 | 59.21 | 38.13 | 63.14 | 70.3 | 54.9 |
| Bhojpur | 58.96 | 74.29 | 41.8 | 70.47 | 81.74 | 58 |
| Buxar | 56.8 | 71.92 | 32.04 | 70.14 | 80.72 | 58.6 |
| Darbhanga | 44.33 | 56.72 | 30.78 | 56.56 | 66.83 | 45.2 |
| East Champaran | 37.54 | 49.31 | 24.27 | 55.79 | 65.34 | 45.1 |
| Gaya | 40.46 | 50.95 | 36.66 | 63.67 | 73.31 | 53.3 |
| Gopalganj | 47.48 | 62.96 | 32.16 | 65.47 | 76.51 | 54.8 |
| Jamui | 42.43 | 57.06 | 26.32 | 59.79 | 71.24 | 47.3 |
| Jehanabad | 55.26 | 70.07 | 39.37 | 66.8 | 77.66 | 55 |
| Khagaria | 41.35 | 51.82 | 29.34 | 57.92 | 65.25 | 49.6 |
| Kishanganj | 31.09 | 42.71 | 18.63 | 55.46 | 63.66 | 46.8 |
| Kaimur | 55.12 | 69.67 | 38.83 | 69.34 | 79.37 | 58.4 |
| Katihar | 35.09 | 45.31 | 23.8 | 52.24 | 59.36 | 44.4 |
| Lakhisarai | 47.96 | 60.74 | 33.96 | 62.42 | 71.26 | 52.6 |
| Madhubani | 41.97 | 56.79 | 26.25 | 58.62 | 70.14 | 46.2 |
| Munger | 59.47 | 69.89 | 47.4 | 70.46 | 77.74 | 62.1 |
| Madhepura | 36.07 | 48.8 | 22.11 | 52.25 | 61.77 | 41.7 |
| Muzaffarpur | 47.95 | 59.1 | 35.81 | 63.43 | 71.28 | 54.7 |
| Nalanda | 53.19 | 66.44 | 38.58 | 64.43 | 74.86 | 53.1 |
| Patna | 62.92 | 73.34 | 50.83 | 70.68 | 78.48 | 62 |
| Purnia | 35.1 | 45.63 | 23.42 | 51.08 | 59.06 | 42.3 |
| Rohtas | 61.29 | 75.31 | 45.71 | 73.37 | 82.88 | 63 |
| Saharsa | 39.08 | 51.66 | 25.27 | 53.2 | 63.56 | 41.7 |
| Samastipur | 45.13 | 57.58 | 31.67 | 61.86 | 71.25 | 51.5 |
| Sheohar | 35.27 | 45.28 | 23.86 | 53.78 | 61.31 | 45.3 |
| Sheikhpura | 48.6 | 61.94 | 33.92 | 63.86 | 73.56 | 53.4 |
| Saran | 51.8 | 67.3 | 35.82 | 65.96 | 77.03 | 54.4 |
| Sitamarhi | 38.46 | 49.36 | 26.13 | 52.05 | 60.64 | 42.4 |
| Supaul | 37.28 | 52.42 | 20.81 | 57.67 | 69.62 | 44.8 |
| Siwan | 51.65 | 67.26 | 36.88 | 69.45 | 80.23 | 58.7 |
| Vaishali | 50.49 | 63.23 | 36.58 | 66.6 | 75.41 | 56.7 |
| West Champaran | 37.54 | 49.31 | 24.27 | 55.79 | 65.34 | 45.1 |

Source: Computed by researcher on the basis of data collected from Census of India 2001 and 2011

**Inter District Variations in Work Participation Rate**

The year 2011 saw significant workforce participation rates (WPR) in several districts of Bihar. Jamui, Araria, Banka, Gaya, and Madhepura stood out with notably high WPR during this period. Similarly, a decade earlier, in 2001, these districts also experienced impressive levels of workforce participation. In terms of gender-specific WPR, the year 2011 showcased a distinct pattern. Aurangabad, Sheohar, and Sitamarhi demonstrated a high male WPR, indicating active participation of men in the workforce. On the other hand, Araria, Gaya, Jamui, Madhepura, and Supaul witnessed a noteworthy female WPR, high lighting the significant contribution of women in the workforce during that year.

**Status of women (2001-2011)**

Status of women derived with the help of standardized Z-score and the lowest value of z-score is observed in the district of Sheohar (-0.79) in 2001 and Sitamarhi (-0.876) in 2011 due to low sex ratio, low literacy rate and low juvenile sex ratio. While both districts have stepped up from low to medium in 2011. Gopalganj district (0.66) registered highest value of Z-score in 2001. West Champaran East Champaran, Muzaffarpur Khagaria have showed low status of women in 2001 and 2011. Supaul Araria and Lakhisarai have shifted from high to low status of women from 2001 to 2011 is mainly due to declining juvenile sex ratio.

Buxar, Darbhanga and Saharsa have shifted from low to high level of status of women from 2001 to 2011. Gaya, Jamui and Aurangabad have highest status of women in 2011.

**Conclusion**

The analysis revealed that the state's sex ratio remains below the national average. District-wise examination shows significant variations, with some districts experiencing notable declines while others exhibit improvements. Siwan stands out as the district with the highest point of difference in sex ratio between 2001 and 2011. Similarly, Vaishali witnessed a sharp fall in sex ratio since 2001. Further analysis based on the rural-urban divide demonstrates that sex ratios in rural areas were generally better than in urban areas. However, there was a rapid decline in sex ratio trends in rural regions. This decline can be attributed to the significant out migration of people from rural Bihar to other states in search of job opportunities. Examining the sex ratio for the age group of 0-6 years, it was found that Gaya, Purnia, and Bhagalpur had comparatively higher sex ratios in 2001, while Gopalganj, Kishanganj, and Saran exhibited higher ratios in 2011. Generally, the juvenile sex ratio declined in most districts, with a few exceptions like Gopalganj, Jehanabad, Kishanganj, Saran, Supaul, and Siwan, which showed positive sex ratio.

Bhagalpur, Banka, Begusarai, Purnia, Khagaria, Vaishali, Katihar, Araria, Bhojpur, East Champaran, and West Champaran displayed negative child sex ratios. Lastly, the analysis of total literacy rates highlights Rohtas as the top district in 2011, while Patna led in 2001. Kishanganj had the lowest literacy rate in 2001, whereas Purnia had the lowest rate in 2011. Male-female literacy gaps were high in Buxar in 2001 and Madhubani in 2011, while Gaya had the lowest gap in 2001, and Bhagalpur had the lowest in 2011.The findings highlight the need for targeted interventions to address the declining sex ratios, especially in rural areas, and to bridge the gender gaps in literacy rates. Efforts should focus on promoting gender equality, improving educational opportunities, and addressing the factors that drive migration from rural areas for employment.

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# MAPPING THE WAY TO RURAL RESILIENCE: SITE SUITABILITY FOR SOLID WASTE DISPOSAL

**Ravi Shankar and Pardeep Kumar**

**ABSTRACT**

*This research paper focuses on addressing the unique challenges of solid waste management in rural areas, where the dynamics of waste generation and disposal differ significantly from urban settings. The primary objectives of this study are to quantify the volume of solid waste produced in a rural region and identify suitable disposal sites tailored to the specific characteristics and needs of rural communities. In pursuit of the first objective, the research employs a context-sensitive approach to quantifying solid waste production in the study area. The second objective centers on identifying optimal disposal sites that consider the unique environmental and socio-economic aspects of rural landscapes. The outcomes of this research are expected to offer valuable insights for rural policymakers, local authorities, and community stakeholders. By providing a nuanced understanding of solid waste dynamics in rural areas and suggesting tailored disposal sites, which helps in development of sustainable waste management practices.*

## Introduction

Almost every kind of activity associated with human beings produces waste. Nevertheless, from prehistoric times, the generation of wastes has been a significant cause of worry. Both the rate at which the garbage is being produced and the amount of garbage creation have risen up recently. The nonuniformity of wastes similarly rises as the quantity of trash does. Conversely to the prehistoric era, when wastes were only a source of annoyance that required to be disposed of. Since there was an ample quantity of land accessible to the people at the time and a tiny population, proper management was not a considerable problem. Back then, the amount of waste generated was readily absorbed by the ecosystem without any form of degradation.

A material that is labelled as trash by one person could be a useful material by another. As a result, a material may only be written off as trash by its owner. It is essential to define precisely what a waste is notwithstanding the subjective nature of wastes. This is so that the procedures that must be followed to safeguard the general public and the environment while the garbage is being processed are determined by the choice to categorise a substance as trash. The living organism of our planet produces some kind of waste every day whether it is organic or inorganic. If we talk about the inorganic waste then among the living organism human is an animal which produces most of it. Waste can be defined as a product which would not be in use anymore and ready to thrown away. Waste can be a composition of different materials.

In rural contexts, the selection of disposal sites is a nuanced process that requires careful consideration of ecological, socio-economic, and logistical factors. Geospatial analysis, guided by community consultations and ecological

1. **Ravi Shankar, M. Phil. Student, Department of Geography, Maharshi Dayanand University, Rohtak. M. 9991129449, ravimudgil22@gmail.com**
2. **Dr. Pardeep Kumar, Assistant Professor, Department of Geography, Maharshi Dayanand University, Rohtak. M. 9050019553, pkjgeography@mdurohtak.ac.in**

assessments, will inform the selection of disposal locations that prioritize environmental sustainability, community health, and logistical feasibility. To enhance the precision and efficiency of the research, advanced technologies such as Geographic Information Systems (GIS) will be employed. This interdisciplinary approach, blending traditional fieldwork with cutting-edge technology, ensures a holistic understanding of the solid waste management challenges faced by rural communities.

**The Study Region**

The current study has only been conducted in the Rohtak district's Kalanaur C.D. Block. With a total area of 1,745 square kilometres, Rohtak is a district of the state of Haryana. It is situated between latitudes 28° 54' and 28° 9' N and 76° 34 ' and 76° 57' E. It is flanked by Jind district in north, Hisar in north-west, Sonipat in north-east, Jhajjar in south, Bhiwani in west and Charkhi Dadri in south-west. The study area being formed of the Punjab plain, sedimentary rocks are consolidated here with brown sand. The area is covered by sandy loam deposits of quaternary period of the Cainozoic era. It is a part of Indo-Gangatic alluvial plain boardering the downward fringe of the Pre-Cambrian Aravalli rocks od Delhi system. The study region lacks a perennial river. The Yamuna subbasin of the Ganga basin's artificial drain number 8, which runs from north to south, is primarily responsible for draining the region. The Kalanaur block area is irrigated by the Bhalaut sub branch. The regions of the block are further irrigated by the Kahnaur distributary and the Bhiwani sub branch.

It experiences the usual three seasons- the winter, the summer and the rainy. Both the heat in summer and cold in winter are extreme. Being in the northwest of the nation, Kalanaur block has benefited from rain from both the south-west monsoon and the western disturbances. The area has average rainfall. The block typically receives 443 millimetres of rain each year, spread out across 23 days. The Indo-Gangetic alluvium is found in the research region. In the Kalanaur block, the soil is loamy sand with sporadic clay loam. The block has no reserved and unclassified forest. Forest in the block is found along the road and canals side.

According to the 2011 Census, there are a total of 17,331 homes in the 28 villages that make up Kalanaur Block and there are 90,946 people living in the block as a whole. The Kalanaur block is well connected through the roads and railways with the other parts of district and state. National Highway No 709 passes through Kalanaur block and the Trans Haryana expressway (National Highway No 152 D) is under construction in this area which would connect Narnaul and Ambala. The Railway line which connects Rohtak to Bhiwani passes through this area.

**Objectives of the Study**

1. To quantify the solid waste generation in research region.
2. To identify the suitable sites for solid waste disposal in the research region.

**Database and Research Methodology**

Sentinel 2B data of 2021-02-23 having the resolution 10 m and the secondary data acquired from the website of Haryana Space Application Centre, Hisar and with the use of field research and secondary maps, primary input theme maps such as land-use/land-cover, geological features, and lithology have been prepared. For this investigation, digital elevation data from the Shuttle Radar Topographic Mission (SRTM) with a 30 m resolution were employed. GPS was used to gather data on well points and open waste sites in the field. To confirm the area's present land-use/land-cover types, some illustrative points from different land-use types were also gathered. All of the input data files were classed

using weights, geospatially referenced to the UTM Zone 43N coordinate system, and new maps were created. The input datafiles, their derived datafiles, maps of the weighted overlay analysis, and the end result were all incorporated in construction of the spatial geodatabase. The geodatabase additionally contained verification layers in tabular and shape file formats. In contrast to the shape files getting exported to the appropriate feature data sets, the raster files were created as distinct raster datasets in the geodatabase. Primary data have also been collected through a questionnaire to fulfill the need of data for Research objectives. The figure 01 depicts the methodology's flowchart, which employs a hierarchical approach.

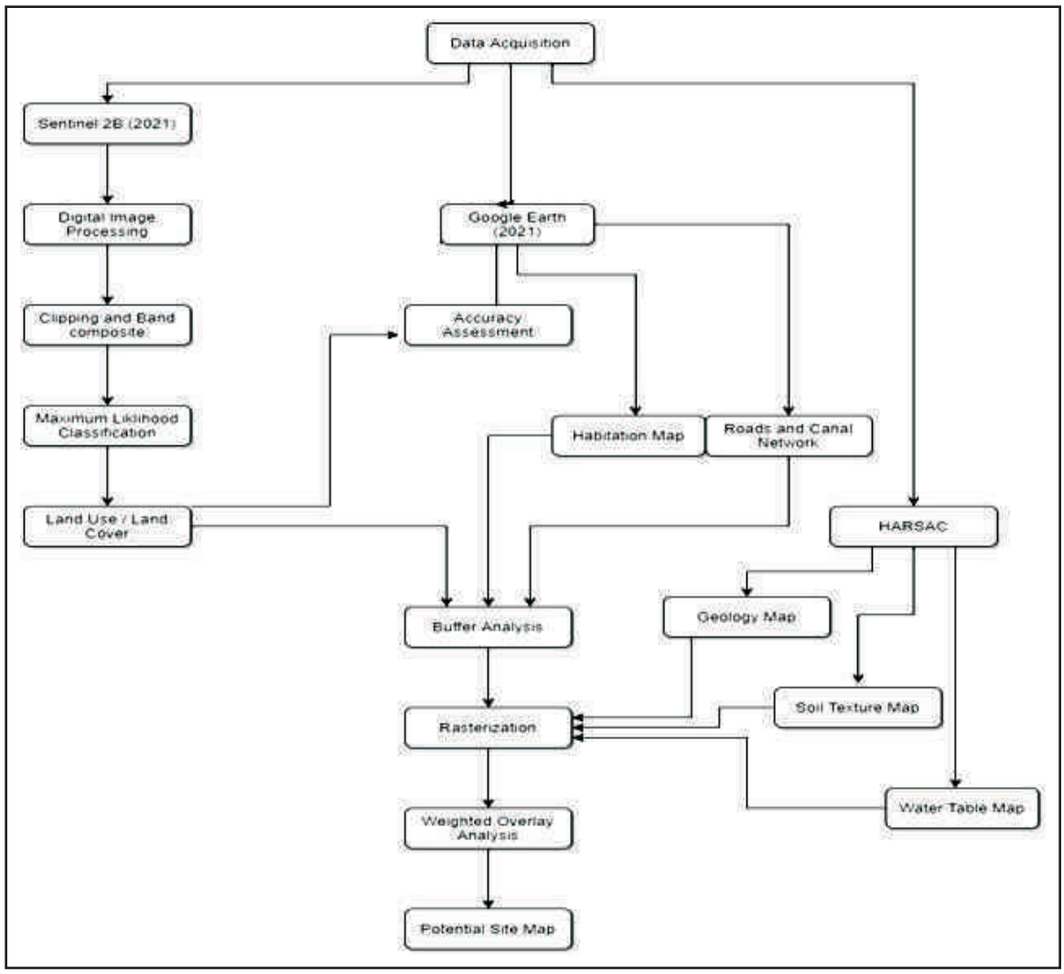


**Fig 01 : Flow chart of methodology**

**Quantification of Generated Solid Waste**

In order to quantify the solid waste generated in the study region a primary survey has been conducted with the help of google forms. It has been found that the average production of solid waste by one person in research region is 0.52 kg/ day. The solid waste generation of the study region in accord with villages has been shown through Table No. 01.

**Table 01 : Village wise Solid Waste Generation in kg/ day.**

| Sr. No. | Village Name | Waste Generated in kg/ day | Sr. No. | Village Name | Waste Generated in kg/ day |
|---|---|---|---|---|---|
| 1 | Anwal | 2,536 | 14 | Lahli | 2,281 |
| 2 | Balab | 1,747 | 15 | Manjha | 306 |
| 3 | Banyani | 3,169 | 16 | Marodi Jatan | 1,111 |
| 4 | Basana | 1,767 | 17 | Marodi Rangran | 963 |
| 5 | Bhali | 2,471 | 18 | Masudpur | 741 |
| 6 | Garhi Balab | 804 | 19 | Nigana | 2,950 |
| 7 | Garnauthi | 2,121 | 20 | Patwapur | 1,059 |
| 8 | Gudhan | 2,254 | 21 | Pilana | 2,687 |
| 9 | Kahanaur | 4,542 | 22 | Sampal | 2,280 |
| 10 | Kakrana | 1,439 | 23 | Sanghera | 1,432 |
| 11 | Kalanaur | 12,126 | 24 | Sundana | 3,209 |
| 12 | Katesra | 2,389 | 25 | Taimaurpur | 241 |
| 13 | Kherari | 1,698 | | | |

**Identification of Suitable Sites for Solid Waste Disposal**

As we have discussed in above that there is a problem associated with waste management in rural area and specifically for solid waste. So, in order to manage the solid waste and to get rid all the problem associated with the solid waste we need to select a site where we can dispose all of the solid waste and then we can further manage this disposed waste. While selecting a site for a particular purpose we need to adhere to a certain procedure and specifically through geo spatial technologies, we have to follow a certain set of pre-determined programing accordingly.

Sentinal 2B, google earth and secondary data from HARSC, Hisar has been used to create multi-thematic maps and layers that include Surface water, ground water table map, soil texture map, land use and land cover, transportation infrastructure, and human habitation.

The soil texture of the study area has been analyzed using Sentinal 2B satellite data and

secondary data from HARSAC. The soil which consists of fine-grained material tend to be more suitable for landfills than other soil types. Clay's appropriateness for landfills is typically diminished by its limited drainage, tendency for shrinkage and expansion, and low workability when compared to soils with a silty clay texture. There have been reports of extremely high, high, moderate, low, and inappropriate for landfill levels of silt to very fine silty clay, clay, mixed soil, sandy soil, and clean sand/gravel. In the present study area three classes of soil have been identified which are Sandy, Fine Loamy and Coarse Loamy soil.

Using Sentinal 2B data, a map of land usage and land cover has been created. Eight major kinds of land use were identified and mapped in the research region. Agricultural land, settlements, open shrub, waste land, fallow land, water bodies, and commercial space are the land use/ land cover categories. Due to improper water and soil management, a lack of natural causes, and sodic fields (land impacted by salt), which appear to be more ideal for landfills, are examples of wastelands. Unsuitable for disposal include sites that are close to or inside settlement or habitation areas, and other significant sites which are marked for tourism or recreational activities like water park and historical monument, etc. As a result, it is discovered that some places are better suited for disposal, while several sites are seen to be moderately suitable.

Thematic layer of water bodies have been prepared. It has been determined that areas that are 500 metres or less from a river, canal, drain, or 200 metres or more from a big body of water are not appropriate for landfills. As a result, it is determined that certain locations are acceptable for use as garbage disposal sites, while many other sites are found to be only marginally suitable.

The research area's habitation map has been created using 10 m-resolution data from the Sentinal 2B satellite. A total of 25 villages have been discovered in the study region, which has been home to a sum of different settlements. A dump site should be located at least 1 km from a densely populated region and 500 m from solitary homes. 500 metres is regarded as an appropriate distance for cities and villages with a population bigger than 500. No new dump site should be positioned any closer to a group of ten or more homes than 0.4 km (0.25 m), according to Siddiqui (1996).On the other hand, due to economic factors, the dump site should be situated no more than 10 kilometres from an urban area. Hence, a buffer zone of 500 meter has been created around every village of the research region.

The danger of pollution is significantly influenced by the groundwater table. The Leachate which is produced on the site of solid waste disposal significantly contaminate the ground water. Considering the importance of water resource, Ground water table map of the study area has been prepared using secondary data of HARSAC and three categories have been identified of ground water level which are 0 to 1.5 meter, 1.6 to 3 meter and 3.1 to 10 meter.

In this study, the various strata are investigated to find the best locations for disposing of solid waste. distributing weights and performing a weighted overlay analysis. In order to apply the proper scale weight based on its affects on site appropriateness for waste disposal, The primary key is the geo-database of the feature class contained within a layer. Based on the potential magnitude to site appropriateness for the disposal of solid waste, the various factors and in the current study, their linked feature classes are provided the proper scale weight and percentage of influencing weight. It is said that the feature class has a scale weight assigned to it that ranges from 1 to 10. In which the feature class with the most contribution to the site's appropriateness for the disposal of solid waste is given the maximum scale weight value, whilst the feature class with the lowest contribution is given the minimum scale weight value. Based on the potential magnitude for site appropriateness for solid waste disposal, all the

categories of different thematic layers are provided a unique value according to scale. Each and every category or feature class of different thematic layer provided scale weight or per cent of influencing weight which have been displayed in table 02. Based on the feature layer's scale weights and percentage of influencing weight, the feature layer (a vector) is transformed to a raster grid format using a weighted overlay analysis.

**Table 02 : Weighted Overlay Analysis**

| Raster | % Influence | Field | Scale Value |
|---|---|---|---|
| Settlements | 20 | Value | |
| | | 500m buffer | 1 |
| Waterbody | 20 | Value | ← |
| | | 500m buffer | 1 |
| Soil | 15 | Value | ← |
| | | Sandy | 1 |
| | | Fine Loamy | 3 |
| | | Coarse Loamy | 2 |
| Geology | 15 | Value | ← |
| | | * | 2 |
| | | ** | 1 |
| Water Table | 15 | Value | ← |
| | | | 3 |
| | | 1.6 – 3m | 2 |
| | | 0 – 1.5m | 1 |
| LULC | 15 | Value | ← |
| | | Settlement | 1 |
| | | Waste Land | 3 |
| | | Waterbody | 1 |
| | | Waterlogged | 1 |
| | | Agricultural Land | 1 |
| | | Open Shrub | 2 |
| | | Fallow Land | 2 |
| | | Commercial Land | 1 |

* Kakar-Ambala Alluvium-Older Alluvium-Quaternary
**Polycyclic Sequence of Sand, Silt, and Clay with Minor Silt-Aeolian Deposit-Holocene. Source – Compiled by author

Maps like buffer from water bodies and settlements, proximity from major roads, soil texture map, geology map and water table map have been created and different weightage have been given to all these factors as shown in table no.2 and site suitability map have been prepared after using the weighted overlay analysis tool in GIS software. After finding locations which are suitable for disposing of solid trash different sites have been marked in a point file after confirming them by ground truthing. Various factors like proximity from the road have been taken into consideration before final selection of the site. A total of twelve sites have been identified which are ideal for disposing of solid waste in the research region. Among all the twelve sites two sites are present along the National Highway 709 in northern part, four sites are present in north west part and two of them are present along the National Highway 152 D. One site is located in western part and one is in southern part, two sites are present in north eastern part and two sites are present in south eastern part of the research region as shown in Fig. 01.

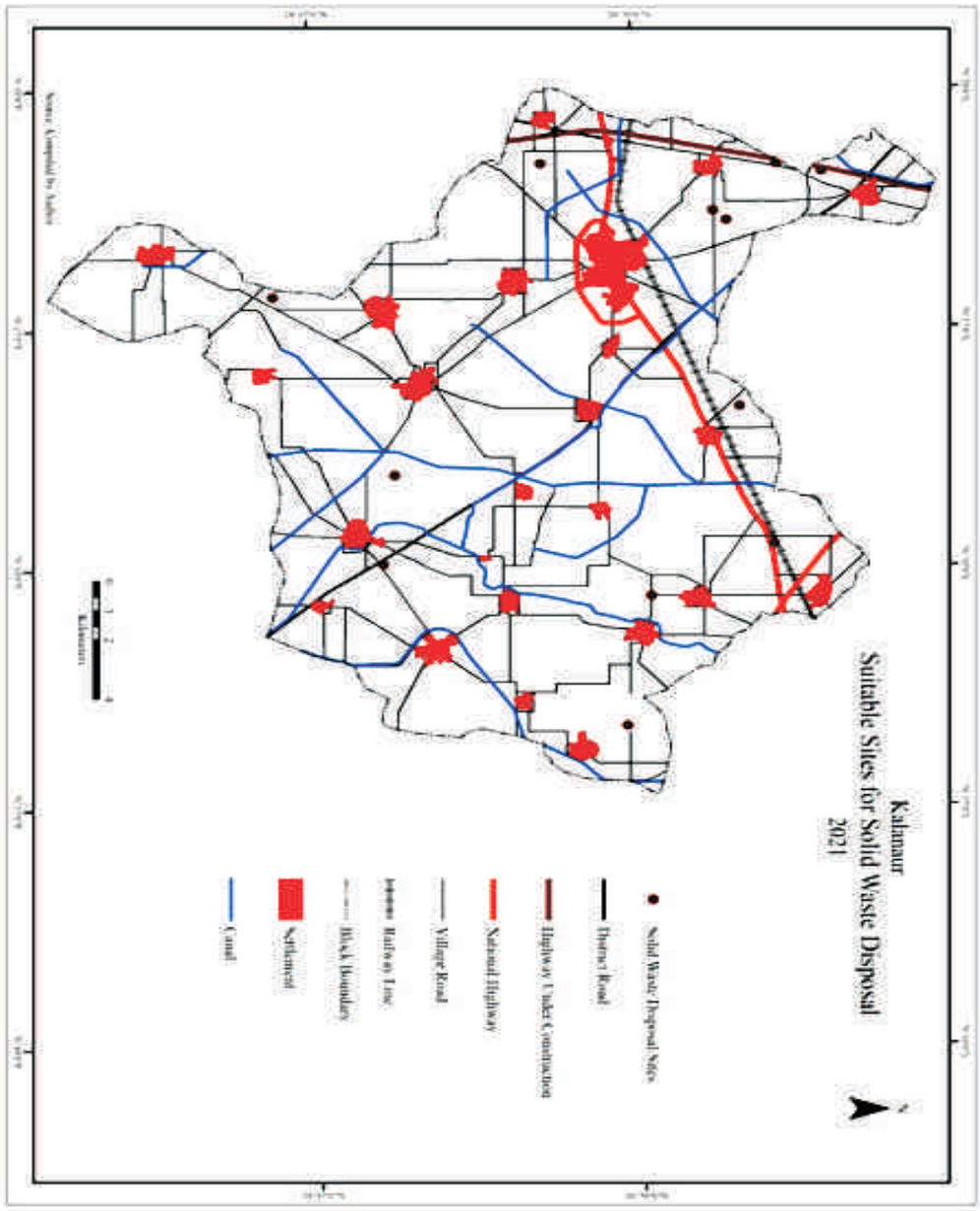
Kalanaur
Suitable Sites for Solid Waste Disposal
2021
Solid Waste Disposal Sites
District Road
Highway Under Construction
National Highway
Village Road
Railway Line
Block Boundary
Settlement
Canal

Fig. 01

**Conclusion**

Government has taken some initiatives like Swachh Bharat Mission (Gramin) to manage waste but even after this kind of initiatives we notice garbage dumped in street, near water bodies and along the roads, etc. Waste management is highly associated with environmental issues. So, in order to make our villages green and clean and pollution free we need to find some sustainable and suitable sites for solid waste disposal using modern geospatial techniques.

Maps like buffer from water bodies and settlements, proximity from major roads, soil texture map, geology map and water table map have been created and different weightage have been given to all these factors and site suitability map have been prepared after using the weighted overlay analysis tool in GIS. The whole study area has been divided into a total of three categories after using GIS software's weighted overlay analysis tool. Among three categories one is highly suitable for solid waste disposal, one is moderately suitable and the last category which covers almost 71 kilometer square area and unsuitable for any kind of solid waste dumping site.

After finding areas which are suitable for disposing of solid trash different locations have been marked in a point file after confirming them by ground truthing. A total of thirteen sites have been identified which are appropriate for dumping solid garbage in research region.

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# EMERGING IMPORTANCE OF HORTICULTURE IN THE ERA OF CLIMATE CHANGE AND LIVELIHOOD SUSTAINABILITY: A CASE STUDY OF BARJORA FARM, WEST BENGAL

**Mahua Chatterjee**

**ABSTRACT**

*India's horticulture industry has come a long way in the last twenty years, both in terms of production and changing people's eating habits to be healthy while still following sustainability principles. Because the climate is tropical and there are few yearly changes in temperature and enough rain, it is very good for growing a wide range of plants. The growing population, increasing human activities, and changing climate all make it harder for the business to provide people with decent ways to make a living.The point of this essay is to show how important horticulture farming is and how it can help people in West Bengal make a living by using the example of Barjora Horticuture farm in Bankura. The once-empty area has quietly turned into a thriving economic hub. In addition to gardening, the farm has started growing a lot of vegetables and is also working on pisciculture, vermicomposting, and many other projects. A method called "purposeful random sampling" was used, and 227 farmers were interviewed either through a questionnaire or a more in-depth focus group talk. The data came from the website and records of the State Horticulture Department as well. Promoting gardening and related activities, building up human resources, and keeping track of land use are all very important for food security, making sure people can make a living, and reaching the national goal of "Aatmanirbhar Bharat," which requires agriculture to be self-sufficient.*

## Introduction

In today's rapidly changing climate, achieving sustainable development poses a significant challenge. The connection between climate change and sustainable development lies in the fact that climate change hinders development, while sustainable development enhances the capacity for mitigation and adaptation (IPCC, 2007b). Horticulture, with its adaptability to diverse climatic, soil, and environmental conditions, offers farmers a broader range of crop options. In India, horticultural production has seen a remarkable increase, doubling from 146 million tons in 2001-02 to 333.25 million tons in 2021-22. In contrast, food grain production rose from 213 million tons to 316.6 million tons during the same period (Ministry of Agriculture & Farmers Welfare, Government of India). Many horticultural crops, including fruits, vegetables, tuber crops, mushrooms, plantation crops, and spices, are highly valued for their nutritional content and are increasingly used in dietary therapies and herbal medicines. As a result, there is a growing demand for horticultural produce. This has led to the promotion of horticulture-based farming systems, which are seen as crucial for food and livelihood security as well as for enhancing farm profitability.

A sustainable way of life is an important part of the Sustainable Development Goals. The World Committee on Environment and Development (WCED) first talked about the idea in a study in 1987. Chambers (1991) and Li, et al. (2023) say it is one of the most common ways to move towards sustainability. There is a lot of uncertainty about how to measure how climate change will affect people

**Dr. Mahua Chatterjee, Associate Professor of Geography, Lady Brabourne College, Kolkata**
**mail: chatterjeemahua34@gmail.com**

and the business, as well as how it will affect small areas or regions. Farmers have had to change when they plant and harvest some fruits and vegetables, like apples, peaches, cherry, apricots, and many others, because the world temperature is going up. A higher quantity of ozone may also hurt the quality of the plants. India's many agro-ecological areas make it possible to grow a wide range of horticulture crops, which make up a big part of the country's total agricultural output. West Bengal is better than other states at growing different types of horticultural crops because it has a wide range of agro climatic conditions and a varied scenery. The horticulture industry needs a lot of infrastructure, like orchards and gardens. Because they help rural people make more money, horticulture goods play a unique role in the state's economy. The one-time cost of building a horti-tourism centre would be worth it because horticulture activities are expected to increase spending on different types of tourism, which will help the country's GDP. Most of the horticulture farms in the state don't have buildings set aside for tourists and don't have the basic services that visitors need. So, it is quite clear that West Bengal has been missing out on horti-tourism opportunities, even though it grows a lot of plants and has more and more tourist sites.

**Geographical Personality of the Study Area**

The horticulture farm in Barjora of Bankura district, West Bengal was established in 1966 under the Department of Agriculture and yet is lesser known to the outside world. The farm is within geographical co-ordinates of $23^{0}26'$ North and $87^{0}17'$ East. The once barren patch of drier Bankura has transformed into a vibrant source of horticulture farming and sustainable livelihood. Presently, the farm includes around 4000 trees in 14 mother orchards. It can help farmers grow economically which will eventually lead to prosperous regional economy. Since farmers may not be familiar to the techniques to grow valuables trees, the farm conducted training classes and also provides them saplings at free of costs. Since 2020, the farm has conducted 10 training programmes, by means of which around 500 trainees have been benefitted. The farm also focuses on offering better livelihood opportunities of the farmers. The women, though small in number in compare to their male counterpart, are employed in the farm and thus the farm has been proved to be a support to the local rural household. The farm has also given a boost to the local labour force and economy through making timely payment in post covid era.

**Objectives**

The western part of West Bengal comprising the districts of Purulia and Bankura fall under the rainfed condition with substantial precipitation during monsoon, making the state more prone to climatic variability. This paper has two objectives; (i) to study the role of horticulture under changing climatic scenario, and (ii) to identify the potential linkage for enhancing sustainable livelihood efforts ensuring overall development.

In order to fulfill the objectives, a null hypothesis has been constructed.

H0= There is no association of age and horticulture activity.

**Materials and Method**

Information is taken from the reports of the State Horticulture department and the data available on the website. Samples for this study are in accordance with the total horticulture farmers attached with Barjora firm. Purposive random sampling technique was used and the sample number stood to be 227. Selected respondents were interviewed personally with the help of structured questionnaire. Focus group discussion (FDG) was also conducted with 10 to 12 members having enough knowledge about horticulture activity and local economy.

The findings of the survey were analysed

using content analysis and standard statistical techniques that explains the relationship between variables. The research work tested the social capital variables namely, responsibility, co-operation, social network and social norms with a likert scale of 1 (minimum) to 5 (maximum). The result of the demographics and perception survey were analysed using SPSS software.

In order to test the hypothesis, chi square test is applied. The level of relationship was determined at 5 per cent level of significance to test the null hypothesis.

$$X^2 = \frac{\Sigma(fo - fe)^2}{fe}$$

Where,

fo= observed frequency,

fe= expected value

**Results and Discussion**

The socio-demographic data of the respondents was collected to understand the level of awareness and their view on horti-tourism.

**Table 01 : Socio-Economic Profile of The Respondents (n=227)**

| Variables | Classes | Number of Observation |
|---|---|---|
| Gender | Male | 171 |
| | Female | 56 |
| Age | < 25 years | 50 |
| | 26-40 years | 67 |
| | 41-55 years | 58 |
| | >55 years | 52 |
| Length of the year engaged in Horticulture | <10 years | 56 |
| | 10-20 years | 78 |
| | >20 years | 93 |
| Monthly Income (Rs) | <15000 | 55 |
| | 15001-30000 | 61 |
| | 30001-45000 | 63 |
| | >45000 | 48 |

Source: Field Survey

It is found that males are large in number (75.33%) compare to their counterparts. The age group (26-55 years) comprise nearly 56 per cent of sample population. Most of the farmers earn Rs 40,000 in a month and these farmers depend solely on horticulture.

**Horticulture-Sustainable Livelihood**

The Brundtland Commission on Environment and Development came up with the idea of "livelihood." At the UN Conference on Environment and Development in 1992, the idea was expanded to include promoting sustainable livelihoods by ending poverty and making life better for everyone (Ibrahim, et al 2018, Kollamair& Juli, 2002).

A total 7 variables have been chosen to establish the relationship with sustainable livelihood

(Table 02). Skilled human resource availability seems to be a major challenge in the execution of any sustainable project. The results ('r' values) in this case showed that in horticulture activity with respect to Barjora farm, education and training exhibited positive and significant relationship and sapling production and marketing showed positive relationship with sustainable livelihood, where as, other variables did not show any significant relationship. Higher the education, training opportunity, sapling production and distribution; higher will be the sustainable livelihood of the farmers in this particular system.

**Table 02 : Correlation Co-Efficient of Sustainable Livelihood Parameters with Other Variables**

| Independent variable | Co-relation co-efficient |
|---|---|
| Age | +0.003 |
| Education | +0.779* |
| Farming Experience | - 0.041 |
| Sapling Production | +0. 613 |
| Training | +0.672* |
| Marketing | +0.542 |
| Social Participation | -0.076 |

Source: Field Survey*Significant at 5% levels

**Natural capital formation :** Natural capital (land, forest and water resource) accounting is important to sustain growth. Barjora farm is spreading over an area of 52.34 acres which includes 4.66 acres of water body. The projects like Butterfly Park, Nature Park, pisciculture help encouraging local conservation of biotic resources and an increase in number of tree species and insects and fishes. Such huge stock of natural capital enters the production of ecosystem services to humans. The ecosystem of Barjora horticulture firm provides food (fruits, vegetables, fish), water for drinking purpose and maintain biospheric processes which in turn make favourable conditions for the people to live. By incorporating natural resources into development planning this farm can contribute to economic

growth and sustainable growth while maintain balance between horticulture, subsistence livelihood, tourism and other ecosystem services.

**Horticulture-tourism**

Horti-tourism, often referred to as entertainment farming, demands strong public relations and communication skills (Kutchi and Kabir, 2017). Strengthening the connection between horticulture and tourism can significantly boost local product promotion, provide economic benefits, and generate sustainable livelihoods. Globally, horticulture is recognized for its important role in tourism, as well as in overall human health and well-being (Relf, P.D., 2015). The integration of horticulture and tourism appears to be an effective strategy for achieving inclusive growth.To explore this integration, a One-Sample Pearson's Chi-square test was conducted to examine the association between the demographic variables of respondent farmers and their perspectives on farm tourism.

**Table 03 : Association Between Age And Horti-tourism ($\chi^2$ test)**

| | Barjora Farm is gradually elevated to a place of tourist attraction | | | | | | Pearson's Chi Square Value | Degree of Freedom | Significance value |
|---|---|---|---|---|---|---|---|---|---|
| Age of the farmer (Years) | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total | | | |
| <25 | 9 | 14 | 11 | 8 | 8 | 50 | 4.78 | 12 | 0.96 |
| 26-40 | 18 | 17 | 12 | 9 | 11 | 67 | | | |
| 41-55 | 13 | 22 | 10 | 7 | 6 | 58 | | | |
| >55 | 10 | 17 | 10 | 8 | 7 | 52 | | | |
| | | | | | | 227 | | | |

Significance level at 0.05

An effort has also been exerted to understand the association between age and horti-tourism. The result found in the table 03 is which is far beyond the acceptable significance level of 0.05. This statistically means that Barjora's transformation from a mere horticulture firm to a place of tourist attraction is not associated with the age of the farmers.

**Economic Impact:** The state government is committed to increasing farmers' income and is actively promoting horticulture-based tourism around horticultural farms. The tourism sector has substantial potential to create employment opportunities. The economic impact (EI) of tourism can be calculated using the formula $EI = n \times e \times m$, where n is the number of tourists, e is the average expenditure per tourist, and m is the multiplier. This calculation is further detailed by considering sector-specific expenditures made by tourists, such as food, lodging, and transport. The money spent by tourists generates further economic activity as it circulates through various sectors of the economy, demonstrating the multiplier effect (Dritsakis, 2008; Boopen, 2006).

**Enhancing Social capital:** The variables that are considered from the surveyed data for social capital perspective are responsibility (x1), co-operation (x2), social network (x3) and social norms (x4). Responsibility means the self awareness that is associated with the person's moral obligations while dealing with a work. Co-operation refers to the practice of the members working together in a group to achieve a goal. Social network refers the social structure that are intertwined with values, vision, friendship, etc. while social norms explains the general behaviour and habits of the members living in a community.

**Table 04 : Study of Social Capital Parameters**

| | Responsibility ($x_1$) | | Co-operation ($x_2$) | | Social network ($x_3$) | | Social norms ($x_4$) | |
|---|---|---|---|---|---|---|---|---|
| | Total | % | Total | % | Total | % | Total | % |
| Very High | 64 | 28.19 | 42 | 18.50 | 73 | 32.16 | 79 | 34.80 |
| High | 55 | 24.23 | 61 | 26.87 | 64 | 28.19 | 71 | 31.28 |
| Moderate | 47 | 20.70 | 56 | 24.67 | 39 | 17.18 | 51 | 22.47 |
| Low | 32 | 14.10 | 37 | 16.30 | 27 | 11.89 | 15 | 06.61 |
| Very Low | 29 | 12.78 | 31 | 13.66 | 24 | 10.58 | 11 | 04.84 |
| Total | 227 | 100 | 227 | 100 | 227 | 100 | 227 | 100 |
| Score obtained | 769 | | 727 | | 816 | | 873 | |
| Ideal Score | 1135 | | 1135 | | 1135 | | 1135 | |
| Level of Kinship | 67.75 | | 64.05 | | 71.89 | | 77.01 | |

Source: Field Survey

The study explains that social norms are very much inbuilt so that conflict must not arise between the individual who performs well and the individual who is not able to do better. Strong social networking with extending co-operation among the group members is important in maintaining group cohesion for the development of quality horti-tourism in Barjora.

**Livelihood Security:** Horti-tourism enables to support the needs of rural households living in a drought prone area (rainfall is low in the west and highly unreliable) of Bankura, West Bengal.There is no doubt that earning cash is a prime motivation of the local horticulture farmers to develop tourism. Farmers and local community members can sell their products and services to the tourists and tourism enterprises (lodge, food, transport, etc). The cash income generated by tourism helps them to sustain in drought period.

**Supply of Horticulture outputs to Tourists:** Regarding the supply of horticulture products to tourism industry from local sources, i.e. from Barjora

**Table 05 : Potential Impact of Horti-tourism on Livelihood of Farmers/ Local people**

| | **Positive effects** |
|---|---|
| Food security | Cash income |
| Employment | Earning from product sale (fresh fruit and vegetables, pickle, juice, etc) labour and service provider in lodge, cafeteria, car and other tourism enterprises |
| Empowerment | Strong social and human capital formation leads to confidence building, community bonding |
| Vulnerability reduction | Income unaffected during drought, savings (though in little in amount) for drought coping |

Source: Field Interview

farm itself, the majority of the respondents are agreed to supply vegetables, fruits, milk and its by products, fish, etc to the tourists (see table 06). Egg and milk are not being produced by the farmers of the study

**Table 06 : Availability of Supply of Horticulture Products to Tourism Industry**

| Variables | | Frequency | Percentage |
|---|---|---|---|
| Vegetables | Yes | 96 | 42.29 |
| | No | 131 | 57.71 |
| | Total | 227 | 100 |
| Fruits | Yes | 182 | 80.18 |
| | No | 45 | 19.82 |
| | Total | 227 | 100 |
| Fish | Yes | 178 | 78.41 |
| | No | 49 | 21.59 |
| | Total | 227 | 100 |
| Milk | Yes | 101 | 44.49 |
| | No | 126 | 55.51 |
| | Total | 227 | 100 |
| Egg | Yes | 95 | 41.85 |
| | No | 132 | 58.15 |
| | Total | 227 | 100 |
| Processed food | Yes | 146 | 64.32 |
| | No | 81 | 35.68 |
| | Total | 227 | 100 |

Source: Field Survey

As the tourism in Barjora is in infant stage, the absence of market based supply-demand chain is well evidenced during the survey. Bringing the opportunity for the establishment of hotel, lodges surrounding the farm, thereby increases the supply of horticulture products to the tourism industry.

**Conclusion**

It is found from the study that the farming of the horticulture crops particularly vegetable cultivation is the main occupation of the farmers of the region and it has the potential to enhance livelihood sustainability. Sustainable livelihood efforts in India mostly focus on agriculture and related activities; however, there is also an increasing emphasis on the importance of skill development, innovation and entrepreneurship. Barjora farm under PPP model has already emerged as a knowledge hub and training center and significantly developed skill set of farmers and horticulturists across the state. Tourism is another potential sector for the development of the region as the landscape is beautiful and climate is conducive. State Government is introducing the welfare scheme namely Krishak Bandhu, Bangla Sashyo Bima for providing financial assistance to the farmers. Needless to say that tourism is one of the promising sectors in the present-day economy. Creation of a horti-tourist spot and sustainable local development through symbiotic co-existence of all stakeholders are very much important. It would be useful to develop proper knowledge about the role of horti-tourists for a successful horti-tourism business.

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# EXPLORING THE DYNAMICS OF INDIA'S ENGAGEMENT WITH CENTRAL ASIA: OPPORTUNITIES, CHALLENGES, AND FUTURE PROSPECTS

**Harshit Bhardwaj**

**ABSTRACT**

*Central Asia is the region located in the heart of the Eurasia. Its strategic location is going to play an important role in the future. It is often seen as one of the most vulnerable areas due to instability in the neighbouring states. Being situated in the middle of Asia and Europe, it is one of the most suited routes of transit. India as an extended neighbour of the Central Asian Republic has major geo-strategic and economic interests in the region. It can be observed that the relationship between the two regions has evolved through cultural exchanges and reminds us that they did not evolved suddenly but through reciprocal cultural enrichment. However in modern times the importance of Central Asia to India is not only limited to civilisational and historical, but also geopolitical and economic. At present, India's involvement in Central Asia is slightly less, still the region offer great opportunities, which if availed would help India in building a long-term foreign policy goals in this region. This paper offers insights into the significance of India's relations with Central Asia for regional stability and global geopolitics.*

## Introduction

Central Asia is situated at the heart of Eurasia, and its geographical as well as historical linkages makes the region very relevant to India's strategic interests. Since the launch of the Connect Central Asia policy in 2012, India has expanded its geopolitical, economic, and cultural connections with the region. India had in past conducted numerous bilateral and multiparty dialogues and at the same time also established regular channels of communication with the Central Asian Republics through various multilateral forums such as the Shanghai Co-operation Organization (SCO), CICA (Conference on Interaction and Confidence-Building Measures) which was held in India, and the Heart of Asia-Istanbul Process, which reflect its desire to contribute to regional stability and development. Yet, India's role is still underplayed in the region in comparison to other stakeholders of the region like Russia, China, Iran, Turkey, etc.

However, the importance of the Central Asian region has drawn attention since the Taliban took over Afghanistan due to a various factors. Primarily, because both India and Central Asian Republics have common grounds of concerns to establish co-operation and co-ordination with each other due to the rising threat of terrorism and illicit drug trafficking spilling over into their territories from Afghanistan and Pakistan, and secondly, anything that happens into Central Asia has the spilling potential towards India, Russia , China, etc. Therefore, the major concern is the stability of the Central Asian region for the interest of the big players such as Russia and China. The Central Asian region is much more likely to remain in focus at multilateral forums concerning Afghanistan, which plays the strategic role in improving relations with India.

As India looks to the future, the potential for deepening ties with Central Asia remains promising. Strengthening economic co-operation, boosting connectivity through infrastructure projects, and promoting cultural ties are key factors for deepening

**Harshit Bhardwaj, Doctoral Research Scholar at Department of Defense and Strategic Studies, V.S.S.D. College (affiliated to CSJM University) Kanpur, Email: harshitsinghh020999@gmail.com, Phone No.: 7052583999**

engagement. By leveraging its historical connections, geographical proximity, and shared interests, India has the chance to play a constructive role in shaping the trajectory of India-Central Asia relations for mutual benefit and regional stability.

**Research Objectives**

1. To analyse and examine the dimensions of India's Foreign policy in the field of diplomacy, geopolitics and strategic relationships with Central Asian nations.
2. To explore the hurdles encountered by India and the Central Asian countries while giving strength and impetus to their relationship.
3. The paper aims to recommend some countering measures through which the relationship between the two counter parts can be strengthened and stabilised.

**Research Methodology**

The quantitative and analytical methods of description have been chosen for the proposed research, which depends on the approach of documentary analysis of sources consisting of both primary and secondary sources of data.

**Primary data source:** The personal interviews of experts and diplomats concerned with specializations will be valued in a structure-oriented frame of information gathering.

**Secondary data sources:** the data will include published articles, top peer-reviewed journals, magazines, newspapers, authentic internet sources, handbooks, government data, releases, etc.

Consequently, a mechanism will be deployed to use the tool of content analysis to examine these scholarly and non-scholarly data sources for compatible outcomes.

**Importance of Central Asia for India**

- Central Asia has been a area of interest for India because of factors such as security, energy, economic opportunities, etc.
- Central Asian nations serves as an important link between Asia and Western Europe thereby making it geo-politically important for India's security interest.
- Central Asia has associated itself with the Universal market for production and supply of raw materials. Central Asia also acts as a link to the Trans-Eurasian (East-West) Transit and Economic corridors.
- India share many common attributes and perceptions on various issues with the Central Asian Republics (CARs) and their joint co-operation can play a crucial role in providing regional stability.
- Stability, prosperity and security in Central Asia Region is necessary for the advancement of India's economy.
- Chabahar Port can be used by India as a gateway to the Eurasian markets, however, it further requires a Central Asian state to join the project as a major stakeholder.
- The area is extensively rich in natural commodities such as crude oil which can help to fulfil the energy security, natural gas, gold, copper, aluminium, and iron which can provide stability and support to India thereby acting as a major accelerator for growth.
- India has signed a civil nuclear deal with Kazakhstan in 2009 for the supply of uranium until 2014.
- India's oversea airbase lies in Tajikistan at Farkhor and Western Dushanbe.
- Central Asia borders the 'Golden Crescent' (notoriously famous for Opium Production) comprising of Iran-Pakistan-Afghanistan which often acts as a birthplace of terrorism and illicit drug trafficking, and both India and Central Asia are the common victims.

- Any instability that arises in Central Asia due to regional or International factors ultimately has a spillover effect on India's security.
- Therefore, any positive collaboration of India with the Central Asian Republics in this regard will ultimately benefit the entire region can establish peace and harmony.
- There is a need to establish stability in the Central Asian countries as this can make a bid for become a permanent member of the UNSC.
- An kickstart can be given to India-Central Asia link because of India's participation in multinational forums like the Heart of Asia Conference, Eurasian Economic Union, and SCO(Shanghai Co-operation Organisation) (SCO Incorporated India as a permanent member in 2017).

**What are the Present Challenges in the Relationship?**

- **Re-establishment of the Taliban:** The Taliban returns to supremacy over Afghanistan has unveiled the weakness of multilateral forums such as the Shanghai Co-operation Organization, which was established majorly to counter terrorism in the region.
- **Chinese presence:** China's ambitious Belt and Road Initiative and China Pakistan Economic Corridors creates a geostrategic security concern as it violates the India's sovereignty and territorial limits
- India needs a proper recalibration of its regional ties with Central Asian countries.

**How India can Broaden its Relationship with Central Asia**

- Launch of 'Connect Central Asia policy' by India was for a broad approach, including Social, Political, Economic, Security and Cultural Nexus. To give impetus to this policy, the Prime Minister of India Mr. Narendra Modi paid visit all five CAR's countries-Uzbekistan, Kazakhstan, Turkmenistan, Kyrgyzstan, and Tajikistan-in 2015.
- For the past decade, the Central Asian Region has emerged as a site of great power tussles due to abundance of rich energy resources and at the same time, the world also witnessed the rise of India as an economic and a regional power, making it more important to prioritize its relations with Central Asia.
- The key elements of this 'Connect Central Asia' policy cover many important issue areas such as political co-operation, strategic co-operation, economic co-operation, regional connectivity, information technology (IT), people-to-people contact, medical co-operation, and co-operation in regional groupings, etc.
- The Connect Central Asia Policy is primarily based on the 4Cs: Commerce, Connectivity, Consular ship, and Community.

**Results and Conclusion**

The results and outcomes of India-Central Asia relations have encompassed various dimensions, including economic, political, strategic, cultural, and regional co-operation. Here are some key results and outcomes:

- **Investment opportunities:** India has pursued investment opportunities in Central Asia, particularly in the sectors such as energy, infrastructure, mining, and agriculture, contributing to economic development in both regions.

- **Connectivity initiatives:** Efforts to enhance connectivity through the International North-South Transport Corridor (INSTC) and the strategic Chabahar Port have facilitated trade and transit between India, Iran, and Central Asia, opening up new avenues for economic co-operation.

- **Strengthened diplomatic ties:** high-level meetings, diplomatic dialogues, and engagement in regional forums such as the Shanghai Co-operation Organization (SCO) have deepened political relations between India and Central Asian countries.

- **Security co-operation:** Co-operation in recognizing common security challenges, including terrorism, extremism, and illicit drug trafficking, has been strengthened through intelligence sharing, capacity building, and joint exercises, leading to regional stability.

- **Strategic alignment:** India and Central Asian countries have aligned their strategic interests on regional and global issues, including support for a multipolar world order, sustainable development goals, and climate change mitigation efforts.

- **Strengthening regional integration:** Efforts to enhance connectivity, trade, and commerce have contributed to greater regional integration between South Asia and Central Asia, unlocking the potential for shared prosperity and development.

Overall, the results and outcomes of India-Central Asia relations underscore the growing partnership between the two regions and the potential for deeper co-operation across various sectors. By building on these achievements and addressing remaining challenges, India and Central Asian countries can further strengthen their ties and contribute to regional stability, economic prosperity, and cultural exchange.

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# IMPACT OF EDUCATION AND ATTITUDE TOWARDS SAFE MOTHERHOOD PRACTICES AMONG PREGNANT WOMEN IN TEHSIL CHAKRATA DISTRICT DEHRADUN, UTTARAKHAND.

**Vijay Bahuguna, Tania Sharma**

**ABSTRACT**

*In contemporary society, education is considered the fourth most critical human necessity, following shelter, food, and clothing. Before attending school, our primary interactions are with our parents and close relatives, which not only fosters the development of new ideas but also instils vital social skills such as empathy and the ability to relate to others which are key elements of maturity. A crucial issue is that knowledge of safe motherhood practices which can enhance maternal and child health while also mitigating pregnancy-related health risks. The aim of our study is to assess the impact of a health education intervention on pregnant women in Chakrata tehsil, Uttarakhand, India, focusing on pregnant women knowledge and attitudes towards various aspects of safe motherhood. Pregnancy and childbirth are essential for the survival of humanity, but maternal death is a profound tragedy affecting both mother and child. Despite the introduction of the "Safe Motherhood Initiative" Maternal health is an area of concern for us.*

## Introduction

According to Swami Vivekananda, improving the condition of women is essential for the overall well-being of the world. Women can empower themselves through education, which gives them more power and helps to elevate their status within the family, thereby reducing gender disparities. Pregnancy and childbirth, while crucial for the continuation of humanity, often negatively impact women mentally, physically, and emotionally. Studies in developing countries show that if a mother dies during childbirth, the risk of death for her children under five years old doubles or even triples, with girls being particularly affected. Thus, maternal death is doubly tragic. To combat maternal mortality, morbidity, and related adverse outcomes, the International Health Community, including organizations like the World Bank, WHO, United Nations Population Fund, and agencies from 45 other countries, launched the "Safe Motherhood Initiative" in 1987 during a conference in Kenya. This initiative focused on four key aspects of safe motherhood: antenatal care, clean and safe delivery, essential obstetric care, and postnatal care, including family planning. Since the initiative's inception, the maternal mortality rate has decreased by nearly 44% over the past 25 years as of 2015. Additionally, the infant mortality rate has dropped from an estimated 64.8 deaths per 1,000 live births in 1990 to 26.5 deaths per 1,000 live births in 2023.

There was also a decline in the number of under-five deaths from 12.7 million in 1990 to 4.9 million in 2023. Similar significant declines were observed in the maternal, infant and under 5 mortality rates in India as well. Globally, 800 women still die daily from preventable pregnancy-related causes, with India accounting for 20% of these deaths, currently estimated at 212 per 100,000 live births. To

1. **Dr. Vijay Bahuguna, Associate Professor, Dept. of Geaography, D.B.S. (P.G.) College, Dehradun.**
   **Email : vijaybahugunadbs@gmail.**
2. **Tania Sharma, Dept. of Geography, D.B.S. (P.G.) College, Dehradun.**

address this, initiatives such as "Every Mother and Every Newborn" in 2014 and "The Global Strategy" in 2016 were launched to support the 2030 Sustainable Development Goal (SDG)-3, which aims to ensure healthy lives and promote well-being for all ages.

**The Study Area**

Chakrata Tehsil, located in the Dehradun district of Uttarakhand. Nestled in the foothills of the Himalayas, this region is characterized by its dense forests, deep valleys, and snow-capped peaks, making it a popular destination for tourists and nature enthusiasts. The tehsil covers an area of approximately 1,500 square kilometers and a population of around 55,000 people, according to the latest census. Most of the inhabitants belong to various indigenous communities, with the Jaunsari tribe being the most prominent. The latitude and longitude co-ordinates for Chakrata Tehsil are latitude: 30.7013° N and longitude: 77.8626° E.

The population density in Chakrata Tehsil is relatively low, given its mountainous terrain and rural setting. Most of the population resides in small villages scattered across the region, with agriculture being the primary occupation. The terraced fields, which are a common sight, are used to cultivate a variety of crops such as rice, wheat, and millets. The region also has a significant number of people engaged in animal husbandry, particularly in sheep and goat rearing, which complements the agricultural practices. Literacy rates in Chakrata tehsil have been gradually improving, with various government initiatives aimed at enhancing educational facilities and access. Despite these efforts, the tehsil still faces challenges in terms of infrastructure and connectivity, which impact the overall quality of life.

In terms of demographic composition, Chakrata Tehsil exhibits a balanced gender ratio and a predominantly young population, with a significant portion of residents under the age of 30. The area has seen a steady but slow population growth rate, influenced by factors such as migration to urban centers for better employment opportunities. Health services in the region have also been a focus of development programmes, with efforts to improve maternal and child health indicators. Overall, Chakrata Tehsil represents a blend of natural beauty and cultural heritage, facing the challenges of modern development while striving to preserve its unique identity.

Objectives:

- To assess whether knowledge of safe motherhood among women of reproductive age varies across different age groups because of health talks, demonstrations, and role plays.
- To investigate the impact of educational status on the knowledge of safe motherhood among women of reproductive age, specifically in the context of health talks, demonstrations, and role plays.

**Database and Research Methodology**

The study employed a pre-test post-test control group design within a quasi-experimental framework to evaluate the effectiveness of various interventions on safe motherhood knowledge among 120 women of reproductive age in Chakrata Tehsil. This design was selected because it allows for the assessment of changes in knowledge due to specific interventions such as health talks, demonstrations, and role plays. The data collection was carried out using a self-designed 40-item questionnaire, ensuring that the questions were tailored to the specific context and needs of the target population. The questionnaire helped capture a comprehensive view of the participants' understanding of safe motherhood practices before and after the interventions.

For data analysis, demographic information was processed using simple percentages and frequency distribution tables, providing a clear picture of the participants' backgrounds. Research

questions were addressed by calculating the mean and standard deviation, offering insights into the overall impact and variability of the interventions. To test the study's hypotheses, ANCOVA (Analysis of Co-variance) was used at a 0.05 level of significance, allowing the researchers to control for pre-existing differences between the control and experimental groups. This rigorous approach ensured that any observed changes in knowledge could be attributed to the interventions rather than other variables, providing robust evidence for the effectiveness of the health education strategies employed.

**Hypothesis.**

H1 The knowledge of safe motherhood among women of reproductive age is not significantly impacted by health talks, demonstrations, role plays, etc. based on age group.

H2 The knowledge of safe motherhood among women of reproductive age is not significantly impacted by health talks, demonstrations, role plays, etc. based on educational status.

**Results and Discussion**

This section shows each hypothesis in the null form, with the variables as well as the results of the statistical analysis carried out to test the hypotheses. The hypotheses were tested at 0.5level of significance.

**Hypothesis ONE**

Summary of ANCOVA on Difference in Knowledge of Safe Motherhood among Women of different Age groups R Squared = .090 (Adjusted R Squared= .078)

**Table 01 : Reproductive Age Based on Age Group**

| Source of variation | TypeIIISum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | .461[a] | 5 | .092 | 7.793 | .000 |
| Intercept | 12.493 | 1 | 12.493 | 1055.710 | .000 |
| Pre-test | .039 | 1 | .039 | 3.323 | .069 |
| Intervention | .237 | 1 | .237 | 20.065 | .000 |
| Age | .016 | 3 | .005 | .456 | .713 |
| Error | 4.662 | 394 | .012 | | |
| Total | 1340.222 | 400 | | | |
| Corrected Total | 5.123 | 399 | | | |

The result of the analysis as presented in Table 01 shows that there was no significant difference on impact ofhealth talk, demonstration, role play, etc., on women of reproductive age knowledge of safe motherhood based on age group as calculated ANCOVA (F3,394=456, p=.713,

p>.05) was insignificant. The null hypothesis two was accepted. Health talk, demonstration, role play, etc., does not significantly impact women of reproductive age knowledge of safe motherhood based on age group.

**Analysis of ANCOVA Findings**

**Corrected Model**

The corrected model in the ANCOVA table 01 shows a significant F-value (F = 7.793, Sig. = .000), indicating that the model is effective in explaining the variance in the knowledge of safe motherhood among different age groups. This suggests that the variables included in the model—pre-test scores, interventions, and age—are collectively important in understanding the differences in knowledge levels.

**Intercept**

The intercept is highly significant (F = 1055.710, Sig. = .000), showing that there is a substantial baseline knowledge of safe motherhood among the women in Chakrata tehsil. This could be attributed to the existing health education programmes and the community's general awareness of maternal health.

**Pre-test Scores**

The pre-test scores, although not significant (F = 3.323, Sig. = .069), indicate a near-threshold level of initial knowledge about safe motherhood. This near-significance suggests that the baseline knowledge of safe motherhood before the interventions varied slightly but was not a major differentiating factor in the outcome.

**Intervention**

The intervention variable is highly significant (F = 20.065, Sig. = .000), highlighting the effectiveness of health talks, demonstrations, and role plays in improving knowledge of safe motherhood. This underscores the importance of these educational methods in Chakrata Tehsil and suggests that such interventions should be continued and possibly expanded.

**Age Groups**

The age variable is not significant (F = .456, Sig. = .713), indicating that differences in age groups did not significantly affect the knowledge outcomes. This lack of significance suggests that women of all reproductive ages in Chakrata tehsil benefited similarly from the interventions, pointing to the universal applicability of the health education strategies employed.

**Implications for Chakrata Tehsil**

The results from this ANCOVA analysis offer several insights and implications for Chakrata tehsil's efforts to improve maternal health knowledge:

1. **Effectiveness of Interventions:** The significant impact of the interventions demonstrates their value in educating women about safe motherhood. Chakrata tehsil should continue to invest in health talks, demonstrations, and role plays, as these methods have proven effective in raising awareness and knowledge.
2. **Baseline Knowledge:** Despite the non-significant pre-test scores, the high intercept value indicates that women in Chakrata tehsil have a solid foundational knowledge of safe motherhood. This could be due to prior health education efforts, community traditions, or informal knowledge transfer. Future programmes can build on this foundation to enhance more specific or advanced knowledge areas.
3. **Universal Benefit Across** Age Groups: Since age did not significantly influence the knowledge gains from the interventions, it suggests that the educational methods used are effective across the reproductive age spectrum. This universality is crucial for programmes planners, as it simplifies the

design and implementation of maternal health education programmes without needing age-specific customization.

4. **Focus Areas for Improvement:** Although the overall model is significant, the R-squared value (.090) and adjusted R-squared value (.078) indicate that there is still a considerable portion of the variance in knowledge that is unexplained by the model. This suggests room for improvement in the educational interventions and perhaps the inclusion of additional factors such as socio-economic status, cultural beliefs, or access to health services.

**Recommendations for Future Actions**

To further enhance the knowledge of safe motherhood in Chakrata tehsil, the following steps are recommended:

1. **Expand Educational Interventions:** Increase the frequency and reach of health talks, demonstrations, and role plays. Consider incorporating these into regular community events or integrating them into school curricula to reach younger women before they reach reproductive age.

2. **Diversify Educational Methods:** While current methods are effective, incorporating newer technologies such as mobile health applications or interactive online platforms could cater to younger, tech-sawy women and complement traditional methods.

3. **Address Unexplained Variance:** Conduct further research to identify other factors that may influence knowledge of safe motherhood. Understanding the roles of socio-economic conditions, cultural practices, and healthcare access can help tailor more comprehensive and effective educational programmes.

4. **Community Involvement:** Engage community leaders and influencers in promoting safe motherhood practices. Their endorsement can enhance the credibility and acceptance of health education initiatives.

**Table 02: Summary of ANCOVA on the knowledge of safe motherhood among women of reproductive age is not significantly impacted by health talks, demonstrations, role plays, etc. based on educational status.**

| Source of variation | Type III Sum of Squares | df | Mean Square | F | sig. |
|---|---|---|---|---|---|
| Corrected Model | 515 | 5 | .103 | 8.814 | .000 |
| Intercept | 12.434 | 1 | 12.434 | 1063.143 | .000 |
| Pre-test | .044 | 1 | .044 | 3.744 | .054 |
| Intervention | .180 | 1 | .180 | 15.372 | .000 |
| Educational Status | .071 | 3 | .024 | 2.011 | .112 |
| Error | 4.608 | 394 | .012 | | |
| Total | 1340.222 | 400 | | | |
| CorrectedTotal | 5.123 | 399 | | | |

RSquared= .101(AdjustedR Squared=.089

The result of the analysis as presented in Table 02 reveals that there was no significant difference on impact of Health talk, demonstration, role play, etc., on women of reproductive age knowledge of safe motherhood based on educational status as calculated ANCOVA (F3, 394=2.011, p=. 112, p>.05) was insignificant. The null hypothesis was accepted. Health talk, demonstration, role play, etc., does not significantly impact women of reproductive age knowledge of safe motherhood based on educational status.

**Key Findings from the Analysis**

**Corrected Model**

The corrected model indicates a significant effect (F = 8.814, Sig. = .000), suggesting that the variables included in the model—pre-test scores, interventions, and educational status—are collectively important in explaining the variance in knowledge of safe motherhood. The R-squared value of .101 and adjusted R-squared value of .089 indicate that about 10% of the variance in knowledge can be explained by the model.

**Intervention Effectiveness**

The intervention variable is highly significant (F = 15.372, Sig. = .000), highlighting the effectiveness of health talks, demonstrations, and role plays in improving knowledge of safe motherhood across the board. This confirms the value of these educational strategies in enhancing maternal health awareness among women in Chakrata tehsil.

**Educational Status**

The educational status variable, however, is not significant (F = 2.011, Sig. = .112), indicating that there is no significant difference in the impact of these interventions based on the educational status of women. This finding suggests that regardless of whether a woman has low or high educational attainment, the interventions equally improve their knowledge of safe motherhood.

**Implications for Chakrata Tehsil**

The results indicate that the health education programmes in Chakrata tehsil are effectively improving knowledge of safe motherhood among women of all educational backgrounds. The lack of significant differences based on educational status implies that these programmes are inclusive and accessible, providing valuable information to all women, regardless of their level of formal education.

1. **Inclusivity of Interventions:** The finding that educational status does not significantly affect the knowledge gains from interventions suggests that the methods used—health talks, demonstrations, and role plays—are well-designed to cater to diverse educational backgrounds. This inclusivity is a strength of Chakrata tehsil's maternal health programmes.
2. **Focus on Practical Methods:** The practical nature of the interventions, such as demonstrations and role plays, likely contributes to their effectiveness across different educational levels. These methods provide hands-on, visual, and interactive learning experiences that can transcend educational barriers.
3. **Continued Support and Expansion:** Given the proven effectiveness of these interventions, Chakrata Tehsil should continue to support and expand these educational programmes. Ensuring regular and widespread access to health talks, demonstrations, and role plays can further consolidate the gains in maternal health knowledge.

**Recommendations for Future Actions**

1. **Maintain and Enhance Current Programme:** Continue offering health talks, demonstrations, and role plays, ensuring they remain accessible

to all women in the community. Increasing the frequency and reach of these programmes can help maintain and build upon the current knowledge levels.

2. **Leverage Community Resources:** Engage community leaders, healthcare workers, and local organizations to support and promote these educational initiatives. Their involvement can enhance participation and trust in the programmes

3. **Monitor and Evaluate:** Implement regular monitoring and evaluation to assess the impact of these programmes continuously. Collecting feedback from participants can provide insights into areas for improvement and ensure that the interventions remain effective and relevant.

**Conclusions**

Based on the analysis of the impact of educational status on the knowledge of safe motherhood among women of reproductive age in Chakrata tehsil, several important conclusions can be drawn. The ANCOVA results from Table 01 highlight that while interventions such as health talks, demonstrations, and role play significantly enhance knowledge ($F = 20.065$, Sig. = .000), age did not play a significant role in these knowledge gains ($F = .456$, Sig. = .713). This suggests that these educational interventions are universally effective across different age groups, making them valuable tools in promoting maternal health in a diverse population. The high significance of the intercept ($F = 1055.710$, Sig. = .000) indicates a substantial baseline knowledge, likely due to existing community health education efforts.

In contrast, the analysis presented in Table 02 reveals no significant difference in the impact of these interventions based on educational status ($F = 2.011$, Sig. = .112). This finding is crucial as it underscores the inclusivity and broad applicability of the health education programmes in Chakrata tehsil. The effectiveness of the interventions, regardless of the women's educational background, demonstrates that practical, hands-on methods like demonstrations and role plays can bridge educational gaps and provide vital knowledge to all women. Consequently, Chakrata tehsil's health education initiatives are well-suited to its diverse population, effectively enhancing knowledge of safe motherhood across various age groups and educational statuses. This broad impact suggests a strong foundation upon which future maternal health programmes can be built and expanded, ensuring continued improvement in maternal health outcomes.

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# राजस्थान के अर्द्धशुष्क पूर्वी मैदान में शस्य गहनता और सिंचाई गहनता के मध्य सम्बन्ध का अध्ययन

**चन्द्रकान्ता शर्मा एवं विपिन कुमार**

## शोध सारांश

*वर्तमान में बढ़ती जनसंख्या की खाद्य आवश्यकताओं को पूरा करने के लिए कृषि उत्पादन को बढ़ाना अति आवश्यक है। कृषि उत्पादन को दो प्रकार से बढ़ाया जा सकता है एक उत्पादकता में वृद्धि कर एवं दूसरा शस्य गहनता बढ़ा कर। दोनों ही प्रत्यक्ष रूप से सिंचाई सुविधा से प्रभावित होते हैं अर्थात् कृषि विकास में सिंचाई का महत्त्वपूर्ण योगदान रहता है। भारत जैसे मानसूनी जलवायु वाले देश में सिंचाई के अभाव में कृषि विकास की कल्पना भी नहीं की जा सकती है। वर्तमान में सिंचाई सुविधाओं का विकास किया जा रहा है। अतः शस्य गहनता बढ़ाने के लिए सिंचाई एक आवश्यक शर्त है। इस प्रकार प्रस्तुत शोध पत्र में 2000–01 से 2018–19 तक राजस्थान के अर्द्धशुष्क पूर्वी मैदान में शस्य गहनता और सिंचाई गहनता के मध्य सम्बन्ध का अध्ययन किया गया हैं। अध्ययन क्षेत्र में 2000–01 में सिंचाई गहनता 46 प्रतिशत थी, जो 2018–19 में बढ़कर 51 प्रतिशत हो गयी है। लगभग इन 20 वर्षों में सिंचाई गहनता में काफी परिवर्तन देखा गया है। इसी प्रकार शस्य गहनता में भी परिवर्तन हुआ है, 2000–01 में 130 प्रतिशत थी जो 2018–19 में बढ़कर 153 प्रतिशत हो गयी है। इस प्रकार कह सकते हैं कि सिंचाई गहनता में वृद्धि होने से शस्य गहनता में भी वृद्धि होती है। शस्य गहनता में वृद्धि के अन्य कारक, जैसे– उपजाऊ मृदा, जलवायु व अन्य भौगोलिक एवं आर्थिक कारक, आदि भी महत्त्वपूर्ण होते हैं, लेकिन सिंचाई अनिवार्य है।*

## प्रस्तावना

कृषि प्राचीनतम आर्थिक व्यवसाय हैं जो प्रारम्भ में अव्यवस्थित रूप में था, लेकिन धीरे–धीरे सुव्यवस्थित रूप में किया जाने लगा हैं और आधुनिक कृषि विकसित व व्यापारिक रूप में आ गयी है। वर्तमान में सिंचाई, उत्तम बीज, रासायनिक खाद, आधुनिक कृषि यंत्र–औजार, आदि का सुव्यवस्थित प्रयोग कर निश्चित क्षेत्र से अधिकाधिक कृषि उत्पादन प्राप्त किया जा रहा हैं। इनके अतिरिक्त अनेक सामाजिक, आर्थिक एवं राजनीतिक कारकों द्वारा भी उत्पादन प्रभावित होता हैं। भारतीय अर्थव्यवस्था में कृषि का प्रमुख स्थान रहा है। लेकिन वर्तमान में देश के कुल सकल घरेलू उत्पाद में कृषि की हिस्सेदारी में लगातार कमी आ रही हैं। वर्ष 1990–91 में 35 प्रतिशत थी, जो घटकर 2022–23 में 15 प्रतिशत रह गयी हैं। परन्तु बढ़ती जनसंख्या की खाद्य आवश्यकताओं की पूर्ति करने एवं अनेक उद्योगों को कच्चा माल उपलब्ध कराने में कृषि का महत्त्वपूर्ण योगदान हैं।

इस प्रकार किसी प्रदेश के आर्थिक विकास के लिए कृषि का विकास अति आवश्यक है तथा कृषि विकास के दो महत्त्वपूर्ण संकेतक शस्य गहनता एवं सिंचाई गहनता हैं। शस्य गहनता से तात्पर्य किसी निश्चित कृषि क्षेत्र में कृषि वर्ष में फसलों की आवृत्ति अर्थात् कितनी बार फसलें उगायी जाती हैं, से है। यह आवृत्ति ही शस्य गहनता कहलाती है। यह वास्तविक बोये गये क्षेत्र एवं सकल बोये गये क्षेत्र का आनुपातिक सम्बन्ध है। वास्तविक बोये गये क्षेत्र से सकल बोया गया क्षेत्र जितना अधिक होगा शस्य गहनता उतनी अधिक होगी। जबकि सिंचाई गहनता कृषि उत्पादन एवं फसल प्रतिरूप को निर्धारित करती है, इस प्रकार सिंचाई गहनता वास्तविक बोये गये क्षेत्र में विशुद्ध सिंचित क्षेत्र के

1. **Chandra Kanta Sharma, Principal Author, Research Scholar, Department of Geography, Banasthali Vidyapith, Rajasthan -304022, India.**
2. **Dr. Vipin Kumar, Research Supervisor and Associate Professor, Department of Geography,Indira Gandhi University, Meerpur-Rewari, Haryana.**

अनुपात को दर्शाती है।

### अध्ययन क्षेत्र

**अर्द्धशुष्क पूर्वी मैदानी क्षेत्र**– प्रस्तुत शोध पत्र में अर्द्धशुष्क पूर्वी मैदानी क्षेत्र को अध्ययन क्षेत्र के रूप में लिया गया हैं। यह क्षेत्र राजस्थान के पूर्व में स्थित है जो कि अरावली पर्वत श्रृंखला के पूर्व में लगभग 2.96 मिलियन हेक्टेयर क्षेत्रफल में फैला हुआ हैं। इसका अक्षांशीय विस्तार 25°33′ से 27°51′ उत्तरी अक्षांश तथा देशांतरीय विस्तार 73°54′ से 76°90′ पूर्वी देशांतर तक है। प्रशासनिक दृष्टि से यह क्षेत्र चार जिलों अजमेर, दौसा, जयपुर एवं टोंक में फैला हुआ है। यह क्षेत्र बनास, बाणगंगा, साबी, मोरेल, खारी, आदि नदियों द्वारा सिंचित मैदान है क्योंकि यह सभी मौसमी नदियां है। जिसके कारण यह एक शुष्क मैदान है। अतः इस क्षेत्र में दोमट, कच्छारी व काली मिट्टियां पायी जाती हैं। यहां उष्ण व शुष्क ग्रीष्म ऋतु तथा ठण्डी शीत ऋतु पायी जाती है, ग्रीष्म ऋतु मार्च से जून माह तक, शीत ऋतु नवम्बर से फरवरी माह तक और वर्षा ऋतु जुलाई से अक्टूबर माह तक रहती है। इस क्षेत्र का अधिकतम तापमान 40.6°C व न्यूनतम तापमान 8.3°C है, तथा औसत वार्षिक वर्षा 500–700 मिमी. प्राप्त करता है। यहां कुल वार्षिक वर्षा का लगभग 93 प्रतिशत भाग जून से सितम्बर माह तक दक्षिण–पश्चिम मानसून पवनों से प्राप्त होता है। यहां पर साधारणतयाः जनवरी व फरवरी के शीत मौसम में भी वर्षा होती है। इस कारण यहां उष्ण कटिबन्धीय वनस्पति पायी जाती है तथा साल, सागौन, बबूल, खेजडा, शीशम, पीपल, नीम, पलाश, गूलर, अडूसा, हिंगोट, शिरीष, खिरनी, करंज, बेर, आदि प्रमुख वृक्ष मिलते हैं।

2011 की जनगणना के अनुसार इस क्षेत्र की जनसंख्या 1,22,64,965 है, जिसमें 59 प्रतिशत जनसंख्या ग्रामीण क्षेत्रों में तथा 41 प्रतिशत नगरीय क्षेत्रों में निवास करती है। इसका औसत जनसंख्या घनत्व 408 व्यक्ति प्रति वर्ग किमी. हैं। इस मैदानी क्षेत्र की व्यवसायिक संरचना में कुल जनसंख्या का 36.27 प्रतिशत किसान, 9.61 प्रतिशत कृषि मजदूर, 3.29 प्रतिशत घरेलू उद्योग में श्रमिक एवं 50. 81 प्रतिशत जनसंख्या अन्य कार्यकर्ता है।

### अध्ययन का उद्देश्य

प्रस्तुत शोध पत्र का मुख्य उद्देश्य राजस्थान के अर्द्धशुष्क पूर्वी मैदानी क्षेत्र की शस्य गहनता एवं सिंचाई गहनता का अध्ययन करना तथा 2000–01 से 2018–19 तक शस्य गहनता एवं सिंचाई गहनता के मध्य सम्बन्धों का विश्लेषण करना हैं।

### आंकडा स्त्रोत एवं शोध विधितंत्र

शोध कार्य द्वितीयक आंकडों पर आधारित हैं जो निम्न विभागों से एकत्रित किये गये हैं –

- जिला सांख्यिकीय रूपरेखा, अजमेर, दौसा, जयपुर व टोंक 2000, 2005, 2010, 2015, 2020 (आर्थिक एवं सांख्यिकी निदेशालय, राजस्थान, जयपुर)
- जिला जनगणना पुस्तिका, अजमेर, दौसा, जयपुर व टोंक 1991, 2001, 2011 (भारतीय जनगणना विभाग)

आंकड़ों को आवश्यकतानुसार सारणीयों, आरेखों व मानचित्रों की सहायता से समझाया गया हैं।

### शस्य गहनता

शस्य गहनता कृषि भूमि के किसी विशेष भाग में एक से अधिक बार फसल उगाकर अधिकतम उत्पादन प्राप्त करने के प्रयासों को दर्शाता हैं। इस प्रकार शस्य गहनता उन क्षेत्रों में अधिक होगी जहां सकल बोये गये क्षेत्र का प्रतिशत अधिक होता हैं। शस्य गहनता का अध्ययन आर. आर. त्रिपाठी (1970) के निम्नलिखित सूत्र के अनुसार किया जाएगा –

$$I = \frac{G}{N} \times 100$$

I = शस्य गहनता का सूचकांक (Cropping Intensity)

G = सकल बोया गया क्षेत्र (Gross Area Sown)

N = शुद्ध बोया गया क्षेत्र (Net Sown Area)

उपर्युक्त सूत्र का प्रयोग करके अध्ययन क्षेत्र की वर्ष 2000–01 से 2018–19 तक की शस्य गहनता ज्ञात की गयी हैं। जिसके अनुसार शस्य गहनता वर्ष 2000–01 में 130

प्रतिशत थी, जो 2010–11 में 165 प्रतिशत एवं 2018–19 में 153 प्रतिशत हो गयी हैं। लगभग इन 20 वर्षों में सबसे कम शस्य गहनता वर्ष 2002–03 में 124 प्रतिशत थी, जबकि सर्वाधिक शस्य गहनता वर्ष 2010–11 में 165 प्रतिशत थी।

**सारणी 01 : राजस्थान के अर्द्धशुष्क पूर्वी मैदानी क्षेत्र में शस्य गहनता (वर्ष 2000–01 से 2018–19 तक) (प्रतिशत में)।**

| क्र. संख्या | वर्ष | वास्तविक बोया हुआ क्षेत्र (दुपज घटाकर) (हैक्टर में) | समस्त बोया हुआ क्षेत्र (हैक्टर में) | शस्य गहनता |
|---|---|---|---|---|
| 1 | 2000–01 | 15,90,855 | 20,74,159 | 130 |
| 2 | 2001–02 | 15,45,137 | 19,97,400 | 129 |
| 3 | 2002–03 | 15,30,184 | 1,894,485 | 124 |
| 4 | 2003–04 | 17,55,969 | 2,334,170 | 133 |
| 5 | 2004–05 | 17,41,213 | 2,318,183 | 133 |
| 6 | 2005–06 | 17,37,786 | 2,419,888 | 139 |
| 7 | 2006–07 | 16,65,661 | 2,143,189 | 129 |
| 8 | 2007–08 | 17,30,740 | 2,236,566 | 129 |
| 9 | 2008–09 | 17,58,043 | 2,390,414 | 136 |
| 10 | 2009–10 | 17,57,922 | 2,323,536 | 132 |
| 11 | 2010–11 | 18,55,199 | 3,054,407 | 165 |
| 12 | 2011–12 | 18,34,497 | 2,806,255 | 153 |
| 13 | 2012–13 | 18,17,328 | 2,692,985 | 148 |
| 14 | 2013–14 | 18,33,238 | 2,912,678 | 159 |
| 15 | 2014–15 | 18,08,056 | 2,694,642 | 149 |
| 16 | 2015–16 | 17,58,340 | 2,442,404 | 139 |
| 17 | 2016–17 | 18,18,327 | 2,834,908 | 156 |
| 18 | 2017–18 | 17,53,688 | 2,503,374 | 143 |
| 19 | 2018–19 | 17,86,154 | 2,735,809 | 153 |

Source: District Outline (Ajmer, Dausa, Jaipur & Tonk),

Fig. 02 में वर्ष 2000–01 से 2018–19 तक अध्ययन क्षेत्र की शस्य गहनता (प्रतिशत में) को चार्ट में दर्शाया गया हैं। इसके आधार पर विगत् 20 वर्षों में काफी परिवर्तन हुआ हैं। सर्वाधिक परिवर्तन वर्ष 2010–11 में देखा गया हैं।

## सिंचाई गहनता

किसी क्षेत्र विशेष में जहां वर्षा पर्याप्त मात्रा में होती हैं वहां सिंचाई के लिए जल सरलता से उपलब्ध हो जाता है। लेकिन अध्ययन क्षेत्र में मानसून की अनिश्चत, अनियमित, अल्पकालिकता, सूखा एवं जलवायु परिवर्तन के

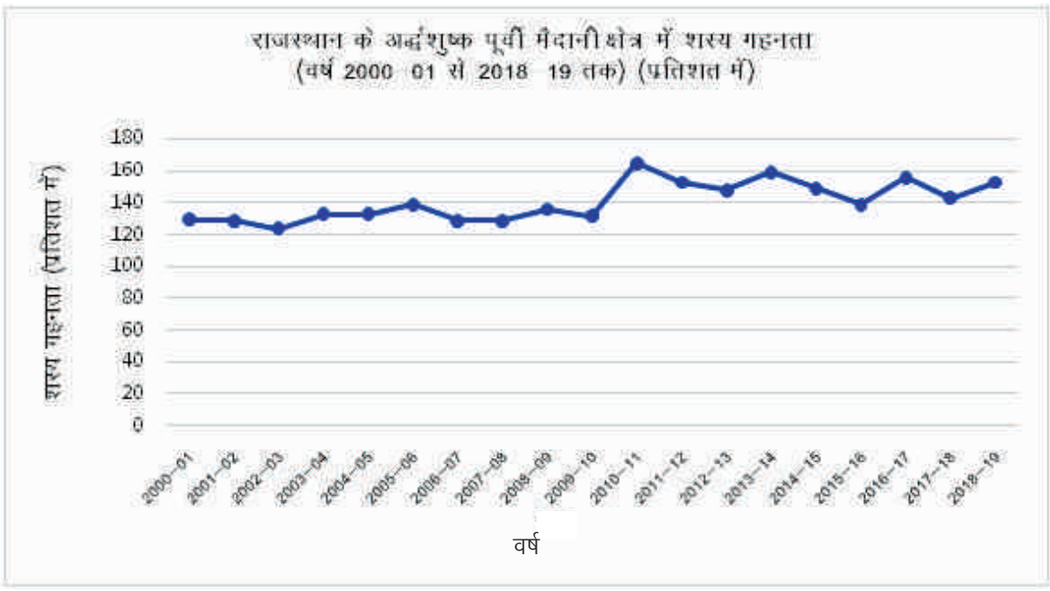


Fig. 01

कारण सिंचाई सुविधाओं का पूर्ण विकास नहीं हुआ हैं। अध्ययन क्षेत्र में सिंचाई के लिए भूमिगत जल का प्रयोग प्रमुखता से किया जाता हैं, क्योंकि यहां सतही जल का अभाव पाया जाता है।

सिंचाई गहनता –

$$II = \frac{NIA}{NSA} \times 100$$

II = सिंचाई गहनता (Irrigation Intensity)

NIA = शुद्ध सिंचित क्षेत्र (Net Irrigated Area)

NSA = शुद्ध बोया गया क्षेत्र (Net Sown Area)

उपर्युक्त सूत्र के माध्यम से अध्ययन क्षेत्र की सिंचाई गहनता ज्ञात की गयी हैं। सारणी–02 में वर्ष 2000–01 से 2018–19 तक सिंचाई गहनता को दर्शाया गया हैं। जिसके अनुसार अध्ययन क्षेत्र की सिंचाई गहनता वर्ष 2000–01 में 46 प्रतिशत थी, जो 2010–11 में 42 प्रतिशत एवं 2018–19 में 51 प्रतिशत हो गयी हैं। लगभग इन 20 वर्षों में सबसे कम सिंचाई गहनता वर्ष 2009–10 में 34 प्रतिशत थी, जबकि सर्वाधिक सिंचाई गहनता वर्ष 2014–15 व 2016–17 में 54 प्रतिशत थी।

**शस्य गहनता व सिंचाई गहनता के मध्य सम्बन्ध–**

आंकड़ों के विश्लेषण से यह ज्ञात होता हैं कि सिंचाई गहनता एवं शस्य गहनता में सह–सम्बन्ध पाया जाता हैं कुछ अपवाद वर्षों के अतिरिक्त अधिकांश वर्षों में सिंचाई गहनता में वृद्धि के साथ ही शस्य गहनता में भी वृद्धि देखी गयी हैं जैसे– वर्ष 2000–01, 2003–04, 2004–05, 2005–06, 2010–11, 2013–14, 2016–17 व 2018–19 में तथा कुछ वर्षों में सिंचाई गहनता में कमी के साथ शस्य गहनता में भी कमी देखी गयी हैं, जैसे–वर्ष 2001–02, 2002–03, 2006–07, 2007–08, 2009–10, 2015–16 व 2017–18 में। लेकिन वर्ष 2011–12, 2012–13 व 2014–15 में सिंचाई के अतिरिक्त अन्य स्थानिक कारकों के प्रतिकूल होने से सिंचाई गहनता में वृद्धि के बावजूद शस्य गहनता में कमी आयी थी, और इसके विपरीत वर्ष 2008–09 में सिंचाई के अतिरिक्त अन्य स्थानिक कारकों के

**सारणी 02 : राजस्थान के अर्द्धशुष्क पूर्वी मैदानी क्षेत्र में सिंचाई गहनता (वर्ष 2000–01 से 2018–19 तक) (प्रतिशत में)**

| क्र. संख्या | वर्ष | वास्तविक बोया हुआ क्षेत्र (दुपज घटाकर) (हैक्टर में) | कुल विशुद्ध सिंचित क्षेत्रफल (हैक्टर में) | सिंचाई गहनता |
|---|---|---|---|---|
| 1 | 2000–01 | 15,90,855 | 7,27,251 | 46 |
| 2 | 2001–02 | 15,45,137 | 6,82,590 | 44 |
| 3 | 2002–03 | 15,30,184 | 5,32,435 | 35 |
| 4 | 2003–04 | 17,55,969 | 6,72,551 | 38 |
| 5 | 2004–05 | 17,41,213 | 7,92,839 | 46 |
| 6 | 2005–06 | 17,37,786 | 7,97,301 | 46 |
| 7 | 2006–07 | 1,665,661 | 7,24,081 | 43 |
| 8 | 2007–08 | 1,730,740 | 7,28,871 | 42 |
| 9 | 2008–09 | 1,758,043 | 6,87,469 | 39 |
| 10 | 2009–10 | 1,757,922 | 6,01,610 | 34 |
| 11 | 2010–11 | 1,855,199 | 7,72,330 | 42 |
| 12 | 2011–12 | 1,834,497 | 8,56,657 | 47 |
| 13 | 2012–13 | 1,817,328 | 9,34,760 | 51 |
| 14 | 2013–14 | 1,833,238 | 9,38,004 | 51 |
| 15 | 2014–15 | 1,808,056 | 9,75,484 | 54 |
| 16 | 2015–16 | 1,758,340 | 9,12,804 | 52 |
| 17 | 2016–17 | 1,818,327 | 9,81,123 | 54 |
| 18 | 2017–18 | 1,753,688 | 8,35,965 | 48 |
| 19 | 2018–19 | 1,786,154 | 9,05,167 | 51 |

Source: District Outline (Ajmer, Dausa, Jaipur & Tonk),

अनुकूल होने से सिंचाई गहनता में कमी के बावजूद भी शस्य गहनता में वृद्धि हुई थी। इसका प्रमुख कारण नियमित वर्षा, उपजाऊ मृदा, मृदा में पर्याप्त नमी, उत्तम बीज, रासायनिक उर्वरक, विकसित कृषि यंत्र व औजार, आदि, के कारण अल्प सिंचाई सुविधा में भी दो या उससे अधिक बार फसलें उगायी जा सकती हैं अर्थात् अपवाद स्वरूप कभी – कभी सिंचाई गहनता में वृद्धि होने पर भी शस्य गहनता में कमी हो जाती हैं तो कभी इसके विपरीत सिंचाई गहनता में कमी होने पर भी शस्य गहनता में वृद्धि हो जाती हैं। लेकिन जिन कृषि प्रदेशों में सिंचाई सुविधाओं का विकास अधिक हुआ हैं वहां, तुलनात्मक रूप से जहां पर सिंचाई सुविधाओं की कमी हैं, फसलों की उत्पादकता एवं उत्पादन दोनों में

वृद्धि हुई हैं।

विगत् 20 वर्षों में कुल मिलाकर देखे तो सिंचाई गहनता एवं शस्य गहनता दोनों में वृद्धि हुयी है। अधिकांशतः सिंचाई गहनता में वृद्धि तो शस्य गहनता में भी वृद्धि एवं सिंचाई गहनता में कमी तो शस्य गहनता में भी कमी देखी गयी हैं।

सारणी 03 : राजस्थान के अर्द्धशुष्क पूर्वी मैदानी क्षेत्र में शस्य गहनता एवं सिंचाई गहनता (वर्ष 2000–01 से 2018–19 तक) (प्रतिशत में)

| क्र. संख्या | वर्ष | शस्य गहनता | सिंचाई गहनता |
|---|---|---|---|
| 1 | 2000–01 | 130 | 46 |
| 2 | 2001–02 | 129 | 44 |
| 3 | 2002–03 | 124 | 35 |
| 4 | 2003–04 | 133 | 38 |
| 5 | 2004–05 | 133 | 46 |
| 6 | 2005–06 | 139 | 46 |
| 7 | 2006–07 | 129 | 43 |
| 8 | 2007–08 | 129 | 42 |
| 9 | 2008–09 | 136 | 39 |
| 10 | 2009–10 | 132 | 34 |
| 11 | 2010–11 | 165 | 42 |
| 12 | 2011–12 | 153 | 47 |
| 13 | 2012–13 | 148 | 51 |
| 14 | 2013–14 | 159 | 51 |
| 15 | 2014–15 | 149 | 54 |
| 16 | 2015–16 | 139 | 52 |
| 17 | 2016–17 | 156 | 54 |
| 18 | 2017–18 | 143 | 48 |
| 19 | 2018–19 | 153 | 51 |

Source: Computed by the Researcher.

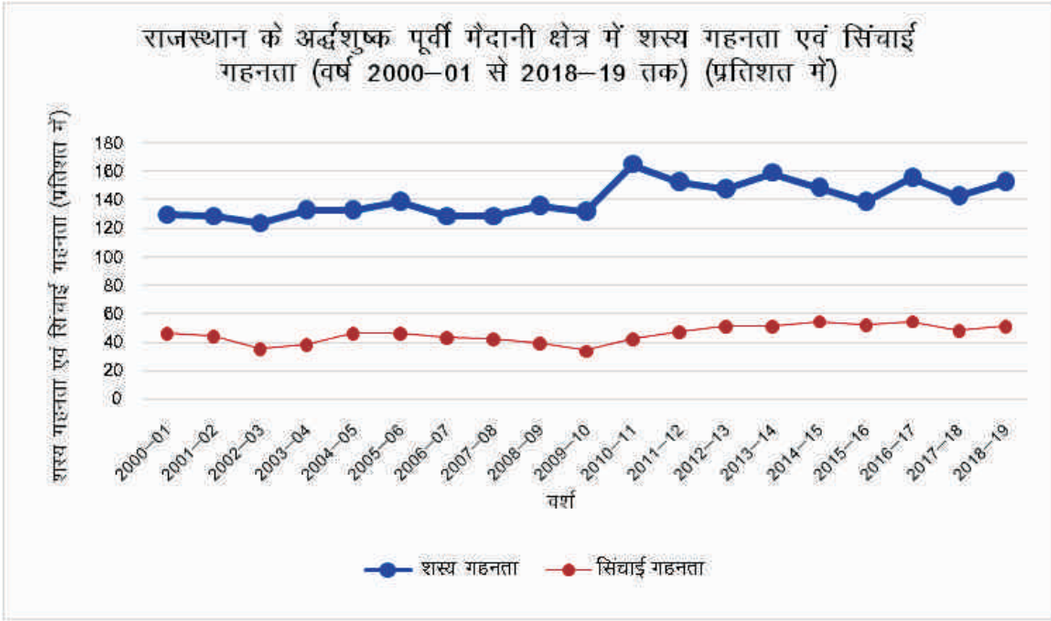


Fig. 02

## निष्कर्ष

सिंचाई सुविधाओं के अभाव में शुष्क क्षेत्रों में शस्य गहनता कम तथा पर्याप्त सिंचाई सुविधाओं वाले क्षेत्रों में शस्य गहनता भी अधिक पायी गयी है अर्थात् सिंचाई शस्य गहनता को नियंत्रित करने वाला एक महत्त्वपूर्ण कारक हैं। लेकिन जलवायु, आधुनिक तकनीक, पूंजी की उपलब्धता, आदि अन्य कारक भी शस्य गहनता को प्रभावित करने में महत्त्वपूर्ण भूमिका निभाते हैं। इस प्रकार कहा जा सकता हैं कि सिंचाई गहनता कृषि विकास के स्तर को मापने का प्रमुख मापक हैं। सिंचाई के अभाव में उत्पादन का स्तर निम्न हो जाता हैं तथा कृषि विकास अवरूद्ध हो जाता हैं। अतः कृषि की मूलभूत समस्याओं से निपटने के लिए सिंचाई बहुत महत्वपूर्ण हैं।

इस प्रकार अध्ययन क्षेत्र में सिंचाई सुविधाओं का विकास कृषि विकास के लिए अति आवश्यक हैं। सिंचाई की पर्याप्त सुविधा से क्षेत्र में कृषि उत्पादन व उत्पादकता दोनों में वृद्धि हो सकेगी। वर्तमान में शुष्क प्रदेशों में जहां सिंचाई सुविधाओं का अभाव हैं। वहां ऐसी फसलें उगायी जाने लगी है जो कम सिंचाई में भी उत्पादन दे सकती हैं तथा ऐसे बीजों का विकास किया जा रहा हैं जो अल्प समय व जल में भी अधिक उत्पादन देते हैं। इसी तरह वर्तमान में आधुनिक सिंचाई के साधनों के द्वारा भी कम पानी में अधिक कृषि क्षेत्र को सिंचित किया जा रहा हैं। जिससे पानी के अपव्यय से भी बचा जा सकता हैं और अधिक क्षेत्र को सिंचित कर उत्पादन बढ़ाया जा सकता है। ग्रामीण क्षेत्रों में जहां इन आधुनिक सुविधाओं का अभाव हैं उन क्षेत्रों में किसानों को जागरूक किया जाना चाहिए ताकि उचित सुविधाओं का उपयोग कर अधिक उत्पादन प्राप्त किया जा सके।

इस प्रकार शस्य गहनता में वृद्धि से उत्पादन व ग्रामीण क्षेत्र में रोजगार में भी वृद्धि होती हैं। अतः कृषि

विकास के साथ ग्रामीण क्षेत्र के विकास के लिए भी समुचित सिंचाई सुविधाओं का होना महत्त्वपूर्ण हैं। जिससे सिंचाई गहनता को बढ़ाकर शस्य गहनता में भी वृद्धि कर सकेंगें।

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# गोरखपुर महानगर (उ0प्र0) में कचरा बीनने वालों की सामाजिक–आर्थिक दशा तथा ठोस अपशिष्ट प्रबन्धन में उनकी भूमिका : सामाजिक भूगोल में एक अध्ययन

**धर्मेन्द्र प्रताप यादव**

## शोध सारांश

*विगत शताब्दी में जनसंख्या विस्फोट, तीव्र औद्योगिकरण, नगरीकरण तथा अन्य सामाजिक–आर्थिक क्रियाकलापों में बेतहाशा वृद्धि के कारण जहाँ पर्यावरण क्षरण और प्रदूषण की समस्या विराल हुई है, वही ठोस, तरल एवं गैसीय सभी प्रकार के अपशिष्टों का निस्तारण भी अत्यधिक हुआ है। जिसके कारण पर्यावरण अवनयन, जलवायु परिवर्तन, मानव एवं जीव जन्तुओं के स्वास्थ पर नकरात्मक प्रभाव पड़ा है। अपशिष्टों का निस्तारण और उनका प्रबंधन वैश्विक समस्या के रूप में उभरा है। वहीं दूसरी ओर अधिकांश छोटे बड़े नगरों में मलिन बस्तियों में बसे हुए कचरा बिनने वाले लोग (Rag-pickers) अपशिष्टों के ढेरों , सड़कों के किनारे तथा आवासीय बस्तियों से पुनर्चक्रणीय कूडों को इकठ्ठा कर उनकी बिक्री से हुई आय से अपना जीवन यापन कर रहे हैं। ऐसे लोगों की संख्या दिनानुदिन बढ़ती जा रही है। ये कचरा बीनने वाले लोग बस्तियों के मध्य या वाहर क्षेत्र के खुले भाग में मलिन बस्तियों के रूप में टाट एवं झोपड़ी के बने छोटे–छोटे आवासों में बड़ी दयनीय सामाजिक–आर्थिक स्थिति में जीवन यापन करते हैं। लेकिन नगर के ठोस अपशिष्ट के निष्पादन में अपनी महत्वपूर्ण भूमिका अदा कर रहे हैं। प्रस्तुत शोध लेख में गोरखपुर महानगर (उत्तर प्रदेश) में बसे ऐसे कचरा बीनने वालों की अवस्थिति तथा उनके सामाजिक–आर्थिक दशाओं का निरुपण करते हुए नगर के ठोस अपशिष्टों के निष्पादन में उनके योगदान का विश्लेषण करने का प्रयत्न किया गया है।*

## प्रस्तावना

20वीं शताब्दी में तीव्र औद्योगीकरण, नगरीकरण, वैज्ञानिक, तकनीकी और परिवहन प्रगति के साथ–साथ जीवन को सुखमय एवं बेहतर बनाने की अभिलाषा हेतु मानव द्वारा उत्पादन, विपणन, उपभोग और सुख सुविधाओं एवं सेवाओं में अभूतपूर्व अभिवृद्धि के कारण प्राकृतिक संसाधनों का अन्धाधुन्ध दोहन होने से जहाँ एक ओर पर्यावरण क्षरण तथा प्रदूषण की समस्या विकराल हुई, वहीं घटते संसाधन एवं बढ़ते अपशिष्टों ने मानव के सामने एक चिन्ता उत्पन्न कर दी है, अपशिष्टों के उत्सर्जन एवं उनके सुरक्षित निस्तारण न होने के कारण पर्यावरण अवनयन, प्रदूषण, जलवायु परिवर्तन, वैश्विक ताप वृद्धि, मानव एवं जीव–जन्तुओं के स्वास्थ्य की समस्या दिनानुदिन बढ़ती ही जा रही है।

अपशिष्ट का अर्थ कूड़ा–करकट, कचरा, निष्प्रयोज्य, निष्क्रिय, बेकार, मूल्यहीन, त्याज्य वस्तु, पदार्थ या तत्त्व से है। इसलिए अपशिष्ट' तत्व ऐसे पदार्थों को कहते हैं, जो मूलतः प्रयोग हो जाने के बाद उसका अवशेष भाग, बेकार या निरर्थक या किसी प्रयोग के लायक नहीं होता है। संयुक्त राष्ट्र संघ ने अपशिष्ट को पारिभाषित करते हुए स्पष्ट किया है कि ''अपशिष्ट ऐसे पदार्थ या वस्तुएं होती हैं, जिन्हें राष्ट्रीय कानून के प्रावधानों के अनुसार या तो निस्तारित कर दिया जाये या उनके निस्तारित करने की योजना हो या जिन्हें निस्तारित करने की अपेक्षा या आवश्यकता हो।'' ठोस अपशिष्ट, विविध साधनों, जैसे–घरों से प्रतिदिन निकलने वाले निष्प्रयोज्य पदार्थ; भोजन, सब्जी, मल–मूत्र, कूड़ा–कचरा, संस्थाओं, कार्यालयों, चिकित्सालयों, आदि से निकलने वाले कूड़ा–करकट तथा जैव पदार्थ, भवनों के निर्माण या ध्वस्तीकरण, खदानों,

**धर्मेन्द्र प्रताप यादव, सहायक आचार्य, भूगोल विभाग, डी0ए0वी0(पी0जी0) कालेज, आजमगढ़।**
**मो0.8808625008, ई–मेलः dpy5008@gmail.com**

उद्योगों, आदि से निकलने वाले पदाथों के प्रयोग के बाद बचे अवशेष पदार्थ, पुराने प्रयोगहीन वस्तुएं, इलेक्ट्रिकल सामग्री, घरों, उद्योगों, संस्थानों एवं परिवहन से निकलने वाले निष्प्रयोज्य वस्तुयें, पशु–पक्षियों के अवशेष तथा अस्पतालों, होटलों, दुकानों, स्कूलों एवं कालेजों व इसके अतिरिक्त विभिन्न स्रोतों से निकले कचरा को इसके अन्तर्गत शामिल किया जाता है।

भारत में अन्य विकासशील देशों की तरह ही यह समस्या अति विकट है, देश में अपशिष्टों के उत्सर्जन के विश्लेषण का प्रयास केन्द्रीय प्रदूषण एवं नियन्त्रण बोर्ड (CPCB), केन्द्रीय प्लास्टिक अभियान्त्रिकी, तकनीकी संस्थान, राष्ट्रीय पर्यावरण प्रौद्योगिकी शोध संस्थान एवं भारतीय वाणिज्य एवं उद्योग चैम्बर का संघ द्वारा संयुक्त रूप से किया गया है। इनका मानना है कि समूचे देश में 200 ग्राम से 600 ग्राम तक प्रति व्यक्ति/दिन केवल महानगरीय ठोस अपशिष्ट के रूप में उत्सर्जित होता है। इस प्रकार देश में 160 हजार मीट्रिक टन प्रति वर्ष उत्सर्जित होता है जिनका सुरक्षित निष्पादन आज देश के सम्मुख समस्या बनी हुई है।

ठोस अपशिष्टों के निस्तारण हेतु विविध विधियों का उपयोग होता है लेकिन कचरा, बीनने वालों (Rag-pickers) भी इसके निष्पादन में अहम भूमिका निभाते हैं। इनके द्वारा कूड़े के ढेरों से उपयोगी पदार्थों को एकत्र कर पुनर्चक्रण हेतु उन्हे बेचकर अपने आजीविका चलाने के साथ–साथ ठोस अपशिष्टों के प्रबन्धन में सहयोग करते है।

**कचरा बीनने वाले लोग (Rag-pickers)**

कचरा बीनने वाले लोगों (Rag-pickers) का तात्पर्य ऐसे लोगों से है जो पुनर्चक्रीय होने योग्य कूड़ें जैसे कागज, दफ्ती, प्लास्टिक, रबर, टायर–ट्यूब, खनिजों के टुकड़े, आदि को ठोस अपशिष्टों के ढेरों, नदियों, सड़कों के किनारे तथा आवासीय बस्तियों आदि से इकट्ठा कर के उनकी छटाई करने के बाद उसे बेचकर अपनी जीविका चलाते है। ऐसे कूड़ा इकट्ठा करने वाले लोगों की संख्या नगरीय बस्तियों में बड़ी तेजी से बढ़ रही है, ये लोग नगरों के मध्य तथा बाहरी क्षेत्रों में झुण्ड के रूप में टाट–पट्टियों या झुग्गी–झोपड़ियों युक्त सुविधा विपन्न गंदी बस्तियों में रहकर अपने इस क्रिया–कलाप को सम्पादित करते है। ऐसे लोगों की आयु 5 से 60 वर्ष के बीच होती है, जो कम पढ़े–लिखे या निरक्षर होने के साथ–साथ निम्न समाजिक–आर्थिक स्थिति वाले परिवार के लोग होते है जो अपने परिवार के अधिकांश लोगों (बच्चों, स्त्रियों तथा प्रौढ़ों) के साथ इस व्यवसाय में लगे होते है।

कचरा बीनने वालों का समूह नगरों में उत्सर्जित ठोस अपशिष्टों के एकत्रीकरण, छटनी, तथा पुनर्चक्रीय करके उसे बेचकर जहॉ एक ओर अपना जीवन–यापन करते है, वही अपशिष्टों के प्रबन्धन में भी वे अपनी महत्वपूर्ण भूमिका निभाते है। ऐसे लोग शारीरिक, मानसिक, पर्यावरणीय एवं स्वास्थ्य सम्बन्धी सभी खतरों के बावजूद कूड़ेदानों, कूड़े के ढेरों, अस्पतालों के कचरों, आदि में से उपयोगी कचरों को बीनते हुए अपने व्यवसाय में सतत् लीन रहते है। ऐसे खतरों से खेलने में बच्चों की भूमिका, युवाओं की अपेक्षा अधिक रहती है। कचरा बीनने वाले ऐसे लोगों की संख्या एशिया के देशों के नगरों में अपेक्षाकृत अधिक है, जो सतत् बढ़ता ही जा रहा है। इनकी बस्तियॉं अधिकांश बडे नगरीय केन्द्रों में या उनके उपनगरीय क्षेत्रों में स्थापित हो गयी है जो आवश्यक नागरिक सुविधाओं से विहीन अतिगंदी बस्तियॉ होती है जिनमें अतिनिम्न आय वर्ग के ये कचरा बीनने वाले अपने परिवार के साथ अति नारकीय जीवन व्यतीत करने के लिए बाध्य होते हैं। इसलिए वे न केवल सामाजिक उपेक्षा के शिकार होते है बल्कि शारीरिक एवं मानसिक यातनाओं और शोषण के भी शिकार होते हैं। ऐसी स्थिति में ऐसे लोगों की जनांककीय, सामाजिक–आर्थिक एवं सांस्कृतिक स्थिति का गहन अध्ययन कर उनके जीवन–स्तर में सुधार हेतु आवश्यक उपाय करना सामाजिक न्याय हेतु आवश्यक ही नहीं बल्कि अपरिहार्य है। यही इस अध्ययन का उत्प्रेरणा स्रोत है तथा वर्तमान अध्ययन का औचित्य और अभीष्ट भी है।

वर्तमान समय में कचरा बीनने वालों का महानगरीय ठोस कचरा प्रबन्धन में योगदान को देखते हुए उनकी जनांककीय विशेषताओं, सामाजिक–आर्थिक एवं सांस्कृतिक दशा, कचरा बीनने और उसके प्रबन्धन में उनकी भूमिका तथा उनकी समस्याऍं, आदि अब अध्ययन का एक प्रमुख विषय वस्तु बन गया है। यद्यपि कचरा बीनने

वाले (Rag-pickers) शब्द का प्रयोग 19वीं शताब्दी से ही प्रारम्भ हो गया था क्योंकि उस समय भी निम्न आय वर्ग के लोग गलियों एवं सड़कों पर कूड़ों को बीनना या इकट्ठा करना, भीख मांगने की अपेक्षा अच्छा और ईमानदार व्यवसाय मानकर इस व्यवसाय में लगे रहते थे। लेकिन 20वीं शताब्दी के उत्तरार्ध में विकासशील राष्ट्रों के नगरों में इनकी बढ़ती जनसंख्या के कारण इन पर विशेष अध्ययन प्रारम्भ हुए। एर्स्टीन ने सम्भवतः पहली बार जर्मनी के कचरा बीनने वाले (Rag-pickers) का विस्तृत सर्वेक्षण कर एक विस्तृत लेख 1997 में प्रकाशित किया। इसके बाद कचरा बीनने वालों की सामाजिक–आर्थिक स्थिति, उनके निवास क्षेत्र की पर्यावरणीय दशा तथा ठोस अपशिष्टों के प्रबन्धन पर उनकी भूमिका पर साहित्यों की एक बाढ़ सी आ गयी।

प्रस्तुत अध्ययन में गोरखपुर नगर में कचरा बीनने वालों की बड़ी संख्या और कूड़ा निस्तारण में महत्वपूर्ण भूमिका होने के बावजूद उनकी विपन्न स्थिति को देखते हुए इनकी सामाजिक–आर्थिक स्थिति के अध्ययन ने मुझे प्रेरित किया है।

## नगर का सामान्य परिचय

गोरखपुर नगर अपने नाम के मण्डल, जनपद एवं तहसील का मुख्यालय है, जो जनसंख्या (6,72,446, 2011 परन्तु अब इसकी जनसंख्या बढ़कर 13 लाख होने का अनुमान है।) की दृष्टि से पूर्वी उत्तर प्रदेश का वाराणसी नगर (36,76,841) के पश्चात् सबसे बड़ा नगर है। यह नगर पूर्वी उत्तर प्रदेश का वाणिज्यिक एवं व्यापारिक केन्द्र होने के साथ–साथ सामाजिक–सांस्कृतिक एवं राजनैतिक केन्द्र भी है, तथा देश के उत्तर में स्थित नेपाल राष्ट्र के लिए एक प्रवेश द्वार है। समीप स्थित बिहार प्रान्त एवं सुदूर ग्रामीण क्षेत्रों से शिक्षा, चिकित्सा एवं रोजगार के लिए स्थायी एवं अस्थायी आव्रजकों की अधिक संख्या होने के कारण यह नगर बड़ी तीव्र गति से प्रत्येक दिशाओं में फैल रहा है। भौगोलिक दृष्टि से गोरखपुर नगर 26°41′ से 26°50′ उत्तरी अक्षांश एवं 83°20′ से 83°27′ पूर्वी देशान्तर के बीच, मध्य गंगा घाटी के सरयूपार मैदान के पूर्वी भाग में राप्ती एवं रोहिन नदियों के संगम पर, इन नदियों के बायें किनारे पर अवस्थित है। महानगर का विस्तार वर्तमान समय में 147.00 वर्ग किमी. क्षेत्रफल पर है।

## शोध का औचित्य

वर्ष 2019 के एक विस्तृत अध्ययन हेतु प्राथमिक आकड़ों के एकत्रण एवं सर्वेक्षण करने के दौरान महानगर के अन्दर तथा इसके बाहर विभिन्न क्षेत्रों में बसे कचरा बीनने वालों की बस्तियों और ठोस अपशिष्ट के निष्पादन में उनकी अहम भूमिका का आभास हुआ, उक्त अध्ययन के उपरान्त् शोधार्थी ने महानगर का एक विहंगम सर्वेक्षण कर नगर के अन्तर्गत पाये जाने वाले कचरा बीनने वालों की बस्तियों के अवस्थिति की गणना कर पाया कि महानगर में छोटी–बड़ी इनकी कुल 27 बस्तियां है, जो मानचित्र संख्या–01 में प्रदर्शित है। इनकी कुल जनसंख्या लगभग 22 हजार है तथा कुल परिवारों की संख्या लगभग 3.5 हजार है, जिसमें से 5 साल से अधिक उम्र के बच्चों सहित सम्पूर्ण वयस्क (स्त्री एवं पुरूष) लगभग 15 हजार लोग इस काम में लगे हुए हैं, और ज्ञात करने पर पता चला कि प्रति परिवार (5.6 व्यक्तियों) लगभग 35 से 40 किग्रा0 कूड़ा/दिन इकट्ठा करते है। इस प्रकार सम्पूर्ण महानगर में प्रति परिवार प्रतिदिन 35 से 40 किलोग्राम कूड़ा बीनकर लगभग कुल 120 टन अपशिष्ट निस्तारण करते है जो पूरे महानगर में प्रतिदिन उत्सर्जित कूड़े (लगभग 601 मी0 टन) का 15 से 20 प्रतिशत होता है। अतः अपशिष्ट प्रबन्धन में इनकी अहम भूमिका होती है। इसी तथ्य के संदर्भ में यह निश्चित किया कि इन कचरा बीनने वाले लोगों की संख्या तथा उनकी सामजिक–आर्थिक स्थिति, जीवन दशा, पारिवारिक स्थिति, उनके द्वारा एकत्रित कूड़ों की मात्रा एवं प्रकार, आय, स्वास्थ्य तथा अन्य समस्याओं का गहन अध्ययन सामाजिक न्याय के लिए आवश्यक ही नहीं अपरिहार्य है। साथ ही यह भी आवश्यक है कि महानगरीय क्षेत्र में उत्सर्जित ठोस अपशिष्टों के निष्पादन एवं प्रबन्धन में उनके योगदान का मूल्यांकन एवं विश्लेषण भी किया जाये। यही इस अध्ययन का अभीष्ट है।

## परिकल्पनायें

प्रस्तुत अध्ययन में निम्नलिखित परिकल्पनाओं

की परख की जायेगी।

1. आय के साधनों का अभाव तथा निम्न बौद्धिक एवं शारीरिक क्षमता कचरा बीनने को, जीवनयापन (Livelihood) का साधन अपनाने के लिए बाध्य करती है।

2. कचरा का बीनना, अन्य जीविकोपार्जन के साधनों की अपेक्षा कम श्रम साध्य होने के कारण बच्चों एवं अधिक उम्र के प्रौढ़ों या वृद्धों द्वारा अपनाने में सुविधा होती है।

3. शैक्षिक, सामाजिक–आर्थिक और राजनैतिक स्थिति दयनीय होने के कारण यह समाज विभिन्न प्रकार की पारम्परिक रूढ़ियों, मान्यताओं और बुराईयों तथा सामाजिक और सांस्कृतिक समस्याओं से ग्रसित होता है।

4. कचरा बीनने वाले समुदाय में शैक्षिक स्तर कम होने के कारण संगठनात्मक अभिरुचि की कमी होती है, जिससे अपनी स्थिति में सुधार के लिए ये आवाज कम उठा पाते हैं। परिणामतः स्थानीय या प्रान्तीय सरकारें इनकी समस्याओं के समाधान के लिए कोई ठोस पहल नहीं करती है।

## उद्देश्य

प्रस्तुत अध्ययन का मुख्य उद्देश्य अपशिष्ट प्रबन्धन में कचरा बीनने वालों की महत्ता को उजागर करने के साथ–साथ उनकी स्थिति का निरूपण करना है। प्रस्तुत अध्ययन के उद्देश्य निम्नलिखित हैं–

1. महानगर में कचरा बीनने वालों की बस्तियों की भौगोलिक स्थिति तथा उनके बसाव के लिए उत्तरदायी भौतिक एवं सांस्कृतिक कारकों का विवेचन करना।

2. कचरा बीनने वाले समुदाय की जनसंख्या, जनांकिकीय विशेषताएं, सामाजिक–आर्थिक, एवं उनकी बस्तियों में उपलब्ध नागरिक सुधिाओं की स्थिति, स्वच्छता, पर्यावरणीय तथा स्वास्थ्य दशा, उससे सम्बन्धित समस्याओं का निरूपण करना।

3. कचरा बीनने वाले आर्थिक रूप से विपन्न (Economic Vulnerable) और सामाजिक रूप से नाजुक इस समुदाय के नाजुकता के प्रकार एवं स्तर का निरूपण करना।

4. कचरा बीनने वालों का बसावट (Settlement) तथा सामाजिक–आर्थिक, सांस्कृतिक एवं राजनैतिक समस्याओं के समाधान के लिए व्यावहारिक उपायों का सुझाव प्रस्तुत करना।

## शोध विधितंत्र

कचरा बीनने वाले लोगों की संख्या, लिंग, आयु, कार्यशीलता, धर्म एवं सामाजिक–आर्थिक स्थिति तथा उनके आवासीय क्षेत्रों की स्थिति, आदि के बारे में नगर निगम के द्वारा किसी भी प्रकार के आंकड़ों का संकलन न होने के कारण, इनके समस्त पक्षों से सम्बन्धित अध्ययन हेतु प्राथमिक आंकड़ों का संकलन ही एक मात्र साधन है। इसलिए प्राथमिक आंकड़ों के एकत्रीकरण एवं उनका विश्लेषण निम्नलिखित चरणों में पूर्ण किया गया है–

1. सम्पूर्ण महानगर का एक विहंगम सर्वेक्षण कर पूरे महानगर और उसके चतुर्दिक स्थिति भागों में कचरा बीनने वाले लोगों की बस्तियों की भौगोलिक अवस्थिति की जानकारी प्राप्त कर GPS से उनकी अवस्थिति को अभिलेखित कर महानगर के मानचित्र में उनकी स्थिति को प्रदर्शित किया गया। साथ ही उस क्षेत्र में उनकी बस्तियों के विकास के भौतिक एवं सांस्कृतिक कारकों, बस्तियों का क्षेत्रफल, परिवारों की संख्या, कुल जनसंख्या तथा उसकी सामाजिक–आर्थिक संरचना, आदि से सम्बन्धित आकड़ों को प्रथमतः एकत्रित किया गया।

2. पूरे नगर में बिखरी इनकी बस्तियों में से 15 वृहद बस्तियों का चयन, उनके भौगालिक स्थिति के आधार पर शहर के प्रत्येक भाग से निर्णयात्मक प्रतिचयन विधि से करके प्रत्येक बस्ती में एक साझा अध्ययन चर्चा का आयोजन कर सहगामी शोध विधि का उपयोग करके समुदाय से उनकी कुल संख्या, कुल परिवारों की संख्या, उनकी जनांकिकीय विशेषता, बसाव का कारण, उनकी पारिवारिक पृष्ठभूमि, जीवन शैली, उनकी सामान्य दिनचर्या, उनके द्वारा एकत्रित

कूड़ों का प्रकार एवं मात्रा, उससे होने वाली आय तथा वर्तमान सामाजिक और आर्थिक स्थिति से सम्बन्धित जानकारी जुटाने का प्रयास किया गया। इस क्रम में सहगामी शोध विधि का उपयोग करते हुए उनकी वर्तमान पारिवारिक, सामाजिक, आर्थिक समस्याओं, उनके निदानों के उपाय, स्थानीय जनप्रतिनिधियों तथा स्थानीय सरकार की भूमिका, आदि से सम्बन्धित सूचनायें/आंकड़ों को भी एकत्रीकरण करने का प्रयास किया गया है।

3. अन्तिम एवं तीसरे चरण में इनकी 15 बस्तियों की 150 परिवारों के मुखियों से सघन साक्षात्कार द्वारा उपरोक्त तथ्यों के बारे में गहन जानकारी प्राप्त किया गया है। साक्षात्कार हेतु परिवारों का चयन सामानुपातिक यादृच्छिक विधि द्वारा किया गया है। परिवारों का साक्षात्कार हेतु एक विस्तृत प्रश्नावली का निर्माण कर उसे उनके उत्तरों के आधार पर पूर्ति कर सूचनाओं को एकत्रित किया गया है।

अन्त में, इनकी समस्यायों, उनके समाधान के उपायों, उनका क्रियान्वयन और सरकार की नीतियों की जानकारी के लिए जिला प्रशासन, नगर निगम के अधिकारियों तथा अन्य हितकारकों का भी साक्षात्कार किया गया। साझा अध्ययन चर्चा, व्यक्तिगत चर्चा और साक्षात्कार के समय सम्बन्धित के उत्तरों को ध्वनि अभिलेखन यन्त्र द्वारा अभिलेखित कर उनका विस्तृत स्वरूप लिखने का प्रयास किया गया है। इन तीनों ही प्रकार से प्राप्त सूचनाओं/आकड़ों को संगणक (Computer) में अभिलेखित कर SPSS साफ्टवेयर के माध्यम से वर्गीकरण एवं सारणीयन करने के उपरान्त भौगोलिक सूचना तंत्र (GIS) का उपयोग कर Manifold Software/Arc view GIS Software के उपयोग माध्यम से आरेखों एवं मानचित्रों का निर्माण कर उनका विश्लेषण एवं उनके आधार पर निष्कर्षण की प्रक्रिया पूर्ण की गयी।

## कचरा बीनने वालों की बस्तियों का वितरण

महानगर में ये कचरा बीनने वाले पूरे शहर में बिखरे रुप में बसे हुए है। इनके बसाव को मानचित्र संख्या–01 में प्रदर्शित है। ये लोग शहर के उन क्षेत्रों में ज्यादा बसते है जहाँ गन्दगी, नीची/खाली भूमि तथा घनी आबादी हो। महानगर में ये ट्रांसपोर्ट नगर में राजघाट के नदी तटीय क्षेत्र, नवीन सब्जी मण्डी के आस–पास के भाग, रुस्तमपुर के अन्दर के भागों, जैसे–भरवलिया, फुलवरिया, चिलमापुर, आदि क्षेत्रों तथा तारामण्डल क्षेत्र के हनुमान मन्दिर के सामने के भागों में बसे हुए है। अन्य भागों में इनकी बस्ती पुर्दिलपुर वार्ड के सुमेर सागर के पास, धर्मशाला का धोबीघाट क्षेत्र, हूमायूँपुर, रसूलपुर, राजेन्द्र नगर में 10 नम्बर बोरिंग, जंगल शालीग्राम, पादरी बाजार, मेडिकल कालेज के पास झुंगिया बाजार, इन्जीनियरिंग कालेज, नन्दानगर, महादेव झारखण्डी, कूड़ाघाट तथा इलाहीबाग का घासी कटरा, आदि क्षेत्रों के अलावा महानगर के अधिकतर क्षेत्रों में इनका बसाव देखने को मिलता है (चित्र सं0–01)।

## कचरा बीनने वालों की सामाजिक–आर्थिक दशा

पूरे महानगर में इनकी जनसंख्या लगभग 22 हजार है, गोरखपुर महानगर में ठोस अपशिष्टों के निस्तारण में गलियों एवं सड़कों पर कचरा बीनने वाले महिलाओं, पुरुषों तथा बच्चों का भी महत्वपूर्ण योगदान है। लेकिन हमारा समाज इन्हें बहुत अच्छी निगाहों से नहीं देखता है तथा वे इन्हें एक समस्या मानते हैं। समाज मानता है कि कचरा चुनने वाले लोग गन्दगी फैलाते है। फिर भी महानगर के ठोस अपशिष्टों के प्रबन्धन में इनका बहुत बड़ा योगदान है। महानगर में इन कचरा चुनने वालों के बसाव की प्रक्रिया बड़ी अजीब है। ये लोग मुख्यतः बिहार, प0 बंगाल, असम के ग्रामीण क्षेत्रों के तथा बांग्लादेश/म्यान्मार से आये विदेशी घुसपैठिये/विस्थापित गरीब परिवार होते हैं। इनके बसाव के लिए सबसे पहले इनके गांव या इस शहर का एक ठेकेदार जो यहाँ आकर जमीन किराये पर लेकर या अवैध कब्जा कर अपने गांव तथा उसके आस–पास के गरीब परिवारों को लाकर यहां पहले बसाता है तथा इन्हे कचरा बीनने के लिए ठेला गाड़ी, जमीन एवं इनको बसने के लिए आर्थिक मद्द देता है। लेकिन उस ठेकेदार की शर्त होती है कि ये लोग अपने बीने हुए कूड़े सिर्फ उसी को बेचेंगे। ठेकेदार इनके द्वारा बीने गये कूड़ें को औने–पौने दाम में खरीद लेता है। अतः उन्हे अपने कूड़ों का उचित मूल्य भी

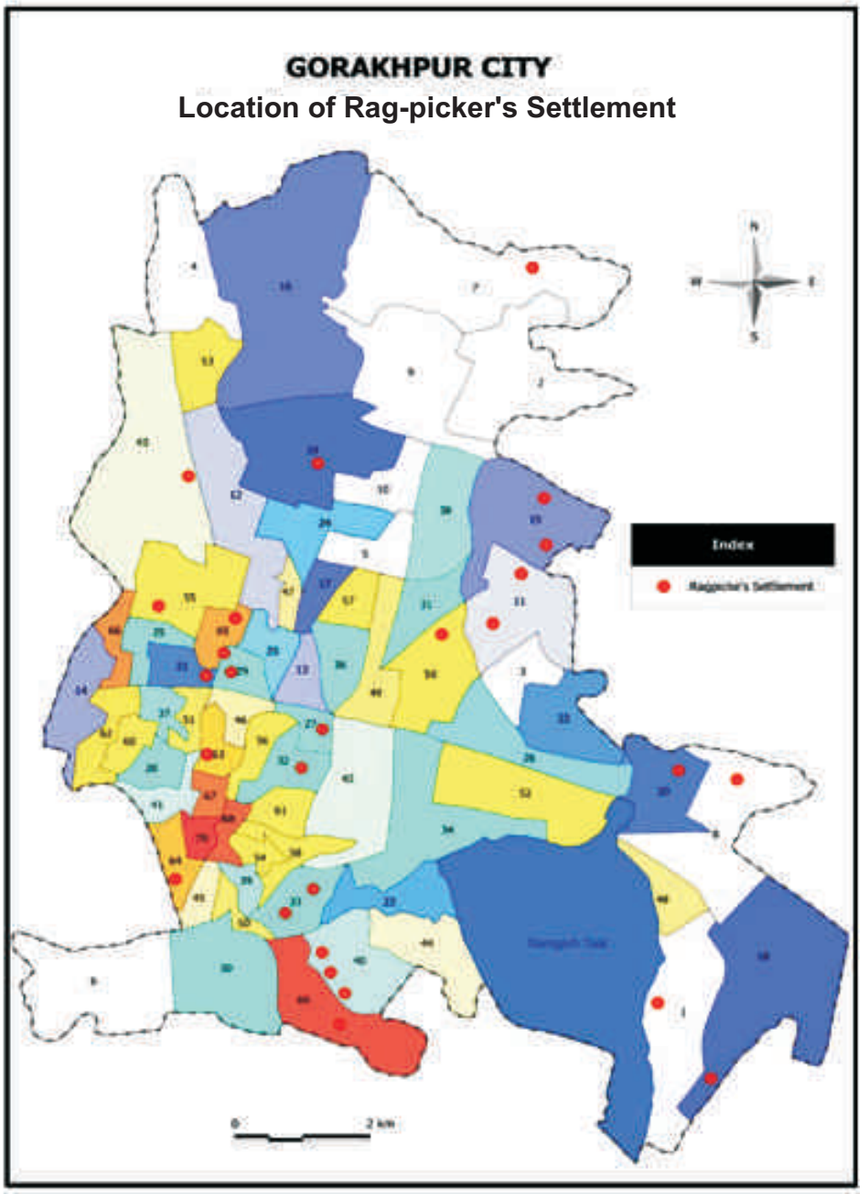
GORAKHPUR CITY
Location of Rag-picker's Settlement
Index
Rag-picker's Settlement
0
2 km

Fig. 01

नहीं मिल पाता है। फिर भी ये लोग खुशी–खुशी अपना कार्य करते रहते है। बाद में क्रमशः आने वाले लोग बसते जाते है और एक मलिन बस्ती का पूर्ण विकास हो जाता है।

कचरा बीनने वालों की बस्तियों और उनके आवासों में बुनियादी सुविधाओं का पूर्णतः अभाव होता है, तथा वे अस्वास्थ्यकर वातावरण में जीवन–यापन करते हैं। सर्वेक्षण के दौरान यह विदित हुआ कि इनकी बस्तियाँ पूर्णतः अस्थायी होती हैं। मकान टाट, कपडे एवं पालीथीन के बने हुए है, जो अति छोटे होते हैं, इसलिए स्थानाभाव के कारण एक ही कक्ष मे भोजन पकाना, खाद्य सामाग्री तथा अन्य वस्तुओं को संग्रहीत करना तथा उसी में उन्हें सोना भी पड़ता है। इस प्रकार 8X8' या 8X10' के भू–भाग पर इस टाट पट्टियों से बने हुए मकान में वे अपने सम्पूर्ण परिवार के साथ जीवन बसर करते है।

जल की उपलब्धता के लिए सामुहिक हैण्डपम्प या कुछ स्थानों पर पाइप से जल की व्यवस्था है। ऐसे जल के स्रोतों पर स्नान करने, बर्तन साफ करने तथा पेयजल लेने वालों की सतत कतारे लगी रहती है। इन जल स्रोतों से गिरने वाले अतिरिक्त जल के बहाव का कोई उपयुक्त ब्यवस्था न होने के कारण वही समीपवर्ती क्षेत्र में फैलता रहता है, या किसी नाले में जाकर गिरता रहता है, जिसके किनारे की खाली जमीन पर उनका बसाव होता है। शौचालय का पूर्णतः अभाव होने के कारण सड़कों या नालों के किनारे या खुले में शौच त्याग करते हैं। प्रकाश के साधन का भी पूर्णतः अभाव है, लेकिन अधिकांश में समीपवर्ती क्षेत्र से गुजरने वाले बिजली के खम्भों से अवैध रूप से तार खीच कर रोशनी प्राप्त करते हैं। खाना बनाने के लिए सामान्यतः लकड़ी का उपयोग करते हैं लेकिन कुछ परिवारों के पास छोटे या बड़े आकार के गैस सिलेंडर भी उपलब्ध है।

अस्वास्थकर वातावरण में निवास करने के कारण बीमारियों एवं अन्य शारीरिक कष्टों को झेलना इनके लिए सामान्य बात है। कुछ के पास राशनकार्ड बन जाने से सस्ते अन्न की दुकानों से राशन उपलब्ध हो जाता है। लेकिन स्वास्थ्य से संबंधित किसी भी प्रकार की कोई व्यवस्था नहीं है। इनकी बस्तियों के सन्निकट कोई सार्वजनिक स्वास्थ्य सेवा उपलब्ध कराने वाले चिकित्सक या चिकित्सालय का अभाव है। महामारियों से बचने के लिए किसी भी प्रकार की कोई व्यवस्था नहीं है। बीमा या स्वास्थ बीमा, आदि जैसी सेवाओं से पूर्णरूप से वंचित हैं।

इन लोगों की सामाजिक–आर्थिक दशा बड़ी ही दयनीय होती है। ये लोग छोटी–छोटी झुग्गी झोपड़ियों में सुख–सुविधाओं से वंचित नारकीय जीवन व्यतीत करते हैं। इनके बच्चों के लिए न तो कोई स्कूल की व्यवस्था है और न ही ये लोग अपने बच्चों को स्कूल भेजते है। बच्चों को भी अपने साथ कूड़ा बीनने में लगा देते हैं। सर्वेक्षण द्वारा इन लोगों के रहन–सहन का आंकलन करने के बाद देखा गया कि इन लोगों के पास बिजली, पानी तथा अन्य मूलभूत सुविधाओं का अभाव है तथा आस–पास इतनी गन्दगी है कि ये लोग तरह–तरह के रोगों से ग्रसित होते रहते हैं।

सर्वेक्षण से विदित हुआ है कि इन कचरा एकत्रित करने वाले लोगों में से 70 से 80 प्रतिशत घूम फिर कर कचरा बीनने और लैंड फिल से कचरा बीनने वाले हैं। सामान्यतः ये मोहल्लों–मोहल्लों में घूम कर सड़कों पर एवं गलीकूचों में फेंके गये कूड़े कचरों में से अपने जरूरत के अनुसार बेचने योग्य कूड़ों को एकत्रित करते हैं, शेष भाग के कचरा बीनने वाले रेलवे स्टेशनों, बस स्टैण्ड, टैक्सी स्टैण्ड, मालगोदामों, आदि भीड–भाड़ वाली जगहों से प्लस्टिक के बोतल तथा पालीथीन के निष्प्रयोज्य थैलों को इकट्ठा करते हैं। 2 से 3 प्रतिशत लोग स्कूलों, अस्पतालों तथा अन्य सार्वजनिक स्थानों पर फेंके गये अपशिष्टों से कचरा इकट्ठा करते हैं।

सर्वेक्षण से यह भी विदित हुआ कि कुल कचरा बीनने वालों में से 75 प्रतिशत महिलाएं और बच्चे होते हैं। पुरुष कचरा बीनने का काम स्वयं कम करता है, लेकिन स्त्रियों और बच्चों द्वारा बीने गये कचरों को एकत्रित करना और अपने आवास तक पहुचाने या विक्रय स्थल तक ले जाने के लिए सामान्यतः सहयोग करते है। खाली समयों में पुरुष कचरों की छटनी, बोरों में भराई, आदि का कार्य करते हैं।

कचरा बीनने, उसके प्रबन्धन और पुनर्चक्रण में सहयोग करने वाले इन लोगों की आमदनी पर्याप्त नहीं है। सर्वेक्षण के दौरान 70 प्रतिशत लोगो नें अपने परिवार की आय 10,000 रुपया मासिक से कम बताया उसमें से कुल

के 50 प्रतिशत ने अपनी आमदनी 5,000/माह या इससे कम होने की सूचना प्रदान की, केवल 4 प्रतिशत लोगों ने ही अपनी आय 10,000 से 20,000 के मध्य और 2 प्रतिशत लोगों नें 20,000/माह से अधिक आमदनी होना स्वीकार किया है । अधिक आमदनी वाले वही परिवार हैं, जिनका पुरुष वर्ग कचरा बीनने के साथ–साथ किसी अन्य व्यवसाय जैसे –दुकानों पर काम करना, ठेला व रिक्शा चलाना या किसी लघु उद्योग में श्रमिक के रूप में काम करता है।

कचरा बीनने वालों को उनके एकत्रित कचरों का मूल्य भी अत्यल्प प्राप्त होता है, क्योंकि उनके कचरे का सबसे अधिक लाभ उनको बसाने या ठेला देने वाले ठेकेदार उठाता है, जो उनके कचरों को अल्प मूल्य पर लेकर बड़े स्क्रैप डीलर को बेचता है और वह डीलर शहर या बाहर के दूसरे जगहों में स्थित एग्रीगेटर (बड़ा संग्रह कर्ता) और पुनर्चक्रीय कर्ता को बेच देता है। इस प्रकार कचरे को बीनने से लेकर पुनर्चक्रीय प्रक्रिया तक एक स्तम्भ (पिरामिड) का निर्माण होता है जिसके आधार में कचरा बीनने वाला और उसके ऊपर ठेकेदार या कचरा डीलर या वृहद एकत्रीकरण करने वाला और सबसे उपर पुनर्चक्रीय करने वाला व्यवसायी होता है।

सर्वेक्षण से कचरा बीनने वालों के सामाजिक स्थिति का भी ज्ञान प्राप्त करने का प्रयास किया गया है जिससे यह विदित होता है कि अधिकांश कचरा बीनने वाले परिवार में 6 से 10 व्यक्ति होते हैं, जिनमे परिवार का मुखिया और उसकी पत्नी तथा शेष उनके बच्चे होते हैं। इसलिए कचरा बीनने वालों के परिवार में बच्चों की संख्या अपेक्षाकृत अधिक होती है जो उनके साथ ही कचरा बीनने, कचरे की सफाई, बोरों में भराई, आदि में सहयोग करते है। सर्वेक्षण से विदित हुआ कि 65 प्रतिशत कचरा बीनने वाले अशिक्षित हैं, उनमें सर्वाधिक संख्या बच्चों की है। बच्चे आज भी किसी विद्यालय में नहीं जाते, न ही शिक्षा अध्ययन में उनकी कोई अभिरुचि है। पुरुषों की अपेक्षा अशिक्षित महिलाओं की संख्या लगभग 80 से 82 प्रतिशत तक है। इसके अलावा 94 प्रतिशत लोगों के पास जन्म प्रमाण पत्र, 96 प्रतिशत लोगों के पास व्यवसाय सम्बंधित प्रमाण पत्र तथा 99.5 प्रतिशत के पास जाति और आय प्रमाण पत्र नहीं है। सर्वेक्षण के दौरान अधिकांश कचरा बीनने वालो ने अपना जाति एवं धर्म छुपाने का प्रयास किया, फिर भी उनकी बोल–चाल तथा हाव–भाव से पता चलता है कि वे अल्पसंख्यक वर्ग के एक विशेष धर्म के पिछड़े वर्ग से है।

## कचरा निस्तारण में भूमिका

कचरा बीनने वाले, महानगर के सफाई व्यवस्था के एक अंग होते हैं। ये लोग दिन भर कूड़ा बीनने का ही कार्य करते रहते हैं। सुबह 4 या 5 बजे ये कूड़ा बीनने निकल जाते हैं जिनके पास ठेला है, वे ठेले से, जिनके पास नहीं है वे बोरा लेकर पैदल जाते हैं तथा 12 या 1 बजे कूड़ा बीनकर आते हैं, इन कचरा बीनने वालों से बात करने पर ज्ञात हुआ कि एक व्यक्ति औसतन 40 से 45 किलोग्राम सभी प्रकार के कूड़े बीनकर लाता है। फिर उस कूड़े की छटाई की जाती है। जैसे–शीशा, प्लास्टिक, पेपर, गत्ता, धातु, प्लास्टिक की बोतल एवं गिलास तथा अन्य सामाग्रियों को अलग–अलग छाँटते है। फिर 15–16 दिन के बाद जब इनकी मात्रा कुछ ज्यादा हो जाती है तो ये इन्हें अपने ठेकेदार को बेच देते हैं। फिर ठेकेदार इन छँटे हुए कूड़े को बाहरी व्यापारियों के हाथों बेच देता है। इनके द्वारा बीने गये 40–45 किग्रा0 कूड़े को तौल करके देखा गया तो उसमें 3 से 4 किग्रा0 प्लास्टिक, 12–15 किग्रा0 पेपर तथा गत्ता, 10 किग्रा0 शीशा, 1 या 1.5 किग्रा0 धातु जिसमें टिन, स्टील, लोहा, आदि तथा 3–4 किग्रा0 प्लास्टिक के बोतल, ढक्कन, डिब्बे, आदि के अलावा अन्य प्रकार की बस्तुए होती हैं।

महानगर में कचरा बीनने वाले कुल परिवारों की संख्या लगभग 3000 के आस पास है, और एक परिवार प्रतिदिन औसतन 45 किलोग्राम कचरा एकत्रित करता है। इस प्रकार इनके द्वारा कुल लगभग 130 टन के आसपास कचरा प्रतिदिन एकत्र किया जाता है जो महानगर में प्रतिदिन एकत्रित होने वाले कुल कचरा 601 टन का लगभग 20 प्रतिशत होता है। अतः महानगर के सफाई व्यवस्था में इनका भी एक महत्वपूर्ण योगदान होता है। संयुक्त राष्ट्र की संस्था, बीटैट का कहना है कि एशिया के महानगरों में कूड़ा करकट चुनने और बेचने वाले अब इन अवशेषों के निष्पादन की बढ़ती हुई समस्या के समाधान के लिए कारगर हो सकते हैं।

## निष्कर्ष

उपरोक्त तथ्यों से स्पष्ट है कि महानगर में कचरे के निष्पादन की व्यवस्था नहीं होने के कारण ये इधर–उधर पड़े रहते हैं। लेकिन इनके निष्पादन में इन हजारों लोगों के हाथ अवश्य सक्रिय हैं, ये एक तरह से सरकार का ही काम करते हैं। इससे सरकारी खर्च भी कम होता हैं। भविष्य में यह एक छोटा–मोटा उद्योग बन सकता है और रोजगार के नये स्रोत पैदा कर सकता है। बस जरुरत है इन हाथों को सुरक्षित दस्तानों की, ताकि ये कचरे को कंचन बनाते रहे।

उपरोक्त विवरण से स्पष्ट हो चुका है कि गोरखपुर नगर में बसने वाले कचरा बीनने वालों की सामाजिक–आर्थिक और बुनियादी सुविधाओं की दयनीय स्थिति है। लेकिन अधिकांश बस्तियां अवैध स्थल पर अवैध रूप से बसी हुई हैं, इसलिए इनमें सुधार के लिए सर्वाजनिक स्तर पर कोई प्रयास नहीं हो पाता है। फिर भी औपचारिक शिक्षा की कमी, शिक्षण संस्थाओं का अभाव, जल, ऊर्जा, आवागमन के साधन, स्वास्थ्य सुविधा एवं सार्वजनिक कल्याण योजनाओं का अभाव इनकी बस्तियों की मुख्य समस्या है। खाद्य सुरक्षा, स्वास्थ्य सुरक्षा, आर्थिक सामाजिक उत्थान, सामाजिक सुरक्षा, सम्मानजनक आजीविका का अभाव, बेहतर वैकल्पिक रोजगार के सुअवसर, आदि की उपलब्धता के साथ स्थाई भूमि पर स्थाई आवास इनके बेहतर जीवन यापन के लिए अपरिहार्य है। लेकिन प्रश्न यह है कि इन कचरा बीनने वालों में अधिकांशतः अवैध प्रवासी विदेशी है, इसलिए सरकार की तरफ से इस प्रकार की पहल फिलहाल असम्भव दिखाई देता है।

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# जनपद जालौन की कोंच तहसील में लिंगानुपात के नये उभरते प्रतिमान

**कृष्ण कुमार गुप्ता एवं कृष्ण कुमार त्रिपाठी**

## शोध सारांश

*किसी समुदाय में लिंगानुपात सन्तुलन सामाजिक एवं आर्थिक सम्बन्धों पर गहरा प्रभाव डालता है। भारत जैसे कृषि प्रधान देश में जहाँ कृषि कार्य का एक बहुत बड़ा भाग मानव श्रम पर निर्भर है, यहाँ लिंगानुपात का महत्व सर्वाधिक है। इससे कृषि अर्थव्यवस्था सबसे अधिक प्रभावित होती है क्योंकि कृषि क्षेत्र में क्रियाशील श्रमिकों में बड़ी संख्या स्त्री श्रमिकों की होती है। लिंगानुपात का स्पष्ट प्रभाव जनसंख्या वृद्धि, वैवाहिक जीवन एवं व्यावसायिक संरचना पर दृष्टिगोचर होता है। अध्ययन क्षेत्र उत्तर प्रदेश के बुन्देलखण्ड का अभिन्न अंग है। यहाँ आज भी बाल–विवाह, बेटा–बेटी में भेदभाव, ग्रामीण क्षेत्रें में शिक्षा ग्रहण कराने में भेदभाव, जातीय व्यवस्था में भेदभाव, इत्यादि समस्याओं के कारण लिंगानुपात की स्थिति अत्यंत गम्भीर है। जनांकिकी के लगभग सभी सूचकांकों पर राष्ट्रीय अथवा राज्य स्तर के औसत से समानता रखने के उपरान्त एक महत्वपूर्ण सामाजिक अभिसूचक 'लिंगानुपात' में जनपद जालौन की स्थिति अत्याधिक निराशाजनक है। जिले का लिंगानुपात 865 प्रति हजार तथा अध्ययन क्षेत्र का 855 प्रति हजार है जो देश के सबसे कम लिंगानुपात वाले राज्य हरियाणा के लिंगानुपात 879 प्रति हजार से भी कम है। उत्तर प्रदेश में यह छठा सबसे कम लिंगानुपात वाला जनपद है। लिंगानुपात में क्षेत्रीय विषमता स्पष्ट रूप से देखी जा सकती है। बढ़ती हुई शिक्षा से उच्च आयु के लिंगानुपात में सुधार दिखाई देता है लेकिन 0–6 वर्ष आयु वर्ग में यह स्थिति अत्यन्त गम्भीर है।*

## प्रस्तावना

जनसंख्या विश्लेषण के लिए लिंग अनुपात का अध्ययन करना अधिक उपयोगी है। फ्रैंकलिन (1956) ने लिंगानुपात के महत्व को समझाते हुये बताया कि 'लिंग अनुपात किसी क्षेत्र की अर्थव्यवस्था का एक सूचक है तथा प्रादेशिक विश्लेषण के लिए अत्यंत लाभदायक यंत्र है। लिंग अनुपात का प्रभाव अन्य जनसांख्यकीय तत्वों जैसे जनसंख्या वृद्धि, विवाह दर, व्यवसायिक संरचना पर भी माना गया है।' भारत अपनी संस्कृति, धार्मिक एकता एवं सहिष्णुता के लिए विश्वविख्यात है। हमारे देश की अजीब बिडंबना है कि सरकारी प्रयासों के उपरान्त समाज में कन्या भ्रूण हत्या की घटनाएं निरन्तर बढ़ती जा रही है। स्त्री–पुरुष लिंगानुपात हमारे समाज के लिए कई खतरे पैदा कर सकता है। इससे सामाजिक अपराध तो बढ़ेंगे ही महिलाओं पर होने वाले अत्याचार में भी वृद्धि हो सकती है।

केन्द्रीय सांख्यिकी संगठन की रिपोर्ट के अनुसार भारत में वर्ष 2008 से 2012 के अन्तराल में करीब 6,82,000 कन्या भ्रूण हत्या हुई हैं। यह आँकड़ा बताता है कि इन वर्षों में प्रतिदिन 1800 से 1900 कन्याओं को जन्म लेने से पहले ही मौत की नींद सुला दिया गया। समाज की रूढ़िवादिता में जीने की सही तस्वीर दिखाने के लिए केन्द्रीय सांख्यिकीय संगठन की रिपोर्ट पर्याप्त है। लिंगानुपात की स्थिति देश में सुखद नहीं कही जा सकती है। इसके साथ ही साथ निम्नवत् विभिन्न जनांकिकी वर्षों में लिंगानुपात घटता बढ़ता नजर आता जा रहा है। जैसे–1981–934, 1991–927, 2001–933 एवं 2011 में 943 महिलायें 1000 हजार पर सहभागी थी। दूसरी ओर देश में 0–6 आयु क्रम का लिंगानुपात लगातार घटता जा रहा है। शिशु लिंगानुपात 1981 में 962, 1991 में 945, 2001 में 927 तथा 2011 में शिशु लिंगानुपात घटकर 919 हो गया, प्रदर्शित आँकड़ों से समाज को एक प्रकार की चेतावनी दी जा रही है।

**1. डा0 कृष्ण कुमार गुप्ता, सहायक प्राध्यापक, भूगोल विभाग, गाँधी महाविद्यालय, उरई जिला–जालौन (उ0प्र0)।**
**2. डा0 कृष्ण कुमार त्रिपाठी, सहायक प्राध्यापक, भूगोल विभाग, गाँधी महाविद्यालय, उरई जिला–जालौन (उ0प्र0)।**

## अध्ययन क्षेत्र

कोंच तहसील जालौन जनपद दक्षिण–पश्चिम में स्थित है, जिसका क्षेत्रफल 876 वर्ग किमी0 है।कोंच तहसील में 2 विकासखण्ड (नदीगांव, कोंच), 16 न्याय पंचायत, 195 आबाद ग्राम तथा 66 गैर आबाद गांव हैं। इसका भौगोलिक विस्तार लगभग 25° 47'20" से 26° 14'40"N अक्षांश तथा 78° 56'35"E से 79° 18'30"E देशान्तर तक है। कोंच तहसील के दक्षिण में बेतवा नदी तथा पश्चिम में पहूज नदी कुछ हद तक सीमा बनाती है। कोंच तहसील के उत्तर में माधौगढ़ तहसील, दक्षिण में जनपद झांसी, और पश्चिम में म0प्र0 राज्य के भिण्ड जिले की लहार तहसील तथा पूर्व में जालौन एवं उरई तहसील स्थित है। यहाँ विषम जलवायु तथा कम वर्षा का क्षेत्र है। अध्ययन क्षेत्र की औसत वार्षिक वर्षा लगभग 83.31 सेमी0 है। यहाँ की 90% वर्षा मुख्य रूप से दक्षिणी पश्चिमी मानसून से होती है, शेष वर्षा लौटते हुये मानसून से होती है।

2011 की जनगणना के अनुसार यहां की कुल जनसंख्या 2,75,931 है, जिसमें 1,48,671 (53.88%) पुरुष एवं 1,27,260 (46.12%) स्त्रियाँ हैं। अध्ययन क्षेत्र के ग्रामीण क्षेत्र में 78.97% तथा नगरीय क्षेत्र में 21.03% जनसंख्या निवास करती है। जनसंख्या का घनत्व 265 व्यक्ति प्रतिवर्ग किमी0, कृषि घनत्व 66 व्यक्ति प्रतिवर्ग किमी0 एवं पोषण घनत्व 344 व्यक्ति प्रतिवर्ग किमी0 है। अध्ययन क्षेत्र में साक्षरता 64% जिसमें पुरुष 75.90% जबकि महिलायें 48.09% साक्षर हैं।

## उद्देश्य

1. कोंच तहसील में लिंगानुपात का अध्ययन करना।
2. कोंच तहसील के जनगणना वर्ष 1991–2011 के लिंगानुपात का तुलनात्मक अध्ययन करना।
3. कोंच तहसील के लिंगानुपात ह्रास के कारणों का विश्लेषण करना।

## विधितन्त्र

प्रस्तुत शोध में लिंगानुपात का अध्ययन द्वितीयक आँकड़ों के आधार पर किया गया है, जिसके लिये विभिन्न दशकों की जिला जनगणना पुस्तिकाओं के आंकड़ों का उपयोग कर अध्ययन क्षेत्र की 16 न्याय पंचायतों का विश्लेषण किया गया है। लिंगानुपात में आये परिवर्तनों का अध्ययन करने के लिए 1991 से 2011 तक के आंकड़ों का उपयोग करके उसमें होने वाले परिवर्तन को विभिन्न तालिकाओं, मानचित्रों एवं आरेखों की सहायता से प्रदर्शित किया गया है। इसके साथ ही साथ योजना, कुरूक्षेत्र, भूगोल और आप, विज्ञान प्रगति,इत्यादि पत्रिकाओं तथा समाचार पत्रों सहित अनेक स्रोतों से प्राप्त सामग्री का भी उपयोग किया गया है।

## लिंगानुपात

किसी समुदाय में लिंगानुपात सन्तुलन सामाजिक और आर्थिक सम्बन्धों पर गहरा प्रभाव डालता है। अतः लिंगानुपात का अध्ययन जनसंख्या भूगोलविदों के लिए एक विशिष्ट अभिरुचि का विषय रहा है। अर्थव्यवस्था एवं समाज के विकास में लिंगानुपात की महत्वपूर्ण भूमिका के कारण कृषि क्षेत्र में इसका अध्ययन अपरिहार्य होता है। क्षेत्रीय आधार पर लिंगानुपात में पायी जाने वाली विभिन्नता कृषि विकास के साथ–साथ खाद्यान्न उपलब्धता एवं पोषण में भी प्रभाव डालती है। भारत जैसे कृषि प्रधान देश में जहाँ कृषि कार्य का एक बहुत बड़ा भाग मानव श्रम पर निर्भर है, वहाँ लिंगानुपात का महत्व सर्वाधिक है। इससे कृषि अर्थव्यवस्था सबसे अधिक प्रभावित होती है क्योंकि कृषि क्षेत्र में क्रियाशील श्रमिकों में से काफी संख्या स्त्री श्रमिकों की होती है। भारत में लिंगानुपात प्रति एक हजार पुरुषों पर स्त्रियों की संख्या के रूप में दर्शाते हैं। इसे निम्न सूत्र द्वारा ज्ञात किया जाता है–

$$\text{लिंगानुपात} = \frac{\text{स्त्री जनसंख्या}}{\text{पुरुष जनसंख्या}} \times 1000$$

अध्ययन क्षेत्र कोंच में लिंगानुपात लगातार बढ़ता हुआ नजर आता है। 1991 में 826, 2001 में 819 और 2011 में 855, जो यहाँ के सामाजिक–सांस्कृतिक परिवेश में आये परिवर्तन का सूचक है। लिंगानुपात में लगातार वृद्धि के बाद भी अध्ययन क्षेत्र में पर्याप्त विषमता दृष्टिगोचर होती है। 2011 की जनगणना में कोंच तहसील में सर्वाधिक लिंगानुपात पनयारा न्याय पंचायत में (884) तथा सबसे कम (770) नावली न्याय पंचायत में है। लिंगानुपात का क्षेत्रीय विषमता का वर्णन तालिका सं0 01 व 02 एवं मानचित्र सं0 01 में प्रदर्शित किया गया है।

**तालिका 01 : कोंच तहसील में न्यायपंचायत व लिंगानुपात एवं परिवर्तन।**

| न्याय पंचायत | परिवर्तन | | | | | |
|---|---|---|---|---|---|---|
| | 1991 | 2001 | 2011 | 1991-01 | 2001-11 | 1991-11 |
| नावली | 772 | 730 | 770 | -42 | 40 | -2 |
| रेंढ़र | 821 | 814 | 824 | -7 | 10 | 3 |
| बंगरा | . | – | – | – | – | – |
| खकसीस | 841 | 832 | 869 | -9 | 37 | 28 |
| तीतरा खलीलपुर | 809 | 836 | 872 | -27 | 36 | 63 |
| कनासी | 818 | 813 | 836 | -5 | 23 | 18 |
| गिद्धवासा | 810 | 775 | 782 | -35 | 7 | -28 |
| जगनपुरा | 800 | 744 | 804 | -56 | 60 | 4 |
| कैलिया | 826 | 820 | 858 | -6 | 38 | 32 |
| नदीगांव विकास खण्ड | 817 | 811 | 840 | 6 | 29 | 23 |
| पचीपुरी | 824 | 837 | 848 | 13 | 11 | 24 |
| गुरावती | 830 | 831 | 850 | 1 | 19 | 20 |
| पनयारा | 820 | 820 | 884 | 0 | 64 | 64 |
| चमेंड़ | 850 | 867 | 873 | 17 | 6 | 23 |
| किशुनपुरा | 852 | 851 | 879 | -1 | 28 | 27 |
| पिण्डारी | 832 | 824 | 864 | -8 | 40 | 32 |
| बिलायां | 838 | 816 | 841 | -22 | 25 | 3 |
| कोंच विकास खण्ड | 838 | 832 | 862 | 6 | 30 | 24 |
| नदीगांव नगरीय क्षेत्र | 776 | 768 | 792 | 8 | 24 | 16 |
| कोंच नगरीय क्षेत्र | 864 | 875 | 898 | -11 | 23 | 34 |
| कोंच तहसील | 826 | 819 | 855 | 7 | 36 | 29 |

स्रोत :– जिला जनगणना हस्त पुस्तिका 1991, 2001 तथा 2011

तालिका के अवलोकन से यह स्पष्ट होता है कि अध्ययन क्षेत्र में जनगणना वर्ष 1991 की तुलना जनगणना वर्ष 2001 से करें तो ज्ञात होता है कि स्त्रियों की संख्या में लगातार कमी हो रही है, जहाँ वर्ष 1991 में लिंगानुपात 826 था वही 2001 में यह घटकर 819 हो गया अर्थात् इन दस वर्षो में 07 स्त्रियाँ कम हो गई।

वर्ष 1991 में सबसे अधिक लिंगानुपात पिण्डारी (832), किशनपुरा (852) एवं चमेड़ (850) न्याय पंचायतों में था, जो राष्ट्रीय लिंगानुपात से 81 कम है जो अध्ययन क्षेत्र के लिए एक गम्भीर चुनौती है, वहीं इस दशक में सबसे कम लिंगानुपात नावली (772), जगनपुरा (800) तथा तीतरा खलीलपुर (809) थी। शेष न्याय पंचायतों 810 से 849 के मध्य लिंगानुपात पाया गया।

वर्ष 2001 की जनगणना के आधार पर लिंगानुपात की स्थिति अध्ययन क्षेत्र में और अधिक गम्भीर हुई। यहाँ लिंगानुपात घटकर 819 हो गया, जो राष्ट्रीय

लिंगानुपात (927) की तुलना में 108 कम था। क्षेत्रीय आँकड़ों को देखे तो अध्ययन क्षेत्र में लिंगानुपात की स्थिति अत्यन्त गम्भीर नजर आती है। नावली न्याय पंचायत में सबसे कम लिंगानुपात 730 था, जो हरियाणा, पंजाब से लगभग 135 कम है। इस दशक में सबसे अधिक लिंगानुपात चमेड़ (867) तथा किशुनपुरा (851) न्याय पंचायतों में था, वहीं सबसे कम नावली (730), गिद्धवासा (775), जगनपुरा (744) में रहा शेष न्याय पंचायतों में यह 810–849 के मध्य था। अध्ययन क्षेत्र के लिंगानुपात का क्षेत्रीय क्रमबद्ध वर्णन तालिका संख्या–02 में निम्नवत है–

**तालिका 02 : कोंच तहसील में न्यायपंचायत वार लिंगानुपात का वितरण।**

| क्रमांक | लिंगानुपात | वर्ग | 1991 | 2001 | 2011 |
|---|---|---|---|---|---|
| 1 | 850 से अधिक | अति उच्च | चमेड़, किशुनपुरा पिण्डारी | चमेड़, किशुनपुरा | खकसीस, तीतरा खलीलपुर कैलिया, गुरावती, पनयारा चमेड़, किशुनपुरा, पिण्डारी |
| 2 | 830–849 | उच्च | खकसीस, गुरावती, बिलायाँ | खकसीस, तीतरा, खलीलपुर, पचीपुरा, गुरावती | कनासी, पचीपुरी, बिलायाँ |
| 3 | 810–829 | मध्यम | रेंढ़र, कनासी, गिद्धवासा, कैलिया, पचीपुरी, पनयारा | रेंढ़र, कनासी, पिण्डारी, कैलिया, पनयारा, बिलायाँ | रेंढ़र |
| 4 | 809 से कम | निम्न | नावली, तीतरा, खलीलपुर, जगनपुरा, बंगरा | नावली, गिद्धवासा, जगनपुरा, बंगरा | गिद्धवासा, जगनपुरा, नावली, बंगरा |

**1. अति उच्च लिंगानुपात के क्षेत्र**– इस श्रेणी के अन्तर्गत अध्ययन क्षेत्र की अति उच्च लिंगानुपात वाले क्षेत्रों का विश्लेषण किया गया है। कोंच तहसील की जनगणना 1991 में चमेड़ (856) एवं किशुनपुरा (852) न्यायपंचायत, अति उच्च लिंगानुपात रहा। जनगणना 2001 में चमेड़ (867) व किशुनपुरा (851) एवं जनगणना 2011 की आठ न्यायपंचायतों में 850 लिंगानुपात से अधिक था जिसमें सर्वाधिक लिंगानुपात पनमारा (884), किशुनपुरा (879), चमेड़ (873), तीतरा खलीलपुर (872), खकसीस (869), पिण्डारी (864), कैलिया (858), और न्यूनतम लिंगानुपात गुरावती न्यायपंचायत में 850 महिलायें 1 हजार पुरुषों पर थी। यह वर्ग कोंच तहसील के अति उच्च लिंगानुपात को प्रतिनिधित्व करता है लेकिन राष्ट्रीय लिंगानुपात वर्ष 2011 में 943 की तुलनात्मक रूप से अध्ययन क्षेत्र में 855 लिंगानुपात जो एक अत्यन्त गम्भीर समस्या की ओर इंगित करता है। अध्ययन क्षेत्र के लिंगानुपात में स्थित देश के सामाजिक, सांस्कृतिक, आर्थिक एवं समृद्धरूप से विकसित हरियाणा और पंजाब प्रदेश के समान है, जो एक चिंता का विषय है।

**2. उच्च लिंगानुपात के क्षेत्र** – इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र की उच्च लिंगानुपात वाले क्षेत्र का विश्लेषण किया गया है। कोंच तहसील की जनगणना वर्ष 1991 की उच्च लिंगानुपात खकसीस (850), बिलायाँ (838), एवं गुरावती न्यायपंचायत (830) रहा। वर्ष 2001 में अपने विगत वर्ष 1991 में की तुलना में लिंगानुपात में सरकार प्रयासों के द्वारा वृद्धि देखी गई। न्यायपंचायत पचीपुरा (837), तीतरा खलीलपुर (836), खकसीस (832) और गुरावती में (831) वर्ष 2011 की जनगणना का अध्ययन

करते हैं तो इस श्रेणी में अध्ययन क्षेत्र को न्याय पंचायत पचीपुरी (848), बिलायाँ (841) एवं कनासी (836) इस श्रेणी की तीनों दशकों के अध्ययन से स्पष्ट होता है कि लिंगानुपात में क्रमवद्ध वृद्धि देखी गई जिसके लिये सरकारी प्रयास, सामाजिक, सांस्कृतिक एवं अर्थिक कारकों की महत्वपूर्ण भूमिका रही।

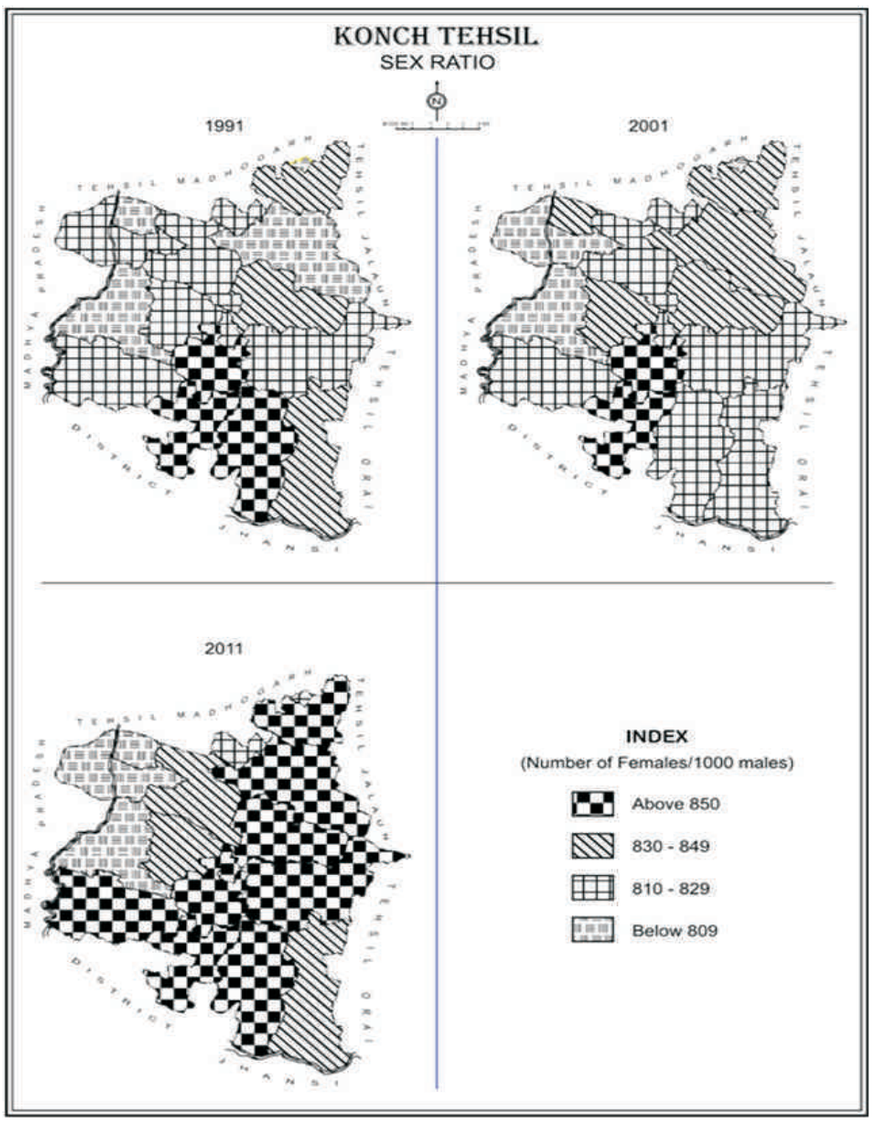


Fig. 01

**3. मध्यम लिंगानुपात के क्षेत्र**– इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र के मध्यम लिंगानुपात वाले क्षेत्रों का विश्लेषण किया गया है। कोंच तहसील में जनगणना वर्ष 1991 में कैलिया (826), पचीपुरी (824), रेढ़र (821), पनयारा (820), कनासी (818) एवं गिद्धवासा न्यायपंचायत (810) क्रमबद्ध रही। लेकिन जनगणना वर्ष 2001 में अधिकांश न्यायपंचायतों में लिंगानुपात में छात्र देखा गया। जहाँ पिण्डारी (824), पनयारा (820), कैलिया (820), बिलायाँ (814), रेढ़र (814) एवं कनासी (813) के लिंगानुपात विगत जनगणना वर्ष की तुलनात्मक रूप से लिंगानुपात में कमी देखी गई। जनगणना वर्ष 2011 में इस श्रेणी में अध्ययन क्षेत्र की मात्र रेंढ़र (824) न्यायपंचायत ही सम्मलित हुई।

**4. निम्न लिंगानुपात के क्षेत्र** :– इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र के अति निम्न लिंगानुपात वाले क्षेत्रों का विश्लेषण किया गया है, जनगणना 1991 से तीतरा खलीलपुर (805), जगनपुरा (800), नावली (772) है। इस श्रेणी में भी 1991 की तुलना में वर्ष 2001 में लिंगानुपात में ह्रास हुआ है। जहाँ वर्ष 2001 में गिद्धवासा (775), जगनपुरा (744) एवं नावली न्यायपंचायत में 730 रहा। यहाँ सर्वाधिक नावली न्याय पंचायत में 42 महिलायें विगत जनगणना वर्ष की तुलना में कमी देखी जो काफी अधिक निराशा जनक रही। जनगणना वर्ष 2011 में इस लिंगानुपात के इस ह्रास के काफी हद तक क्षतिपूर्ति देखी गई जहाँ जगनपुरा (804), गिद्धवासा (782) एवं नावली न्यायपंचायत में (770) क्रमबद्ध लिंगानुपात में वृद्धि देखी गई। इस श्रेणी में एक मात्र बंगरा न्यायपंचायत ऐसी रही जहाँ लिंगानुपात के आकड़ों का उल्लेख नहीं किया गया क्योंकि जनपद–जालौन में 2002 में नवीन तहसील माधौगढ़ का सीमाकंन किया गया। जिस कारण बंगरा न्याय पंचायत के सभी आबाद ग्राम माधौगढ़ तहसील में समाहित कर दिये गये जिस कारण से बंगरा न्यायपंचायत के जनाकिंकी आंकड़ों विश्लेषण नहीं किया जा सका।

उपर्युक्त विश्लेषण से निम्न लिंगानुपात के कारक निम्नवत् है –

1. नदीगांव विकास खण्ड में निम्न लिंगानुपात है, जिसका मुख्य कारण है कि विकास खण्ड आर्थिक, सामाजिक एवं सांस्कृतिक रूप से पिछड़ा है।
2. निम्न साक्षरता, प्राथमिक स्वास्थ्य सुविधाओं का अभाव, अकुशल प्रसव सुविधायें, पुरुष प्रधान समाज, पुत्र मोह, इत्यादि कारक निम्न लिंगानुपात के लिये उत्तरदायी हैं।
3. एक ओर पुत्र कामना और दूसरी ओर जनसंख्या वृद्धि पर अंकुश लगाने की इच्छा, दोनों का प्रतिफल यह है कि लिंगानुपात में भारी गिरावट अंकित की जा रही है।
4. अध्ययन क्षेत्र के ग्रामीण एवं नगरीय क्षेत्रों में निजी अस्पतालों के कर्मचारी क्षेत्र में भ्रमण करते हैं और गर्भवती महिला के परिवार के लिंग परीक्षण के लिये प्रोत्साहित करते हैं। लिंग निर्धारण परीक्षणों के पक्ष में बड़े–बड़े विज्ञापनों में माँ–बाप के सामने अप्रत्यक्ष रूप से चुनाव का नारा दिया जाता है कि आने वाले वर्षो में दहेज के रूप में पड़ने वाले भारी बोझ से बचने का उपाय, बेटियों के जन्म को टालना है। परिवार वालों को इस तरह समझाया जाता है कि ''बाद में 5 लाख रूपये अदा करने होंगे। इससे बेहतर यह है कि आज 5000/– का खर्च किया जाए।'' दलालों, कर्मियों, भ्रामक प्रचार के बहकावे में आकर स्वार्थ के चक्कर से बच्चियों को जन्म लेने ही नहीं दिया जाता है।

वर्ष 2011 की जनगणना का विश्लेषण करें तो यह तथ्य उभर कर आता है कि इस दशक में जनसंख्या वृद्धि की कमी के साथ–साथ लिंगानुपात में भी वृद्धि दर्ज की गई। अध्ययन क्षेत्र का लिंगानुपात वर्ष 2001 के 819 से बढ़कर वर्ष 2011 में 855 हो गया अर्थात् वर्ष 2001 की तुलना में वर्ष 2011 में 36 स्त्रियों की बढ़ोत्तरी अंकित की गयी। अध्ययन क्षेत्र की दृष्टि से यह स्थिति अवश्य ही सुखद है किन्तु राष्ट्रीय स्तर के आँकड़ों की तुलना में इसे सुखद स्थिति नहीं कहा जा सकता है। अध्ययन क्षेत्र में राष्ट्रीय लिंगानुपात 933 की तुलना में अभी भी 78 स्त्रियाँ कम हैं। केवल तथ्य सन्तोष करने योग्य है कि लिंगानुपात में गिरावट न होकर वृद्धि हो रही है। अध्ययन क्षेत्र में सबसे अधिक लिंगानुपात पनयारा (884), किशुनपुरा (879), चमेड़

(873), तीतरा खलीलपुर (872) न्याय पंचायतों में तथा सबसे कम लिंगानुपात नावली (770), गिद्धवासा (782) एवं जगनपुरा (804) न्याय पंचायत में था। इसके अलावा शेष न्याय पंचायतों में 810 से 850 के मध्य था।

## लिंगानुपात में परिवर्तन

भारत में विगत दशकों से लिंगानुपात में लगातार ह्रास देखा जा रहा है। विविध सरकार एवं गैरसरकारी प्रयासों के वाबजूद भी महिलाओं की स्थिति में संतोषजनक सुधार देखने में नहीं आये। भारत के लिंगानुपात 2001 (935) की तुलना में 2011 (946) में सकारात्मक वृद्धि हुयी है। अध्ययन क्षेत्र में भी यह परिवर्तन देखा गया जहाँ 1991 (826) की तुलना में 2001 में घटकर 819 हुआ। लेकिन 2011 में यह बढ़कर 855 हो गया। अध्ययन क्षेत्र के शहरी एवं ग्रामीण क्षेत्रों में यह परिवर्तन देखा गया। वर्ष 1991–2001 दोनों ही दशकों के लिंगानुपात का तुलनात्मक विश्लेषण करें तो यह तत्व उभर कर आया है कि अध्ययन क्षेत्र में लिंगानुपात में गिरावट अंकित की गई। यहाँ पिछले दशक की तुलना में 07 स्त्रियों कमी हुई। इसमें भी सबसे अधिक गिरावट जगनपुरा (–56), गिद्धवासा (–43) तथा नावली (–40) न्याय पंचायतों में थी, वहीं सबसे कम गिरावट पनयारा (0), गुरावती (–1), किशुनपुरा (–1) तथा रेंढ़र (–7) न्याय पंचायतों में थी। शेष न्याय पंचायतों में 10 से 30 स्त्रियों की संख्या गिरावट अंकित की गयी।

वर्ष 2001 और वर्ष 2011 के दशकों में लिंगानुपात का तुलनात्मक अध्ययन करें तो यह तथ्य सामने आता है कि वर्ष 2001 दशक में लिंगानुपात में वृद्धि अंकित की गई। यहाँ सबसे अधिक वृद्धि पिण्डारी (60), जगनपुरा (60), पनयारा (44) तथा नावली (40) न्याय पंचायतों में अंकित की गई, वहीं सबसे कम वृद्धि चमेड़ (6), गिद्धवासा (7) एवं रेंढ़र (10) न्याय पंचायतों में अंकित की गई। इस तुलनात्मक अध्ययन से स्पष्ट है कि जहाँ वर्ष 2001 में जगनपुरा, नावली न्याय पंचायतों में सबसे कम वृद्धि दर्ज की गई थी वहीं इन्हीं दोनों न्याय पंचायतों में सबसे अधिक वृद्धि हुई। इसके अलावा शेष न्याय पंचायतों में वृद्धि 15% से 40% तक अंकित की गई, अध्ययन क्षेत्र के लिंगानुपात का क्षेत्रीय परिवर्तन का वर्णन तालिका संख्या–03, मानचित्र संख्या–02 में प्रदर्शित किया गया है–

**तालिका 03 : कोंच तहसील में लिंगानुपात में परिवर्तन।**

| क्र0 | लिंगानुपात | वर्ग | 1991–01 | 2001–2011 | 1991–2011 |
|---|---|---|---|---|---|
| 1 | 60–अधिक | अति उच्च | – | जगनपुरा, पनयारा | तीतरा खलीलपुर, पनयारा |
| 2 | 40–59 | उच्च | – | नावली, पिण्डारी, | – |
| 3 | 20–39 | निम्न | तीतरा खलीलपुर | खकसीस, तीतरा, कनासी कैलिया, किशुनपुरा, विलायाँ | खकसीस, गिद्धवासा, कैलिया, पचीपुरी,गुरावती, चमेड़, किशुनपुरा, पिण्डारी |
| 4 | 19–कम | अति निम्न | नावली, रेढ़र, बंगरा, खकसीस, कनासी, गिद्धवासा, जगनपुरा, कैलिया, पचीपुरी, गुरावती, पनयारा, चमेड़, किशुनपुरा, पिण्डारी, बिलायाँ | रेढ़र, गिद्धवासा, पंचीपुरी, गुरावती, चमेड़, बंगरा | नावली, रेंढ़र, कनासी, जगनपुरा, विलायाँ, बंगरा |

### 1. अति उच्च लिंगानुपात परिवर्तन के क्षेत्र

इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र की अति उच्च लिंगानुपात वाले परिवर्तन के क्षेत्रों का विश्लेषण किया गया है। जनगणना वर्ष 1991–2001 के परिवर्तन वाले क्षेत्रों मे अध्ययन क्षेत्र की कोई भी न्याय पंचायत लिंगानुपात में 60 महिलाओं से अधिक वृद्धि नहीं हुई बल्कि केवल तीतरा खलीलपुर न्यायपंचायत में ही लिंगानुपात 27

महिलाओं की बृद्धि अंकित की गई, इसके अलावा सभी न्यायपंचायतों में लिंगानुपात में गिरावट देखी गई। जनगणना वर्ष 2001–2011 इस श्रेणी के अन्तर्गत पनयारा (64) और जगनपुरा (60) न्यायपंचायतों में लिंगानुपात में वृद्धि देखी गई। अध्ययन क्षेत्र के लिंगानुपात में 1991–2011 के मध्य इस श्रेणी के अर्न्तगत पनयारा (64) एवं तीता खलीलपुर (63) में महिलाओं सकारात्मक की वृद्धि हुई।

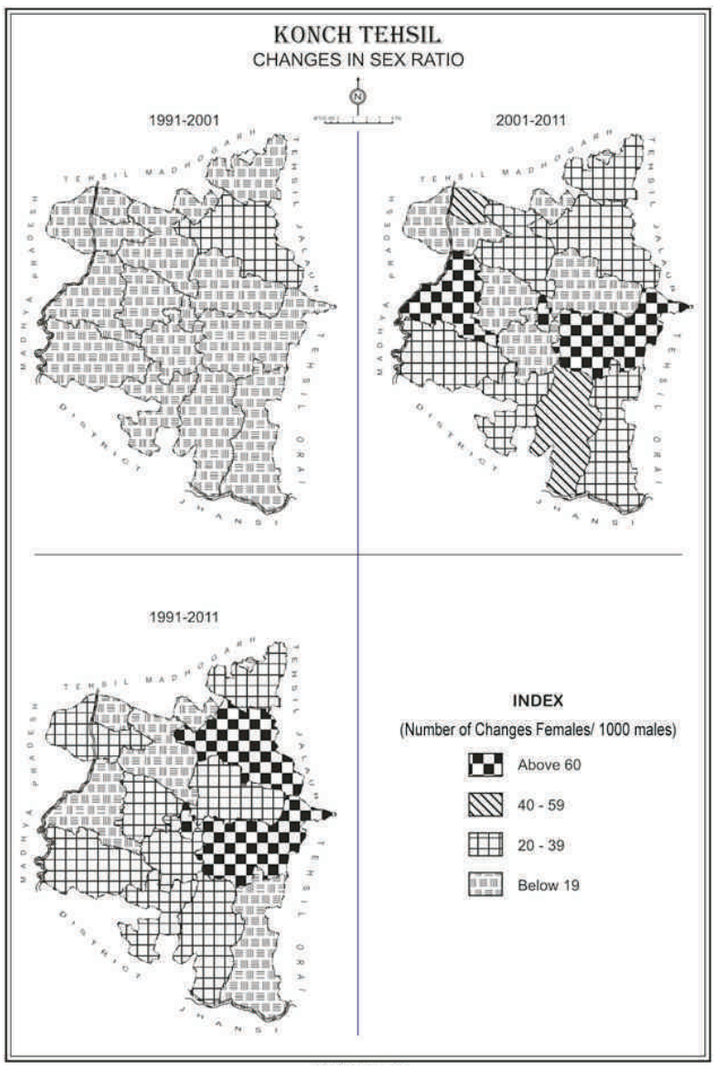


Fig. 02

### 2. उच्च लिंगानुपात परिवर्तन के क्षेत्र

इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र कोंच तहसील की उच्च लिंगानुपात वाले परिवर्तन के क्षेत्रों का विश्लेषण किया गया है। जनगणना 1991–2001 में इस श्रेणी अर्न्तगत कोई भी न्यायपंचायत में परिवर्तन नहीं देखा गया। जनगणना वर्ष 2001–2011 में नावली (40) और पिण्डारी (40) न्यायपंचायत के लिंगानुपात में वृद्धि दर्ज की गयी। 1991–2011 के दशकों के मध्य में अध्ययन क्षेत्र की कैलिया (32), गिद्धवासा (28) एवं पचीपुरी पंचायत में वृद्धि अंकित की गई थी।

### 3. निम्न लिंगानुपात के परिवर्तन के क्षेत्र

इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र के निम्न लिंगानुपात वाले क्षेत्रों का विश्लेषण किया गया है। जनगणना वर्ष 1991–2001 में यहाँ केवल तीतरा खलीलपुर (27), न्यायपंचायत में लिंगानुपात वृद्धि हुई। जनगणना वर्ष 2001–2011 के लिंगानुपात में सकारात्मक वृद्धि दर्ज की गई। अध्ययन क्षेत्र कोंच तहसील की कौलिया (38), खकसीस (37), तीतरा खलीलपुर (36), किशुनपुरा (28), बिलायाँ (25) एवं कनासी (23) न्यायपंचायतों 20–39 महिलायों की वृद्धि हुई। वर्ष 1991–2011 में लिंगानुपात सकरात्मक परिवर्तन देखा गया अध्ययन क्षेत्र की पिण्डारी (32), कैलिया (32), खकसीस (28), गिद्धवासा (28), किशुनपुरा (27), पचीपुरी (24), चमेड़ (23), गुरावती (20) न्यायपंचायतें में महिलाओं की संख्या में वृद्धि हुई।

### 4. अति निम्न लिंगानुपात परिवर्तन के क्षेत्र

इस श्रेणी के अर्न्तगत अध्ययन क्षेत्र के अति निम्न लिंगानुपात के परिवर्तन का विश्लेषण किया गया। अध्ययन क्षेत्र की जनगणना वर्ष 1991–2001 के लिंगानुपात में नकारात्मक परिवर्तन अंकित किया गया। वर्ष 1991 की तुलना में 2001 में अध्ययन क्षेत्र की सभी न्याय पंचायतों के लिंगानुपात में ऋणात्मक वृद्धि अंकित की गई जो अध्ययन क्षेत्र के लिए अधिक चिंता जनक बात है। कोंच तहसील की जगनपुरा (–56), नावली (–42), गिद्धवासा (–35), विलायाँ (–22), खकसीस (–9), पिण्डारी(–8), रेंढ़र (–7), कैलिया (–6), कनासी(–5) एवं किशुनपुरा (–1) न्यायपंचायत में लिंगानुपात में ह्रास देखा गया। यहाँ पनयारा न्यायपंचायत में न वृद्धि हुई और न ही ह्रास हुआ। यहाँ केवल चमेड़ (17), पंचीपुरी (13), एवं गुरावती (1) न्यायपंचात के लिंगानुपात में विगत 1991 की तुलना में 2001 की जनगणना में महिलाओं की संख्या में बहुत कम वृद्धि अंकित की गई। जनगणना वर्ष 2001–2011 में गुरावती (19) पचीपुरी (11), रेढ़र (10), गिद्धवासा (7) एवं चमेड़ (6) न्यायपंचायतों के लिंगानुपात में वृद्धि देखी गई। वही 1991–2011 में अध्ययन क्षेत्र कोंच तहसील की कनासी (18), जगनपुरा (04), रेढ़र (03), विलायाँ (03) एवं नावली (62), न्यायपंचायतों के लिंगानुपात सकारात्मक में वृद्धि देखी गई।

उपर्युक्त विश्लेषण से निम्न लिंगानुपात के कारक निम्नवत् है –

1. स्त्रियों की सामान्य मृत्यु दर में काफी गिरावट आयी है, रोजगार की तलाश में पुरुषों का प्रवास भी अध्ययन क्षेत्र से बाहर हुआ है।
2. जनपद में स्वास्थ्य सेवाओं में जो सुधार लाये जा रहे हैं उनका प्रत्यक्ष प्रभाव कोंच तहसील की जनसंख्या विशेषकर स्त्रियों की सामान्य जीवन प्रत्याशा पर दिखाई दे रहा है। इसी कारण अध्ययन क्षेत्र में हो रही कन्या भ्रूण हत्या एवं गर्भपात के नकारात्मक प्रभाव को भी सीमित रखा जा सका है।
3. अध्ययन क्षेत्र में सामाजिक, आर्थिक तथा सांस्कृतिक स्तर में भी काफी सुधार आया है। इसके साथ ही साथ यहाँ की साक्षरता 64% से अधिक है, जिसमें पुरुष 75.90%, स्त्री 48.09%है। इसके अलावा लोगों में जनसंख्या के विभिन्न अभिलक्षणों के प्रति जागरूकता भी उत्पन्न हुई, यह सभी कारक लिंगानुपात वृद्धि के कारक है।
4. स्त्रियों में सामाजिक, राजनैतिक एवं आर्थिक गतिविधियों में महिलाओं की बढ़–चढ़कर सहभागिता हुई है।
5. चिकित्सा सुविधाओं के विकास सम्बन्धी साधनों के प्रति असावधानी से वर्तमान स्थिति पैदा हुई है। पहले दंपति तब तक बच्चे पैदा करते रहते थे, जब तक कि उन्हें मन वांछित संतान की प्राप्ति नहीं हो जाती थी।

अब अल्ट्रासाउण्ड तकनीकी आ जाने से ऐसे लोग अजन्में बच्चों के लिंग की जाँच करवा लेते हैं।

6. वर्तमान समय में समाज में व्याप्त रूढ़िवादिता का अन्त तो हुआ लेकिन प्राचीन सामाजिक स्थिति का अनुसरण करने की परम्परा के कारण खुद महिलाऐं पुत्रों को प्राथमिकता देने का अनुसरण करती है।

7. अध्ययन क्षेत्र में जागरूकता की कमी भारतीय समाज में अज्ञानतापूर्ण संरक्षणवादी दृष्टिकोण वाले लोग अभी भी बेटी को बराबर का स्थान देने के लिए तैयार नहीं हैं क्योंकि उन्हें लगता है कि बुढ़ापे में वे बेटे पर निर्भर होंगी। मात्र वही खाना–पीना, घर–बार और जिम्मेदारियाँ बाँटेगा।

8. धार्मिक या सांस्कृतिक मान्यताएँ कि केवल पुत्र ही अपने माता–पिता का अंतिम संस्कार और संबंधित अनुष्ठान करने का हकदार है। केवल पुत्र ही परिवार का वारिस होता है। लड़के के अभाव में वंश नहीं चलेगा।

9. आर्थिक कारण भारतीय समाज का मुख्य व्यवसाय कृषि है। गांव वालों की सोच है कि लड़कियों को ज़मीन जायदाद नहीं दी जा सकती क्योंकि शादी के बाद वे दूसरे गांव, कस्बे या शहर चली जाएंगी। न तो लड़की को उसका हिस्सा मिल सकता है और न ही वह ज़मीन की देखभाल कर सकती है।

10. केन्द्र एवं राज्य की योजनाओं में महिला कल्याण पर अधिक बल देना, जिससे दम्पत्ति बच्चियों को बोझ नहीं समझे। जैसे–जननी सुरक्षा, बिटियाँ खूब पढ़े, लाडली योजना, बालिका विवाह अनुदान योजना, इत्यादि।

## निष्कर्ष

उपर्युक्त विश्लेषण में विभिन्न तथ्यों, कारणों का अध्ययन किया गया है। इसके पश्चात् शोधकर्ता इस निष्कर्ष पर पहुँचा है कि नई सहस्त्राब्दी के आरम्भ में अध्ययन क्षेत्र की जनसंख्या के लिंगानुपात की मुख्य बात यह रही है कि कन्या भ्रूण हत्या के बढ़ने के बावजूद भी इसमें 36 अंकों की वृद्धि हुई है। यह सन् 1991 में 826, 2001 में 819 थी तो 2011 में यह बढ़कर 852 हो गई। अध्ययन क्षेत्र की विभिन्न न्याय पंचायतों में भी 2001–2011 के दशकों में वृद्धि अंकित की गई। यह शायद इसलिये सम्भव हो पाया कि देश में स्वास्थ्य सेवाओं में सुधार से स्त्रियों की सामान्य मृत्यु दर में सराहनीय गिरावट आयी। इसके अलावा जनमानस में भी स्त्रियों के प्रति संवेदना जागी, जिससे अब दम्पत्ति पुत्र और पुत्रियों में भेद कम समझते हैं। दोनों को बराबर से लाड़ प्यार, पालन पोषण, देखभाल करते है। सरकारी योजनायें भी बालिकाओं को संरक्षण प्रदान कर रही है। इन सभी प्रयासों के कारण स्त्रियों की संख्या में वृद्धि अंकित की गई है।

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# मैनपुरी जनपद में महिला साक्षरता एवं महिला सशक्तिकरण का विश्लेषणात्मक अध्ययन

**वरूण यादव एवं सालिक सिंह**

**शोध सारांश**

*साक्षरता से तात्पर्य शिक्षित होने की क्षमता से है, प्रत्येक देश में साक्षरता के अपने अलग–अलग मानक हैं। भारत में राष्ट्रीय साक्षरता मिशन के अनुसार 7 वर्ष से अधिक आयु के वो सभी पुरूष व महिलाएं जो किसी भाषा को पढ़ व लिख लेते है, साक्षर कहलाते हैं। साक्षरता किसी क्षेत्र के सामाजिक विकास का पहलू है (शर्मा, ए. और मैथानी, डी.डी., 1990) किसी भी समाज की साक्षरता में जितना प्रतिशत हिस्सा पुरुषों का है उतना ही प्रतिशत हिस्सा महिलाओं का होना परम आवश्यक है। क्योंकि एक साक्षर पुरुष अपने देश को और अपने परिवार को सशक्त बनाता है पर एक साक्षर महिला देश के साथ–साथ आने वाली पीढियों को भी सशक्त करती है। माननीय प्रधानमंत्री जी ने कहा है '' राष्ट्र हमेशा महिलाओं से सशक्त होता है वह वो है जो एक नागरिक को माँ के रूप में, बचपन में, बहन के रूप में और बाद में पत्नी के रूप में पोषित करती है यही सशक्त नागरिक अंततः एक सशक्त देश बनाते हैं'' (मोदी, नरेन्द्र, 2016)। यह शोध महिला सशक्तिकरण में साक्षरता की क्या भूमिका है इस पर आधारित है। इस शोध का अध्ययन क्षेत्र उत्तर प्रदेश का मैनपुरी जिला है, साक्षात्कार के माध्यम से मैनपुरी जिले की महिलाओं को उत्तरदाताओं के रूप में चयनित किया गया है। मैनपुरी जिले में 9 विकासखंडों में महिला पुरुष साक्षरता प्रतिशत को ध्यान में रखकर प्रश्नावली तैयार की गई है।*

## प्रस्तावना

हमारे देश में साक्षरता हमेशा से एक प्रमुख मुद्दा रही हैं। सन् 1951 में भारत की कुल साक्षरता दर 18.33 प्रतिशत थी। जिसमें पुरूष साक्षरता दर 27.16 प्रतिशत तथा महिला साक्षरता दर 8.86 प्रतिशत थी। महिला पुरूष साक्षरता अंतर 18.30 प्रतिशत था। सन् 1971 से 1981 के बीच महिला व पुरूष साक्षरता का अंतर सबसे अधिक 26.62 प्रतिशत रहा जो कि विगत दशकों में सबसे अधिक था। 1981 से 2011 तक महिला पुरूष साक्षरता अंतर में लगातार सुधार हुआ जो कि 2011 में 16.68 प्रतिशत हो गया।

महिला–पुरूष साक्षरता दर में यह अंतर आज भी हमारे सामाजिक स्तर को परिभाषित करता है। ग्रामीण सामाजिक स्तर आज भी एक साक्षर और सशक्त महिला के अस्तित्व को आसानी से स्वीकार नहीं करता। महिला सशक्तिकरण का अर्थ हमारे समाज में हमेशा से इस प्रकार लगाया गया है कि महिला को पुरूष की बराबरी करने के लिये तैयार किया जा रहा है जबकि महिला और पुरूष एक ही सिक्के के दो पहलू हैं। नारी के बिना पुरूष की परिकल्पना करना भी संभव नहीं है। वास्तविक अर्थों में महिला सशक्तिकरण का अर्थ–महिला व पुरूष में शक्ति संतुलन से है। यह संतुलन आर्थिक स्तर पर, सामाजिक स्तर पर और राजनैतिक स्तर पर है। ''महिला सशक्तिकरण वह प्रक्रिया है जिसके द्वारा सामाज के विकास में राजनैतिक संस्थाओं के द्वारा महिलाओं को पुरूष के समान रखा जाता है'' (पैलिनीथुराई, जी, 2011)।

प्राचीन काल से ही भारतीय समाज में नारी को पुरुष के समान अधिकार प्राप्त है। विज्ञान व शिक्षा के क्षेत्र में भी नारी को अपनी प्रतिभा को निखारने का बराबर अधिकार दिया गया था परंतु उत्तर वैदिक काल के पश्चात् नारी की सामाजिक स्थिति में गिरावट आई (शर्मा रामशरण, अगस्त, 2023)। उसे उपनयन संस्कार से वंचित कर दिया गया। शिक्षा जैसा मौलिक अधिकार छीन लिया गया यहीं से पुरुष

**वरूण यादव, शोध छात्र एवं डॉ. सालिक सिंह, एसोसिएट प्रोफेसर, महर्षि यूनिवर्सिटी ऑफ इन्फोमेशन टेक्नोलॉजी, लखनऊ, उत्तर प्रदेश।**

व महिला शिक्षा के बीच अंतर आना प्रारम्भ हो गया। समय के साथ महिलाएं किसी भाषा को पढ़ना व लिखना तक नहीं सीख पाई। जिससे महिलाओं का साक्षरता स्तर गिरता चला गया और महिलाएं अपना आत्मविश्वास खोती चली गईं। इसी अंतर की वजह से आज हमें महिला सशक्तिकरण जैसे आंदोलन की जरूरत पड़ी है। डॉ प्रभा खेतान जी का वक्तव्य बिल्कुल सही साबित होता है ''स्त्री पैदा नहीं होती बना दी जाती है''। शिक्षा ही एक ऐसा माध्यम है जो महिलाओं को सशक्त बना सकता है उनका आत्मविश्वास लौटा सकता है। शिक्षा का पहला स्तर साक्षर होना है, मानव संसाधन के उच्चतम विकास को निर्धारित करने के लिए साक्षरता एक बहुमूल्य तथ्य है। ग्रामीण परिवेश में जो महिलाएं साक्षर है उनका आत्मविश्वास उन महिलाओं से काफी अधिक है जो किसी भाषा को पढ़ व लिख नहीं सकती।

## अध्ययन क्षेत्र

प्रस्तुत अध्ययन क्षेत्र जिला मैनपुरी उत्तर प्रदेश से संबंधित है। मैनपुरी जिला भारत के उत्तर प्रदेश राज्य में स्थित है, यह जिला 6 तहसीलों से मिलकर बना है। जो निम्नवत् हैः मैनपुरी, भोगांव, करहल, किशनी, घिरोर और कुरावली। इसका अक्षांशीय विस्तार 26°53′ से 27°31′ उत्तरी अक्षांश तथा देशांतर विस्तार 78°27′ से 29°26′ पूर्व तक है। अध्ययन क्षेत्र 05 जिलों से अपनी सीमा बनाता है, दक्षिण में इटावा, पूर्व में कन्नौज, उत्तर में फर्रुखाबाद और एटा, पश्चिम में फिरोजाबाद और दक्षिण में आगरा जिला है। जनपद का क्षेत्रफल 2,760 वर्ग किलोमीटर है जिसमें 06 तहसील, 09 विकासखंड, 80 न्याय पंचायत हैं, 503 ग्राम पंचायत, 01 नगर पालिका 08 नगर पंचायत हैं। जनपद की जनसंख्या 2011 की जनगणना के अनुसार 18,68,529 है, जिसमें 28,84,42 नगरीय 15,80,529 ग्रामीण जनसंख्या है। जनपद का जनसंख्या घनत्व 670 निवासी प्रति वर्ग किलोमीटर, लिंगानुपात 876 तथा साक्षरता दर 75.99% है, जिसमें शहरी साक्षरता 79.3% तथा ग्रामीण साक्षरता 75.4% है। जनपद में पुरुष साक्षरता 84.1% तथा महिला साक्षरता 71.1% है।

## अध्ययन का उद्देश्य

1. प्रस्तुत शोध पत्र का उद्देश्य मैनपुरी जिले में महिला साक्षरता व पुरूष साक्षरता का अध्ययन करना है ।
2. मैनपुरी जिले की महिलाओं के जीवन को सशक्त बनाने में साक्षरता की भूमिका का विश्लेषण।

## शोध विधितंत्र

प्रस्तुत अध्ययन में प्राथमिक व द्वितीयक आंकड़ों को आधार बनाकर उनका प्रयोग किया गया है। साक्षात्कार अनुसूची के माध्यम से मैनपुरी जिले में निवास करने वाली महिलाओं से प्रश्नावली द्वारा उनकी सोच और विचारों को जानने का प्रयास किया गया है। तत्वों का संकलन प्रश्नावली से प्राप्त उत्तरों को आधार मानकर किया गया है। द्वितीयक आंकड़ों के लिए भारतीय जनगणना 2011 को आधार बनाया गया है।

अध्ययन क्षेत्र में ग्रामीण जनसंख्या का कम साक्षर होने का कारण यहां शिक्षा सुविधाओं का अभाव, वितरण तथा अभिभावकों का कम जागरूक होना है। इसके विपरीत शहरी क्षेत्र में शिक्षा के अच्छे साधन उपलब्ध हैं तथा यहाँ अभिभावक भी शिक्षा को लेकर अधिक जागरूक हैं।

## विश्लेषण

जिला मैनपुरी के अध्ययन पर आधारित शोध के माध्यम से महिला पुरूष साक्षरता आंकड़े को एकत्रित किया गया है। इसके माध्यम से हम इस जनपद में महिला पुरूष साक्षरता में क्या अंतर रहा है और यह देश के महिला पुरूष साक्षरता से औसतन कितना अधिक है, आदि का विश्लेषण किया गया है। साथ में यह ज्ञात करने का प्रयास किया गया है कि महिला सशक्तिकरण में साक्षरता का क्या योगदान रहा है? जिन विकासखंडों में महिला साक्षरता अधिक है वहां की महिला अधिक सशक्त है या नहीं ? इन्हीं प्रश्नों को ध्यान में रखकर शोध कार्य किया गया है। प्रस्तुत शोध मैनपुरी जिला की महिला उत्तरदाताओं के उत्तर तथा जिला में महिला साक्षरता के तुलनात्मक अध्ययन पर आधारित है।

सारणी 01 : मैनपुरी जनपद में विकासखण्ड वार साक्षरता प्रतिरूप – 2011

| क्र.सं. | विकासखण्ड | साक्षर व्यक्ति | | साक्षरता का प्रतिशत | | | |
|---|---|---|---|---|---|---|---|
| | | पुरूष | स्त्री | पुरूष (%) | स्त्री (%) | अंतर (%) | कुल (%) |
| 1. | घिरोर | 63,230 | 40,623 | 82.08 | 61.21 | 20.87 | 72.42 |
| 2. | कुरावली | 56,245 | 36,711 | 84.14 | 61.76 | 22.38 | 73.61 |
| 3. | मैनपुरी | 86,246 | 59,881 | 86.84 | 68.68 | 18.16 | 78.35 |
| 4. | बरनाहल | 55,058 | 37,240 | 83.74 | 64.74 | 19.00 | 74.88 |
| 5. | करहल | 59,699 | 39,463 | 82.57 | 62.90 | 19.67 | 73.43 |
| 6. | सुल्तानगंज | 81,052 | 53,771 | 85.47 | 64.39 | 21.08 | 75.60 |
| 7. | बेवर | 83,264 | 56,773 | 86.47 | 67.68 | 18.79 | 77.90 |
| 8. | जागीर | 44,823 | 29,727 | 85.93 | 65.17 | 20.76 | 76.24 |
| 9. | किशनी | 72,904 | 49,222 | 82.78 | 64.55 | 18.23 | 74.32 |
| | योग ग्रामीण | 6,02,521 | 4,03,411 | 84.60 | 64.80 | 19.80 | 75.37 |
| | योग नगरीय | 1,09,589 | 88,364 | 84.14 | 74.11 | 10.03 | 79.35 |
| | योग जनपद | 7,12,110 | 4,97,775 | 85.53 | 66.30 | 19.23 | 75.99 |

स्रोत– जनगणना सार– जनपद मैनपुरी 2001–2011

**मैनपुरी जनपद के साक्षरता प्रतिरूप**

विकासखंड वार साक्षरता का विश्लेषण करने पर साक्षरता दर में काफी विभिन्नता देखने को मिलती हैं। अध्ययन क्षेत्र के विकासखंड मैनपुरी में सबसे अधिक साक्षरता 78.35% है। इसके बाद विकासखंड बेवर का स्थान आता है। यहां की साक्षरता 77.90% है, सबसे कम साक्षरता 72..42% घिरोर में अंकित की गई है।

महिला पुरुष साक्षरता अंतर को ध्यान में रखकर किये गए सर्वेक्षण से ज्ञात हुआ मैनपुरी जिले में सबसे अधिक महिला पुरुष साक्षरता अंतर कुरावली विकासखंड का है, यहां स्त्री–पुरूष साक्षरता अंतर 22.38% है, इसके बाद सुल्तानगंज (21.08%) घिरोर (20.87%) करहल (19. 67%) बरनाहल (19%) बेवर (18.79%) किशनी (18.23%) और मैनपुरी (18.16%) है। मैनपुरी विकासखंड में सबसे कम स्त्री पुरुष साक्षरता का अंतर है क्योंकि यहां की ज्यादातर संख्या शहरी होने के कारण शिक्षा के अच्छे अवसर प्राप्त है। अध्ययन क्षेत्र का विश्लेषण करते समय एक गंभीर तथ्य सामने आया है। मैनपुरी जिले में स्त्री पुरुष साक्षरता दर में अंतर काफी चिंताजनक है यह अंतर औसतन 20% का है। जो कि हमारे देश के महिला पुरूष साक्षरता अंतर से लगभग 4% अधिक है। यह अंतर मैनपुरी जिले में महिला सशक्तिकरण में एक बड़ी बाधा बना हुआ है। उत्तर प्रदेश सरकार को इस अंतर पर ध्यान देने की आवश्यकता है और सरकार को इस अंतर को कम करने का प्रयास भी करना चाहिए। इसी के माध्यम से हम महिला सशक्तिकरण जैसे आंदोलन को सही आयाम पर पहुंच सकते हैं।

**मैनपुरी जिले की महिलाओं के जीवन में साक्षरता की भूमिका के आंकड़ों का प्रस्तुतीकरण**

प्रस्तुत शोध में यह ज्ञात करने का प्रयास किया गया है कि महिला सशक्तिकरण में साक्षरता की क्या भूमिका है तथा साक्षर महिलाओं की पारिवारिक निर्णयों में भागीदारी कितनी और किस प्रकार की रही है? इसके लिये निम्न प्रश्नावलियों का सहारा लिया गया है, यह प्रश्न मैनपुरी जिले की महिलाओं से उनके साक्षात्कार के माध्यम से पूछे गये हैं। महिला उत्तरदाताओं के उत्तर पर आधारित यह विश्लेषण सारणी क्रमांक 02 से सारणी क्रमांक 05 तक दर्शाया गया है।

**सारणी 02 : साक्षरता का अर्थ क्या होता है, आपको पता है ?**

| क्र. सं. | साक्षरता का अर्थ | मैनपुरी | % | घिरोर | % |
|---|---|---|---|---|---|
| 1. | हाँ | 28 | 62.2% | 24 | 53.3% |
| 2. | नहीं | 17 | 37.7% | 21 | 46.67% |
| | योग | 45 | 100% | 45 | 100% |

स्रोत–छात्र के सर्वेक्षण द्वारा

उपरोक्त सारणी में विकासखंड ''मैनपुरी'' जिसकी साक्षरता प्रतिशत सबसे अधिक तथा विकासखंड ''घिरोर'' जिसकी साक्षरता प्रतिशत सबसे कम है का आँकड़ा प्रस्तुत किया गया है क्योंकि हम साक्षरता की भूमिका पर शोध कर रहे है इसलिए हम सबसे अधिक साक्षरता प्रतिशत वाले विकासखंड और सबसे कम साक्षरता प्रतिशत वाले विकासखंड का तुलनात्मक अध्ययन करेंगे। कुल न्यादर्शों की संख्या 45 है जिसमें मैनपुरी जनपद के 28 (62.2%) उत्तरदाताओं का मानना है कि उन्हें साक्षरता का क्या अर्थ पता है। जबकि 17 (37.7%) उत्तरदाताओं का मानना है कि उन्हें साक्षरता का क्या अर्थ नहीं पता है। इसी प्रकार ''घिरोर'' जनपद में 24 (53.37%) उत्तरदाताओं का मानना है कि उन्हें साक्षरता का अर्थ पता है जबकि 21 (46. 61%) उत्तरदाताओं का मानना है कि उन्हें साक्षरता का अर्थ नहीं पता है। आँकड़ों विश्लेषण के द्वारा यह प्रदर्शित होता है कि अधिक साक्षरता वाले जिले में लोगों को साक्षरता का क्या अर्थ है उसके बारे में अधिक जानकारी है जबकि घिरोर जिले में साक्षरता कम है तो वहां के लोगों को इसकी जानकारी भी मैनपुरी जनपद की अपेक्षा कम है।

**सारणी 03 : क्या आपका साक्षर होना आपको आत्मनिर्भर व सशक्त बनाता हैं?**

| क्र.सं. | क्या आपका साक्षर होना आपको आत्मनिर्भर व सशक्त बनाता है | कुरावली | % | किशनी | % |
|---|---|---|---|---|---|
| 1. | हाँ | 25 | 55.51% | 21 | 46.6% |
| 2. | नहीं | 15 | 33.39% | 16 | 35.5% |
| 3 | पता नहीं | 05 | 11.11% | 08 | 17.7% |
| | योग | 45 | 100% | 45 | 100% |

स्रोत–छात्र के सर्वेक्षण द्वारा

उपरोक्त सारणी क्रमांक 03 में दो विकासखंड कुरावली, किशनी जिनका स्त्री–पुरुष साक्षरता अंतर क्रमशः अधिक व निम्न है– कुरावली क्षेत्र में 25 (55.5%) उत्तरदाताओं ने हां में उत्तर दिया, जबकि 15 (33.3%) उत्तरदाताओं ने ना में उत्तर दिया तथा 5 (11.1%) उत्तरदाताओ ने उत्तर दिया–पता नहीं। जबकि किशनी विकास खंड में 21 (46.6%) उत्तरदाताओं ने हां में उत्तर दिया। 16 (35.5%) उत्तरदाताओं ने नहीं में उत्तर दिया और 8(17.7%) उत्तरदाताओं ने पता नहीं में उत्तर दिया। आंकड़ों के परिणाम से साफ समझा जा सकता है कि जिन विकासखंडों में महिला–पुरुष साक्षरता में कम अंतर है वहाँ की ज्यादा प्रतिशत महिलाओं का मानना है कि साक्षर होना उन्हें आत्मनिर्भर बनाता है। शिक्षा के प्रति उनकी इसी जागरूकता ने उस क्षेत्र में महिला पुरूष साक्षरता के अंतर को कम किया है।

**सारणी 04 : आप साक्षर हैं इसका लाभ आपके बच्चों को मिला है, क्या आप अपने बच्चों को स्वयं घर पर पढ़ाते हैं?**

| क्रमांक | आप अपने बच्चों को स्वयं पढ़ाते है | संख्या | प्रतिशत |
|---|---|---|---|
| 1. | हाँ | 39 | 86.67% |
| 2. | नहीं | 06 | 13.33% |
| | योग | 45 | 100% |

स्रोत–छात्र के सर्वेक्षण द्वारा

सारणी क्रमांक 04 में संपूर्ण जिले में 45 न्यादर्शों को लिया गया जिसमें 39 महिलाओं ने कहा कि उन्हें साक्षर होने का फायदा मिला है और वे अपने बच्चों को स्वयं पढ़ाती हैं। यह महिला सशक्तिकरण की ओर बढ़ता उनका पहला और सकारात्मक कदम है।

**सारणी 05 : क्या शिक्षा के कारण आपके सामाजिक जीवन में कोई बदलाव आया है?**

| क्रमांक | सामाजिक बदलाव | संख्या | प्रतिशत |
|---|---|---|---|
| 1. | हाँ | 40 | 88.89% |
| 2. | नहीं | 05 | 11.11% |
| | योग | 45 | 100% |

स्रोत–छात्र के सर्वेक्षण द्वारा

सारणी क्रमांक 05 में संपूर्ण जिले से 45 न्यादर्शों को लिया गया जिसमें 40 (88.89%) महिलाओं ने माना कि उनके शिक्षित होने से उनके जीवन में बहुत बदलाव आया है। परिवार के अनेक निर्णयों में उनका योगदान भी आज देखा जा सकता है और उन्हें भी परिवार में पुरुषों की तरह बराबर का सम्मान प्राप्त हुआ है। जबकि सिर्फ 05 (11. 11%) महिलाओं का मानना है उनके जीवन में कोई बदलाव नहीं आया है।

मैनपुरी के 9 विकासखंडों में इसी तरह के प्रश्न पूछे गए। परिणाम काफी सकारात्मक प्राप्त हुए, जिन विकासखंडों में साक्षरता अधिक थी वहां महिलाएं अधिक आत्मनिर्भर और सशक्त है। हमारी उपकल्पना सही साबित हुई जिन विकासखंडों में साक्षरता अधिक है वहां की महिलाएं अधिक सशक्त और पारिवारिक निर्णय में अपनी भागीदारी रखती थी। सामाजिक चेतना या यूं कहें सामाजिक जागरूकता जैसे भाव उनके अंदर थे। वो समाज में पुरुषों के कंधे से कंधा मिलाकर काम करने की क्षमता रखती है।

साक्षर मात्र होने से वे अपने काम और अपने बच्चों को पढ़ाने का काम स्वयं करने लगी हैं। कुछ महिलाएं अपने पास के विद्यालयों में विद्यालय समिति की सदस्य भी हैं तथा कुछ महिलाएं गांव में प्रधान के पद पर चयनित हुई हैं। चयनित होने के बाद उन्होंने अपनी लगन से साक्षरता के स्तर को प्राप्त किया और आज वे अपने दायित्वों को स्वयं निभा रही हैं। के. डी. सिंह ने सही ही कहा है कि ''शिक्षा एक ऐसा साधन है जिसके सहारे व्यक्ति और समाज में चेतना जागृत कर उसकी कार्यक्षमता में वृद्धि की जा सकती है''।

## निष्कर्ष

साक्षर महिलाओं में बहुत तेजी से परिवर्तन आये हैं वह जीवन के प्रत्येक क्षेत्र में सशक्त हुई हैं चाहे वह सामाजिक क्षेत्र हो, आर्थिक क्षेत्र हो या राजनीतिक क्षेत्र हो।

जहाँ महिलाएं अधिक साक्षर हैं वहाँ तेज गति से महिला सशक्तिकरण हुआ है।

जिन विकास खण्डों महिला साक्षरता अधिक रही हैं उन विकासखण्डों की साक्षर महिलाएं शिक्षा के माध्यम से स्वयं को सशक्त बनाने में रूचि लेने लगी हैं।

86.6% उत्तरदाताओं का मानना है कि साक्षर होने से उन्हे अपने पारिवारिक जीवन में काफी लाभ मिला है। अब वह समाचार पत्रों को पढ़ सकती है और अपने आप को बाहरी दुनिया से जोड़ सकती हैं तथा अपने बच्चों को पढ़ाना और उनका गृहकार्य करवाना, आदि कार्यों में भागीदारी कर रही हैं।

88.89% उत्तरदाताओं का मानना है कि शिक्षा के द्वारा उनके जीवन में काफी बदलाव आया है, पारिवारिक निर्णय में उनकी भूमिका बढ़ी है।

सभी क्षेत्रों में महिलाओं की जागरूकता बढ़ी है तथा महिलाओं में यह सभी सकारात्मक परिवर्तन सामाजिक हित के लिये काफी लाभदायक भी साबित हुये हैं।

जिला मैनपुरी के ग्रामीण परिवेश में रहने वाली महिलाएं जो अपने हस्ताक्षर कर सकती हैं। वह अपने आप को उन महिलाओं से अधिक सशक्त समझती है, जो महिलाएं अंगूठा लगाती है। यह सोच शिक्षा के प्रति महिलाओं की रोचकता का द्योतक है और यही प्रतिद्वन्द्विता और रोचकता उन्हें साक्षर बनने के लिये प्रेरित करती हैं।

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# वनाग्नि एवं मानव स्वास्थ्य : टिहरी जनपद का एक भौगोलिक अध्ययन

**अब्दुल वहाब एवं अनुजा रावत**

## शोध सारांश

*मानव और पर्यावरण में घनिष्ट सम्बन्ध पाया जाता है क्योंकि स्वच्छ वातावरण में ही स्वस्थ शरीर का विकास होता है। यद्यपि वायुमण्डल की बनावट में धूलकणों और गैसों का योगदान है परन्तु समय–समय पर इनकी मात्रा में वृद्धि हुई है जिस कारण वायु की गुणवत्ता में परिवर्तन हुआ है। जलवायु परिवर्तन से तापमान व वर्षा के प्रतिरूप में बदलाव से जंगल की आग की व्यापकता और गम्भीरता बढ़ रही है। वर्तमान में जलवायु परिवर्तन में प्राकृतिक एवं मानवीय कारकों का अधिक योगदान है, जिनमें वनाग्नि एक महत्वपूर्ण कारक है। वनाग्नि से सार्वजनिक स्वास्थ्य पर प्रतिकूल प्रभाव डालने वाले कई प्रकार के प्रदूषक (CO, NO, $O_3$ और पार्टिकुलेट मैटर सहित) निकलते हैं। स्वस्थ जीवन के लिये जिस प्रकार पौष्टिक भोजन अति आवश्यक है ठीक उसी प्रकार स्वच्छ वायु भी अति महत्वपूर्ण है। वायुमण्डल में उपस्थित इन अवांछनीय धूलकणों एवं हानिकारक गैसों, पार्टिकुलेट मैटर, पॉलीसाइक्लिक एरोमैटिक हाइड्रोकार्बन और वाष्पशील कार्बनिक यौगिकों का स्वास्थ्य पर प्रतिकूल प्रभाव पड़ता है जिस कारण अनेकों प्रकार के गम्भीर रोग उत्पन्न होते हैं।*

## प्रस्तावना

वनाग्नि विश्व में घटित होने वाली सबसे जटिल और खतरनाक प्राकृतिक घटनाओं में से एक है जो प्राकृतिक अथवा मानवीय कारणों से घटित होती है। वनों का किसी भी देश की अर्थव्यवस्था में महत्वपूर्ण योगदान होता है। उत्तराखण्ड राज्य के सन्दर्भ में तो यह और भी महत्वपूर्ण है क्योंकि यहाँ पर लगभग 71% भू–भाग पर वन पाये जाते है। वनाग्नि सर्वप्रथम सतही आग के रूप में प्रारम्भ होती है तदुपरान्त विकराल रूप धारण करने पर यह न केवल वृक्षों के तनों बल्कि चोटी तक को नष्ट कर देती है। उत्तराखण्ड के पर्वतीय क्षेत्रों में चीड़ के वन सर्वाधिक क्षेत्रफल में फैले हैं तथा यही वन आग से सबसे अधिक प्रभावित होते हैं। वनाग्नि के विभिन्न कारण है यथा–आकाशीय बिजली का गिरना, पेड़ की सूखी पत्तियों के मध्य घर्षण उत्पन्न होना, तापमान में वृद्धि, इत्यादि प्रमुख प्राकृतिक कारक हैं। जबकि अच्छी एवं मुलायम घास की प्रत्याशा में वनाग्नि मानवीय कारणों में से एक है। इसके अतिरिक्त चीढ़ के वृक्षों में रेजिंन की मात्रा अधिक पायी जाती है। यह एक अत्यधिक ज्वलनशील पदार्थ होता है जो वनाग्नि की घटनाओं की पुनरावृत्ति में योगदान देते हैं।

अनियंत्रित एवं तीव्र वनाग्नि की घटनाओं से न केवल वृक्ष, शाक, क्षुपा, अकार्बनिक पदार्थ, जल, उर्वरा शक्ति व जीव–जन्तु प्रभावित होते हैं बल्कि अनेक हानिकारक गैसें वायुमण्डल में एकत्रित होती है जिसका मानवीय स्वास्थ्य व जीवन पर दुष्प्रभाव पड़ता है। उत्तराखण्ड में वनाग्नि की घटनायें 15 फरवरी से 15 जून अथवा मानसून के आगमन तक नियमित रूप से होती रहती है। परिणामस्वरूप विभिन्न प्रकार के जीवों का वितरण तथा आवास क्षेत्र प्रभावित होता है।

उक्त रासायनिक तत्वों के अतिरिक्त सल्फर डाई ऑक्साइड, नाइट्रेट, नाइट्रोजन ऑक्साइड तथा हाइड्रोकार्बन, इत्यादि तत्व भी विभिन्न मात्राओं में वायुण्मडल में निर्मुक्त किये जाते है। वनाग्नि से उत्पन्न महीन धूलकणों एवं गैसों से वायु की गुणवत्ता में ह्रास होता है जिसे वायु गुणवत्ता सूचकांक (AQI) के रूप में प्रदर्शित किया जाता है। भारत में वायु गुणवत्ता सूचकांक 17

**1. डॉ0 अब्दुल वहाब, सहा0 प्राध्यापक, भूगोल, फू0सि0बि0रा0महा0, नौघर, लम्बगाँव, टिहरी गढवाल।**
**2. श्रीमती अनुजा रावत, सहा0 प्राध्यापक, भूगोल, फू0सि0बि0रा0महा0, नौघर, लम्बगाँव, टिहरी गढवाल।**

**वनाग्नि में उत्सर्जित पदार्थों (तत्वों) का विवरण**

| क्र0सं0 | उत्सर्जित पदार्थ (तत्व) | मात्रा (% में) |
|---|---|---|
| 1. | कार्बन डाई ऑक्साइड ($CO_2$) | 67 |
| 2. | जलवाष्प ($H_2O$) | 25 |
| 3. | कार्बन मोनो ऑक्साइड (CO) | 6 |
| 4. | अन्य विमुक्त पदार्थ (कालिख, भभूत) | 1 |

स्रोतः– लडार्च, 2009

सितम्बर 2014 को स्वच्छ भारत अभियान के अन्तर्गत लाँच किया गया था, जिसमें 8 प्रदूषक (Pm2.5, Pm10, $SO_2$, $NO_2$, $O_3$, $NH_3$,CO व Pb) सम्मिलित किये गये हैं। इन तत्वों की मात्रा के आधार पर वायु गुणवत्ता सूचकांक को निर्धारित किया जाता है।

विश्व स्वास्थ्य संगठन के अनुसार $SO_2$, $NO_2$, CO व सीसा मानव स्वास्थ्य को प्रभावित करते हैं। ये प्रदूषक वायु में उपस्थित धूलकणों, फ्यूमस, स्मॉग, कुहासा तथा वायु में उपस्थित अन्य जैविक प्रदूषकों से मिश्रित होकर लम्बे समय बाद लक्षण दिखाई देने वाले रोगों जैसे–कैंसर, श्वसन एवं धमनियों में जनित रोगों को जन्म देते हैं। साथ ही ब्रोकाइटिस, अस्थमा, अनिद्रा व अवसाद, निमोनिया, आँख, दाँत एवं त्वचा के रोगों की तीव्रता को भी बढ़ाते हैं।

दि लैंसेट कमीशन ऑन पाल्यूशन एण्ड हैल्थ (2019) के अनुसार भारत में प्रदूषण के कारण 23 लाख से अधिक लोगों की मृत्यु हुई है जो विश्व के किसी भी देश में सबसे अधिक है तथा सम्पूर्ण विश्व में प्रदूषण से मरने वाली कुल संख्या का लगभग एक–चौथाई है।

**अध्ययन के उद्देश्य**

वनाग्नि के प्रभावों के अध्ययन का मूल्यांकन करने के लिए निम्न उद्देश्यों को सम्मिलित किया गया है–

1. वनाग्नि से प्राकृतिक वनस्पति ही नहीं अन्य जैविक एवं अजैविक तत्व भी नष्ट होते हैं।
2. वायुमण्डल में धुआँ और राख से गैस व सूक्ष्म कणों की मात्रा बढ़ रही है।
3. वनाग्नि से पर्यावरणीय प्रदूषकों की मात्रा एवं वायुमण्डलीय तापमान में वृद्धि हो रही है।
4. वायुमण्डल में उपस्थित गैसें जलवाष्प के साथ मिलकर हानिकारक तत्वों का निर्माण करती है।
5. वायुमण्डल में उपस्थित कण एवं हानिकारक गैसें मानव स्वास्थ्य पर प्रतिकूल प्रभाव डाल रही हैं।

**अध्ययन क्षेत्र**

टिहरी जनपद उत्तराखण्ड के मध्य हिमालय में स्थित है। भौगोलिक दृष्टि से इसका विस्तार 30°12′ से 30°27′ उत्तरी अंक्षाशों तथा 78°8′ से 78°52′ पूर्वी देशान्तरों के मध्य 3,642 वर्ग किमी0 क्षेत्र में फैला है। समुद्र तली से इसकी औसत ऊँचाई 1,550 मीटर है। यहाँ पर उपोष्ण व समशीतोष्ण जलवायु पायी जाती है। भागीरथी व अलकनंदा यहाँ की प्रमुख नदियाँ है। अध्ययन क्षेत्र के उत्तरी सीमा पर उत्तरकाशी, पूर्व में रूद्रप्रयाग, दक्षिण में पौड़ी गढ़वाल तथा पश्चिम में देहरादून है। वर्ष 2001 की जनगणना के अनुसार अध्ययन क्षेत्र की कुल जनसंख्या 6,18,931 तथा औसत घनत्व 170 व्यक्ति प्रति वर्ग किमी0 है। इस क्षेत्र में लिंगानुपात 1,077 तथा साक्षरता दर 70.35 प्रतिशत है। टिहरी जनपद में 9 विकासखण्ड, 12 तहसील तथा 1,868 गाँव हैं।

**आँकड़े एवं शोध विधितंत्र**

प्रस्तुत शोध कार्य प्राथमिक एवं द्वितीयक आँकड़ों पर आधारित है। प्राथमिक आँकड़ें अध्ययन क्षेत्र के 20 ग्रामों से विभिन्न आधारों का अनुसरण करते हुए स्तरित प्रतिचयन विधि के द्वारा एकत्रित किये गये। इस प्रकार कुल 1500

व्यक्तियों को सम्मिलित किया गया, जिसमें आयुवर्गानुसार क्रमशः 2, 17, 16 व 40 प्रतिशत शिशु, युवा, प्रौढ़ एवं वृद्ध शामिल है। आँकड़ों के सरलीकरण हेतु मुख्यतः साधारण प्रतिशत विधि का प्रयोग किया गया है।

## विश्लेषण एवं अवलोकन

वन सम्पदा का किसी स्थान विशेष के विकास की योजनाओं के निर्माण एवं उनके स्वरूप को निर्धारित करने में महत्वपूर्ण योगदान होता है। इस कारण वन उपज से सम्बन्धित आँकड़ों की महत्वपूर्ण भूमिका होती है। टिहरी जनपद एक वन बाहुल्य क्षेत्र है क्योंकि इसके कुल भौगोलिक क्षेत्र (3,642 वर्ग किमी0) के 88.29% भाग पर वन पाये जाते हैं जिसमें वन विभाग के अन्तर्गत 72%, राजस्व विभाग तथा वन पंचायतों के अधीन क्रमशः 23.90 व 4.10% क्षेत्र सम्मिलित है। तालिका 01 से ज्ञात होता है कि अध्ययन क्षेत्र में कुल वनावरण 3,215.64 वर्ग किमी0 है जबकि विकासखण्डों में सबसे अधिक वन जौनपुर, कीर्तिनगर, नरेन्द्रनगर व भिलंगना में क्रमशः 11.49, 12.45, 13.79 व 35.12 प्रतिशत है जबकि शेष 4 विकासखण्डों में लगभग 4 से 7 प्रतिशत वन पाये जाते हैं। इन विकासखण्डों में देवप्रयाग, जाखणीधार, चम्बा व थौलधार सम्मिलित हैं।

**तालिका 01 : टिहरी जनपद में विकासखण्डवार वनों का वितरण।**

| क्र0सं0 | विकासखण्ड | क्षेत्रफल | |
|---|---|---|---|
| | | (है0) | (% में) |
| 1. | प्रतापनगर | 14,004 | 4.35 |
| 2. | भिलंगना | 1,12,955 | 35.12 |
| 3. | जाखणीधार | 16,095 | 5.01 |
| 4. | जौनपुर | 36,933 | 11.49 |
| 5. | धौलधार | 22,944 | 7.14 |
| 6. | चम्बा | 20,733 | 6.45 |
| 7. | नरेन्द्रनगर | 44,355 | 13.79 |
| 8. | देवप्रयाग | 13,506 | 4.20 |
| 9. | कीर्तिनगर | 40,039 | 12.45 |
| | **योग** | **3,21,564** | **100.0** |

स्रोतः– जिला सांख्यिकीय पत्रिका, 2022

वर्तमान में फैलते शहरों व उद्योगों, परिवहन मार्गों की संख्या में वृद्धि एवं विस्तार, कृषि भूमि का विस्तार व बहुउद्देशीय परियोजनाओं इत्यादि मानवीय कारकों तथा भूस्खलन, हिमस्खलन व वनाग्नि जैसी प्राकृतिक घटनाओं से वनावरण क्षेत्र में कमी हुई जिसका विवरण निम्न तालिका में प्रदर्शित किया गया है।

उपरोक्त तालिका से स्पष्ट होता है कि अध्ययन क्षेत्र में वर्ष 2001 से 2022 के मध्य कुल 766 हैक्टेयर क्षेत्र पर वन विनाश हुआ है जिसमें वनाग्नि द्वारा क्षतिग्रस्त क्षेत्र 167 है जो कुल क्षेत्र का लगभग 22% है। वर्ष 2009, 2002 व 2012 में सर्वाधिक वनों की क्षति हुई है जो क्रमशः 24.55, 15.01 व 16.32 प्रतिशत है। उक्त वर्षों में वनाग्नि से वनावरण क्षति सबसे अधिक पायी जाती है जो 24.55, 14.57 व 17.37 प्रतिशत है। इस अवधि में वर्ष 2015 एक मात्र ऐसा वर्ष है जिसमें वनावरण क्षति सबसे कम (1है0) है तथा वनाग्नि की कोई भी घटना नहीं हुई है।

अध्ययन क्षेत्र में वनाग्नि की सर्वाधिक घटनाऐं 15 फरवरी से 15 जून अथवा मानसून आने तक होती रहती है। परन्तु उक्त महीनों में भी अप्रैल व मई प्रमुख हैं। अतः इन महीनों में धूल कणों व गैसों की मात्रा, पार्टिकुलेट मैटर तथा वायु गुणवत्ता सूचकांक को रिकार्ड किया गया है।

उपरोक्त तालिका से ज्ञात होता है कि अप्रैल माह में वायु गुणवत्ता सूचकांक 132.25 पाया जाता है जो मध्यम स्तर के वायु गुणवत्ता को इंगित करता है जिसमें Pm 2.5 व Pm10 क्रमशः 93.9 व 124.91 माइक्रोग्राम प्रति घन मी0 है तथा 6 अन्य गैसों की मात्रा 4.32, 26.01, 15.7 व 1.06 माइक्रोग्राम प्रति घन मी0 है। मई महीने में उक्त सभी प्रदूषकों की मात्रा में कमी दर्ज की गई है जिस कारण वायु गणवत्ता सूचकांक (68.70) मध्यम से संतोषजनक स्तर (50–100) माना गया है।

इस प्रकार टिहरी जनपद में अलग–अलग महीनों में प्रदूषकों के तुलनात्मक अध्ययन से स्पष्ट होता है कि अप्रैल माह में प्रदूषकों की मात्रा आदर्श मात्रा से अधिक है। मई महीने में वर्षा होने के कारण वनाग्नि की घटनायें कम होने से प्रदूषकों की मात्रा घट जाती है। परिणामस्वरूप वायु

तालिका 02 : टिहरी जनपद में वनावरण क्षति।

| क्र0सं0 | वर्ष | कुल वनावरण क्षति | | वनाग्नि से वनावरण क्षति | |
|---|---|---|---|---|---|
| | | क्षेत्रफल | | क्षेत्रफल | |
| | | (है0) | (% में) | (है0) | (% में) |
| 1 | 2001 | 8 | 1.04 | 2 | 1.20 |
| 2 | 2002 | 115 | 15.01 | 24 | 14.37 |
| 3 | 2003 | 13 | 1.70 | 3 | 1.80 |
| 4 | 2004 | 21 | 2.74 | 5 | 2.99 |
| 5 | 2005 | 28 | 13.66 | 7 | 4.19 |
| 6 | 2006 | 50 | 6.53 | 14 | 8.38 |
| 7 | 2007 | 24 | 3.13 | 3 | 1.80 |
| 8 | 2008 | 30 | 3.92 | 6 | 3.59 |
| 9 | 2009 | 86 | 11.23 | 41 | 24.55 |
| 10 | 2010 | 31 | 4.05 | 5 | 2.99 |
| 11 | 2011 | 37 | 4.83 | 5 | 2.99 |
| 12 | 2012 | 125 | 16.32 | 29 | 17.37 |
| 13 | 2013 | 7 | 0.91 | 1 | 0.60 |
| 14 | 2014 | 9 | 1.17 | 2 | 1.20 |
| 15 | 2015 | 1 | 0.13 | 0 | 0 |
| 16 | 2016 | 20 | 2.61 | 1 | 0.60 |
| 17 | 2017 | 20 | 2.61 | 1 | 0.60 |
| 18 | 2018 | 31 | 4.05 | 3 | 1.80 |
| 19 | 2019 | 29 | 3.79 | 4 | 2.39 |
| 20 | 2020 | 24 | 3.13 | 1 | 0.60 |
| 21 | 2021 | 31 | 4.05 | 7 | 4.19 |
| 22 | 2022 | 26 | 3.39 | 3 | 1.8 |
| | योग | **766** | - | **167** | - |

स्रोतः– www.globalforestwatch.org

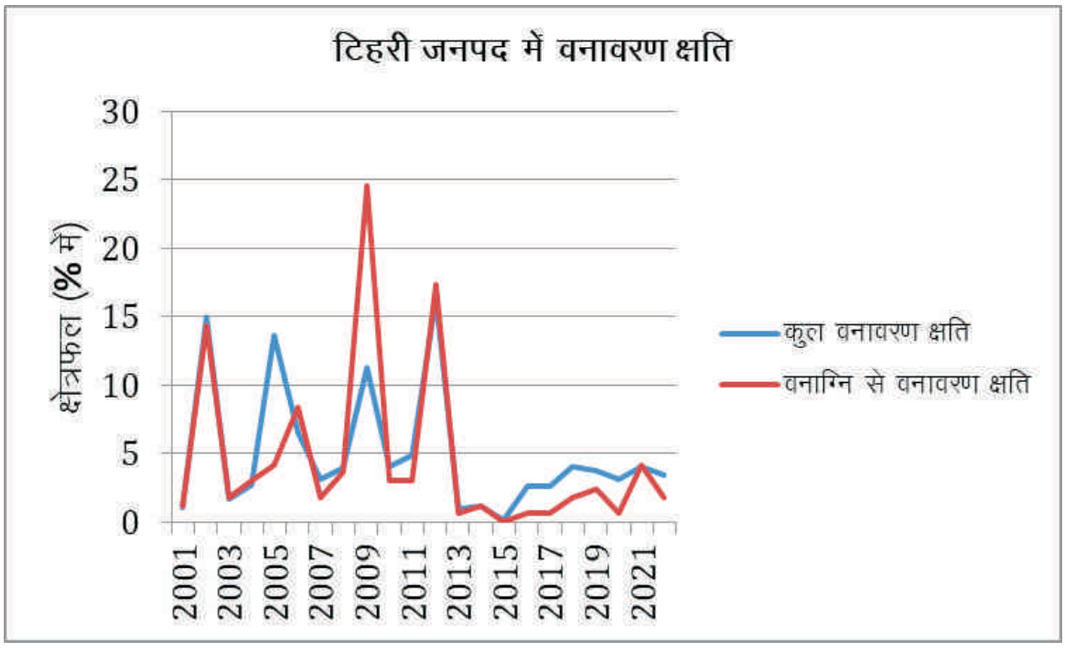


Fig. 01

तालिका 03 : वायुमण्डल में निर्मुक्त धूलकण एवं गैसों का विवरण।

| क्र0सं0 | प्रदूषक (माइक्रोग्राम/घन मी0) | औसत मात्रा | | आदर्श मात्रा |
|---|---|---|---|---|
| | | अप्रैल | मई | |
| 1. | Pm2.5 | 93.90 | 44.56 | 50.00 |
| 2. | Pm10 | 124.91 | 77.17 | 124.00 |
| 3. | $SO_2$ | 4.32 | 3.25 | 3.00 |
| 4. | $NO_2$ | 26.01 | 6.34 | 25.00 |
| 5. | $O_3$ | 15.70 | 14.52 | 39.00 |
| 6. | CO | 1.06 | 0.92 | 1.19 |
| 7. | AQI | 132.25 | 68.70 | 50.00 |

स्रोतः– www.accuweather.com/en/in, 2022

तालिका 04 : आयु वर्गानुसार चयनित व्यक्तियों में बिमारियों का विवरण।

| बिमारीं /आयुवर्ग | 0–5 | 6–20 | 21–60 | >60 | योग |
|---|---|---|---|---|---|
| कैंसर | - (0%) | 1 (16.67%) | 3 (50%) | 2 (33.33%) | 6 (100%) |
| ब्रोकाइटिस | 149 (40.93%) | 32 (18.79%) | 22 (6.05%) | 161 (44.23%) | 364 (100%) |
| अस्थमा | 5 (2.10%) | 15 (6.30%) | 28 (11.77%) | 190 (79.83%) | 238 (100%) |
| आँखों में जलन | 5 (2.39%) | 12 (5.75%) | 25 (11.96%) | 167 (79.90%) | 209 (100%) |
| अनिद्रा व अवसाद | - (0%) | 23 (15.33%) | 14 (9.33%) | 113 (75.34%) | 150 (100%) |
| निमोनिया | 64 (52.03%) | 32 (26.02%) | 18 (14.63%) | 9 (7.32%) | 123 (100%) |
| दाँतों की समस्या | 2 (3.23%) | 25 (40.32%) | 31 (50.00%) | 4 (6.45%) | 62 (100%) |
| त्वचा की समस्या | 43 (26.06%) | 46 (27.88%) | 51 (30.91%) | 25 (15.15%) | 165 (100%) |
| रोग रहित | 40 (21.86%) | 67 (36.61%) | 54 (29.51%) | 22 (12.02%) | 183 (100%) |
| योग | 308 (20.53%) | 253 (16.87%) | 246 (16.40%) | 693 (46.20%) | 1500 (100%) |

स्रोतः– सर्वेक्षण पर आधारित।

गुणवत्ता सूचकांक घट जाता है।

वनों को धरातल पर ऑक्सीजन का कारखाना माना जाता है जो वायु को शुद्ध करते हैं। वनाग्नि का प्रभाव केवल पारिस्थितिक तन्त्र तक ही सीमित नहीं है बल्कि सामाजिक–आर्थिक व्यवस्था के साथ–साथ मानव स्वास्थ्य पर भी प्रभाव पड़ता है। जंगल की आग पार्टिकुलेट मैटर का मुख्य स्रोत है। पार्टिकुलेट मैटर से श्वसन रोग, अस्थमा और फेफड़ों के कैंसर का खतरा बढ़ जाता है तथा यह असामायिक मृत्यु से भी जुड़ा है। इसके अतिरिक्त मनोवैज्ञानिक एवं मानिसक रोग जैसे– एकाग्रता, नींद न आना, घबराहट, मृत्यु का डर, भय, अवसाद, इत्याादि बिमारियॉ हो सकती हैं।

उपरोक्त तालिका में वायु प्रदूषण से उत्पन्न होने वाले रोगों के अवलोकन से ज्ञात होता है कि अध्ययन क्षेत्र में धूलकणों एवं गैसों से ब्रोकाइटिस, अस्थमा एवं आँखों में जलन जैसे रोगों के लक्षण क्रमशः 24, 16 व 14 प्रतिशत व्यक्तियों में देखे गये हैं जबकि त्वचा, अनिद्रा व अवसाद, निमोनिया व दाँतों के रोग क्रमशः 11, 10, 8 व 4 प्रतिशत लोगों में परिलक्षित हुए हैं।

आयु वर्ग के अनुसार व्यक्तियों में होने वाले रोगों के अवलोकन से स्पष्ट होता है कि शिशु वर्ग (0–5 वर्ष) के 87 प्रतिशत शिशुओं में ब्रोकाइटिस, निमोनिया एवं त्वचा के रोग क्रमशः 52, 41 व 26 प्रतिशत बच्चों में पाये जाते हैं जबकि अस्थमा, आँख व दाँतों जैसे रोगों से लगभग 2 से 3

प्रतिशत पीडित पाये गये हैं।

युवा वर्ग (6–20 वर्ष) के लगभग 70 प्रतिशत व्यक्तियों में दाँत, त्वचा, निमोनिया, अनिद्रा व अवसाद जैसे रोग लगभग 40, 29, 20 व 15 प्रतिशत युवाओं में देखे गये हैं।

इसी प्रकार अस्थमा, ब्रोकाईटिस व आँखों की बीमारी 5 से 6 प्रतिशत युवाओं में पायी गई है। प्रौढ़ वर्ग (21–60 वर्ष) में दाँतों के रोग एवं कैंसर जैसी गम्भीर बीमारी लगभग 56 प्रतिशत व्यक्तियों में रिकॉर्ड की गई है।

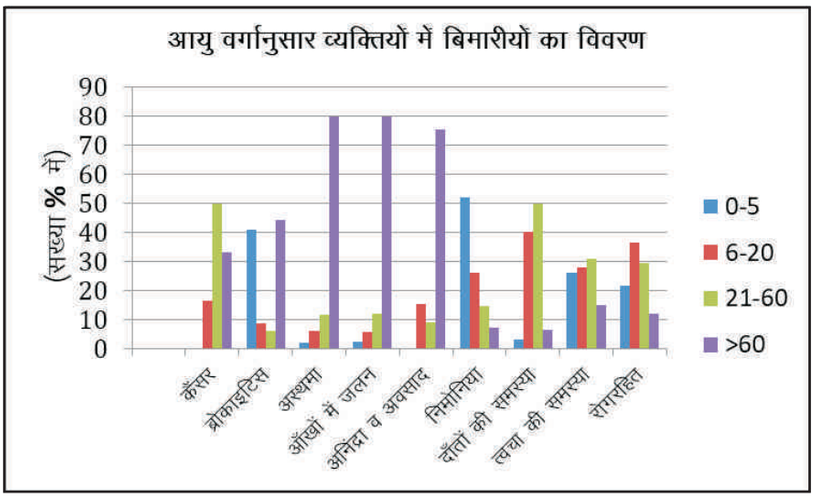


Fig. 02

यह सर्वविदित है कि आयु बढ़ने के साथ–साथ रोग प्रतिरोधक क्षमता घटती जाती है जिस कारण वृद्धावस्था (>60 वर्ष) में व्यक्ति अधिक रोग ग्रस्त पाये जाते हैं। इस वर्ग में अस्थमा, आँखों में जलन, अनिद्रा व अवसाद जैसे रोग 75 प्रतिशत से अधिक लोगों में पाये गये हैं। जबकि दूसरे अन्य प्रमुख रोग जैसे– ब्रोकाइटिस, कैंसर एवं त्वचा की समस्या क्रमशः 44, 33 व 15 प्रतिशत वृद्ध व्यक्तियों में देखी गई है।

## निष्कर्ष

वन जिन्हें ऑक्सीजन का कारखाना माना जाता है, अध्ययन क्षेत्र के लगभग तीन–चौथाई से भी अधिक भाग पर फैले हैं तथा वनाग्नि से सबसे अधिक प्रभावित होते हैं। यद्यपि वनाग्नि के विभिन्न कारण है, लेकिन मानवीय पक्ष सबसे प्रमुख है जो वनाग्नि की घटनाओं की पुर्नावृत्ति में योगदान देते हैं। अध्ययन क्षेत्र में वनाग्नि की घटनायें शीत ऋतु से लेकर मानसून के आगमन तक होती रहती है। वनाग्नि की इन घटनाओं से वायु की गुणवत्ता में परिवर्तन हुआ है। साथ ही साथ जलवायु परिवर्तन से तापमान व वर्षा के प्रतिरूप में बदलाव से वनाग्नि की व्यापकता बढ़ी है। इस परिघटना में निर्मुक्त विभिन्न हानिकारक गैसों और पार्टिकुलेट मैटर के कारण मनुष्य विभिन्न रोगों से ग्रस्त हो रहे हैं। इस लिए हमें इन खतरों से निटपने के लिए वनाग्नि को नियन्त्रित करने, जन–जागरूकता योजनाओं के निर्माण, पशु–प्रजातियों की रक्षा, जंगलों में शिविर तथा वहाँ आग जलाने के नियमों को अधिक प्रभावी ढ़ंग से लागू किया जाना चाहिए।

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