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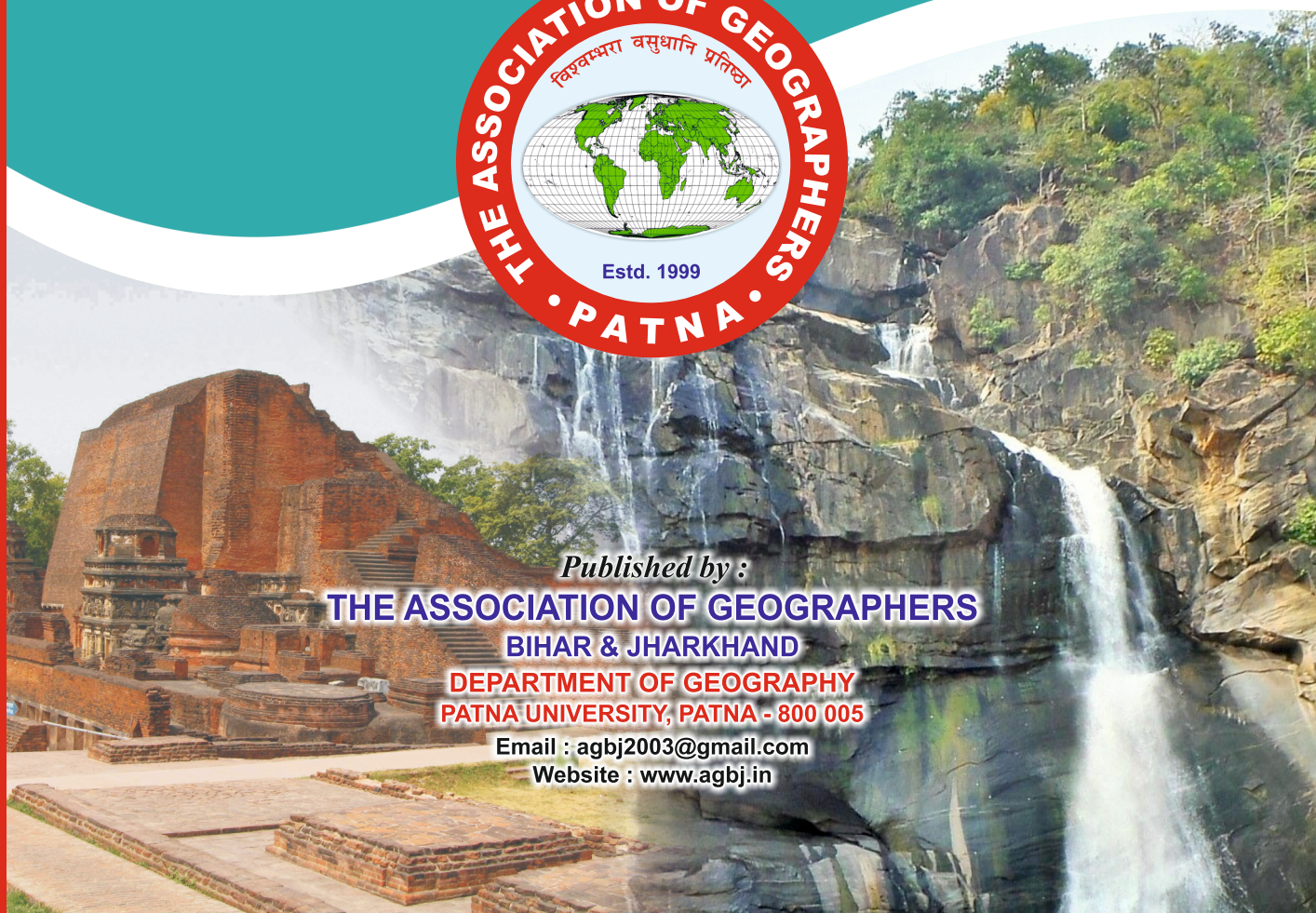
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CONTENTS

Volume: 24
ISSN 0970-809X
October, 2023

- **Editorial Column** i

English Section

1. **Demographic Race : India Vs China** 1-5
Rash Bihari Prasad Singh
2. **A Review of Climate-Smart Agriculture through Climate-Smart Landscapes : Recent Advancements, Challenges and Future Prospects** 6-15
Sandeep Kumar Singh and Veerendra Kumar
3. **Impact of Alcohol Prohibition in Bihar : A Case Study of Patna Municipal Corporation** 16-31
Debjani Sarkar Ghose, Padmja and Akanksha
4. **Contemplating Community Resilience to Coronavirus Pandemic : A Study of Jeevika Self Help Groups in Darbhanga, Bihar** 32-40
Gaurav Sikka and Praveen Kumar
5. **An Analysis of Commercial and Political Attributes of a Cash Crop in District Bijnor, Uttar Pradesh** 41-54
Harvinder Singh
6. **A Study of the Socio-Economic Condition of the Hanjis Community in Srinagar District of Jammu and Kashmir** 55-71
Amjed Ali, Kheraj, Arshad Ahmed, Kiran Rani and Meenaxy
7. **Causes of Urban Floods in the National Capital Territory of Delhi** 72-79
Anuradha Shankar and Satya Raj
8. **Socio-Economic Determinants of Household size : A Spatial Analysis of Bihar** 80-96
Meenakshi Prasad and Deepika Chandra Verma
9. **Assessment of Healthcare Availability and Accessibility in Doda District, India** 97-112
Arshad Ahmed, Kheraj, Amjed Ali, Kiran Rani and Meenaxy
10. **Ecotourism in Management of Protected Areas : A Literature Review** 113-122
Samridhi Raghav and Satya Raj
11. **Spatial Changes in Female Literacy in Bihar (2001-2011)** 123-129
Hulesh Manjhee

CONTENTS**Volume: 24****ISSN 0970-809X****October, 2023****Hindi Section**

- | | |
|--|---------|
| 1. कृषि आधारित उद्योग में महिलाओं की भूमिका भागलपुर जिला के संदर्भ में
<i>प्रेम प्रतीक्षा रानी और संजय कुमार झा</i> | 130-139 |
| 2. निचली कोसी बेसिन में नदी मार्ग परिवर्तन से उत्पन्न प्रवास: एक भौगोलिक समीक्षा
<i>मितु कुमारी और मनोज कुमार</i> | 140-153 |
| • General Secretary Report | 154-156 |
| • Departmental News | 157-168 |
| • Ph.D. Degree Awarded | 169-174 |
| • Journey of the Association of Geographers | 175-177 |
| • Guidelines for Submission of Paper | 178-179 |

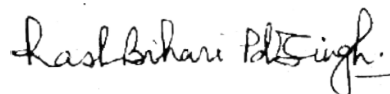
Editorial Column

Dear Fellow Members

It is a matter of great pleasure to present 24th volume of “Geographical Perspective” before you on the auspicious occasion of the 24th Annual Conference of the Association of Geographers Bihar and Jharkhand at Ranchi University, Ranchi (Jharkhand). This Journal is among a few peer reviewed Journals of Geography that is now being made available in both print and E-Journal formats. The editorial board members and the peer reviewers have worked hard to up keep the standard of the Journal so that its credibility and accessibility remains warm not only within the country but even beyond the territorial limits.

The volume of Journal contains 13 research papers including 2 papers in Hindi Language. The papers approved by external reviewers and editorial board members are from the different parts of the country. The papers are free from plagiarism and declaration has also been taken from the authors accordingly. Papers having originality and interest in new frontiers of geography have been given preference in publication. Some writers have covered unaddressed areas and communities in their work. This tendency as well as inter-disciplinary approach have also been given due space in this volume of the Journal.

I am confident that readers will appreciate our academic efforts. At the same time, constructive criticism and suggestions for further improvement shall always be welcome. At the end, I wish to seize this opportunity to express my sincere thanks to the members of Advisory Board, Editorial Board, external reviewers and office bearers of AGBJ for their warm and holistic support in the timely publication of this volume of the Journal.



(Rash Bihari Pd. Singh)
Editor-in-Chief

DEMOGRAPHIC RACE : INDIA Vs CHINA

Rash Bihari Prasad Singh*

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Introduction

Demography is the study of indispensable attributes of population. These attributes are as like, total fertility rate, birth and death rate, age-sex structure, mobility, literacy, occupational structure, population growth rate etc. In fact, indispensable attributes determine the size of population, demographic dividends, absolute growth of population, land-man ratio, gender disparity etc. The nature of these attributes contribute not only in the planning of population (human) resource but also in the planing of regional development, empowerment of under privileged social groups, national integration and economy and prosperity of the society and nation.

Different countries/regions exhibit distinct features of population and demographic attributes. Most of the European countries, Japan and South Korea are facing the problem of negative biological pattern of population growth. It does mean birth is less than the number of death. Some countries of Europe have positive growth rate and that is due to immigrants. USA is witnessing a lesser number of white babies in competition to number of death of whites. China has also the club of having more death and lesser birth. India is lagged and that is due to laissez-faire social and political vision of country.

Objective and Approach

The main objective of this paper is to invite Social Scientist's ideas and vision on the population scenario of India and China. Both have huge size of population. There is a need to provide idea on the sustainable management of population. The analytical part of this paper is principally based on secondary data principally collected from the statistical reports of the World Bank, UNFAA, Census of India and National Sample Survey Organisation.

Present demographic status of India and China

On 19 April, 2023, India became the largest population size country of the world. After the Census of 1921, there has been no census indicating decline in population growth. China's last decline was in 1963-64 census and that was due to cultural revolution in the country. After 60 years, the decline is repeated. This time, China reported about 35 lakh less population and that caused India becoming the largest size population holding country of the world. Possible causes of decline in China are :

* Former Head, Dept. of Geography, Patna University, Patna, Ex- Vice Chancellor, Patna University, Patna & Nalanda Open University Patna. This paper is the 24th foundation Day Lecture of AGBJ delivered of Dept. of Geography, Ranchi, University on 25.4.2023

Geographical Perspective

- i. Decline in marriage institution as boys outnumber girls in a big way. It is due to single baby policy till the last year.
- ii. Couple separation is rapidly increasing.
- iii. Increase in the number of non-productive persons.
- iv. Covid-19 impact, which is not officially declared by China but there are global belief that thousands of people died in China during the pandemic period.

There are a tables just below. Table one reveals that per day population growth of China had become only 15139 persons while India had 45,542 in 2000 AD. Per day growth gap was enough to make India largest population size country. Table 2 shows comparative trend of population growth in both countries since 1800 AD. If the present trend continues, India's population size will be about 59 cr. more in comparison to China in 2100 AD. Table 3 shows how the situation changed in this year (2023). Table 4 was released by UNFPA in 2014 projected the population of the world, India and China. As per projection, India was expected to replace China only after 2025 but this projection is established wrong by India when it replaced China in population size in 2023.

Table-1. Top Ten Countries having per day population growth, 2020

Sl. N.	Country	Population Growth Per Day
1	India	45,542
2	China	15,139
3	Nigeria	11,550
4	Pakistan	8,721
5	U.S.A.	7,371
6	Indonesia	6,552
7	Bangladesh	5,256
8	Congo (D.R.)	4,990
9	Ethiopia	4,910
10	Brazil	4,560

Source : UNFPA Report, 2022

Table-2. Comparative Trend of Population Growth in India and China

India	Year	China
20	1800	33
23.5	1850	40.9
29.9	1900	40.1
35.7	1950	54.3
106.0	2000	126.0
143.0	2023	142.0 (Project)
167.0	2050	131.0 (Project)
135.0	2100	76.0 (Project)

Source : UNFPA Report, 2002

Table-3. Actual Size of April 19, 2023

Population in Cr.		% of World Population	
India	142.86 Cr.	17.77%	35.50%
China	142.57 Cr.	17.73%	
World	804 Cr.	100.00%	

*India has 29 lakh more than China. The table is based on UNFPA Report, 2023

Table-4. UNFPA Projection in 2014

Years (Persons in Billions)	1950	2013	2025	2050	2100
World	2.53	7.16	8.08	9.55	10.85
India	0.38	1.25	1.42	1.62	1.55
China	0.54	1.39	1.45	1.38	1.09

*It was projected that India will overtake China in 2028, we won the race 5 years before.

Politics of Population

The world population achieved 500 crore persons mark on July 11, 1987. The 500th crore girl baby was born in China. Gorbachov, Soviet Union President said that this is the victory of technological development of the world. He congratulated the girl baby and wished to see her having grand success in life. It was based on leftist philosophy, which states, population increases, increases the labour force/workers and this will help in reducing the economic gap and establishing the socialistic socio-political order in the world. American President Ronald Regan on the other hand said, it is not to celebrate. It will increase poverty and disparity. It will also bring pressure on the limited resources of the world. Now after India passing over China, the Chinese Ministry of External Affairs Commented on April 20, 2023 “Size is not important, quality is important.” The statement also reported :

- i. China has 90 crore workers (16-59 years). They are talented and have a skill to compete with the population of any country in the world.
- ii. Our young population stays on an average 10 years in the school.
- iii. We are reconsidering three baby policy revival.

However, there has not been any official statement from the Government of India side till date.

Success Story of India

If you put one person upon another in sequential order, we shall makes six times journey to moon. Once Dr. K.N. Singh (1984) had said, “If all Indians go urinating at one time, there maybe an unprecedented flood in Singapore.” In spite of such large size of population, India could manage population growth to a greater extent. It is believed that there would have been 14 cr. more persons in the total populaiton of India in 2001, if population control measures would have not been adopted.

Table-5 : Success story of Demographic Attributes

- (a) TFR – 1962 – 3.4
– 2020 – 2.0
- (b) Life Expectancy – 1960 – 45.2 years
– 2020 – 71.2 years
- (c) Infant Death – 1960 – 162/1000
– 2020 – 26/1000
- (d) Crude birth rate (2020):
Rural – 23.3/1000
Urban – 12.6/1000
National – 21.8/1000
- (e) Age Structure (2023)
0-14 years – 25.69%
15-64 years – 67.51%
65 and above year – 06.80%

The above stated figures in Table 5 makes it clear that the early rapid growth and present nearly rationalised growth have made India a country having largest size of demographic divided where 67.51 percent population is in between 15–64 years age group. They are both biologically fertile and economically productive. In fact 28.5 years (2011) is the median age group of population and about 70 cr. persons are below this age group. They are potential demographic dividend. Their education, health care facility, skill development and quality education will make them in the centre of the world economic system.

Is there any Population Policy ?

No one is to answer in India. It is a fact that population is a burden over the resources. This burden can be sustainably managed by adopting two facet policy. First need is to convert them as human resource. National Education Policy, 2020 states that there is a need to create knowledge economy which would make India an economic power in the world. Job opportunities creation and skill development are to be developed as socio-economic foundation base for sustainable use of human resource. The 2nd need is to reduce the birth rate. Even without coherise methods (as adopted during the emergency period), better education, empowerment of girls, health case facilities including supply of nutrients and safe delivery, health insurance etc are such indirect approaches which can reduce birth rate to the level of replacement.

It is estimated that the decline of absolute growth in population may begin by 2050 but long term policy has taken the year of 2026 as the year when stability will begin in India's population. The Ministry of Health and Family Welfare is managing the population growth syndrome of India. It is very heartening to see that India is heading towards replacement level without any tough policy approach as China took one baby policy is early seventies of the last country. Now China has come over 2-baby policy and even thinking to shift over 3-baby policy. Rapid demographic ageing and lack of replacement group is a big challenge to China's

economy, geo-polity, society and the political system of the country.

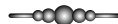
Although India was among the first few countries who framed National Population Policy in 1976, immediately after Budapest global summit on population. But its misuse during emergency period and the change of government at centre, brought a liberal approach where literacy, job, women empowerment etc. were emphasised. It is also known as “Karunakaram Model” because he as the Chief Minister of Kerala had successfully controlled high fertility by literacy and job mission for girls. At the same time, literacy, higher education, technical education and job opportunities in small sector and household sectors were created on large scale. Such kind of policy was later on adopted by many south Indian states and due to that Tamilnadu, Goa and Andhra Pradesh are other states where high fertility is not a challenge. However, northern states, particularly Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, Jharkhand and Chhattisgarh need to be more effective through policies and development programmes to reduce the challenges of high fertility.

Conclusion

The total population of India has now overtaken China to become the largest population size country of the world. Both countries together have about 35 per cent population of the world. It is however, important to understand that the size is not so important as the quality matters. Indian young population (up to 15 years) spends only 5-7 years in the school while Chinese young population spends 10-13 years in the school. The school education provides foundation base to make a citizen enable to act globally. India needs to strengthen school education and also skill development programmes at higher level of education. Although, these are enough provision in the National Education Policy 2020 in this regards but successful implementation is another challenge. Some states are yet to take initiative in this regard. The new system of education is the only way to transform India's large size population as an opportunity for socio-economic development of the country.

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A REVIEW OF CLIMATE-SMART AGRICULTURE THROUGH CLIMATE-SMART LANDSCAPES : RECENT ADVANCEMENTS, CHALLENGES, AND FUTURE PROSPECTS

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ABSTRACT

Agriculture production is under threat from global climate change. Global climatic modification has posed severe threats to agricultural system. Reducing greenhouse gas (GHG) emissions and guaranteeing food security are considered the utmost challenges of this period. Climate-smart agriculture (CSA) is a concept that can deliver a solution to the challenges that agricultural system faces. It can accomplish in a sustainable and ecofriendly way by increasing adaptability, reducing GHG emissions, and safeguarding national food security. So far, little research has systematically reviewed the developments in CSA in developing and in developed countries. For agricultural systems to attain climate-smart objectives, containing enhanced food security and rural livelihoods as well as climate change adaptation and mitigation mechanism, it is imperative to adopt a landscape approach; they must be converted into 'climate-smart landscapes'. Climate-smart landscapes function on the principles of integrated landscape management, while clearly integrating adaptation and mitigation into their management objectives.

Reviewing the recent developments, difficulties, and potential future orientations of CSA will be both timely and beneficial. The definition of CSA and its development objectives are discussed in this study. The most recent CSA developments in industrialized and developing nations are then examined. The current issues and difficulties in CSA are examined and identified. Finally, suggestions for the future prospects and directions of CSA are made. An evaluation of climate change dynamics related to agriculture recommends that three key features illustrate a climate-smart landscape: climate-smart practices at the field and farm scale; diversity of land use across the landscape to provide resilience; and management of land use interactions at landscape scale to achieve social, economic and ecological impacts. To implement climate-smart agricultural landscapes with these features necessitates several institutional machineries: multi-stakeholder arrangement, supportive landscape governance.

This review offers fresh ideas and tactics for improving environmental protection, boosting agricultural green growth, and reducing climate change. To realize climate-smart landscape initiatives extensively and at scale will involve strengthened technical capabilities, institutions and political support.

Keywords: Climate change adaptation, Climate change mitigation, Climate-smart agriculture, Integrated landscape, climate-smart agriculture

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Introduction

Climate change alters agricultural productivity and food systems, creating uncertainty and vulnerability concerns for farmers and policymakers equally (Vermeulen et al., 2013). There is no doubt that the effects of climate change pose significant challenges to global food security, and this is projected to get worse in the coming years due to livelihood pressures such as population growth, economic development, urbanization, and the occurrence of natural hazards such as extreme temperatures, drought, and floods, among others. It is predicted that the standards of living of around 9 billion people globally would deteriorate by 2050, particularly hunger and poverty taking the lead, making it considerably more challenging to put food on the table (Townsend, 2015; Townsend et al. 2021; FAO, 2017). Climate change will certainly have a detrimental effect on agricultural distribution and production, as well as increasing the dangers associated with farming. Crop yields have already experienced serious consequences, underlining the significance of implementing adaptive actions. As a result, several international agencies, including the World Bank and the Food and Agricultural Organization (FAO), are working together to create agricultural systems that will enhance and boost food production at all levels, from global to local. As a result, a global transition to climate-smart agriculture (CSA) has been appreciated by a variety of organizations, including research, elected officials, and investors, as well as stakeholders from the private, governmental, and civil society sectors (Taylor, 2018; Lipper et al., 2014). Climate change is expected to have negative effects on at least 22% of the world's most important crops by 2050, possibly as much as 56% of the land area in Sub-Saharan Africa. The effects may be minimal until 2050, but they are likely to become more severe in the subsequent decades of the century (Easterling, 2007).

Methodology

The review selection method used was the selection literature review procedure. According to Kitchenham and Charters (2007) the review procedure involves of three stages: review planning, review execution, and review reporting. The following query was developed with keywords to search articles: (“Smart Agriculture” or “Smart Farming” or “Precision Agriculture” or “Automatic Irrigation” or “Smart Irrigation” or “Climate smart farming” or “Climate smart landscape” or “Climate change”). The subsequent online bibliographic databases were utilized to search for the above-mentioned keywords: Scopus, IEEE Xplore, MDPI, Springer, Elsevier, SAGE, John Wiley, Taylor and Francis, and Google Scholar. The results from the searches were limited (i.e., query criteria) by year (i.e., articles published between 2005 and 2023), document type (peer reviewed articles), language (English).

A comprehensive review on the current advancements, challenges, and future directions of CSA will be quite timely, appropriate and valuable. In present research work, review is arranged as follows: Section 3 provides a brief link between agriculture and climate change. It reviews few studies done on climate change and agriculture. Section 4 explains the definition and development goals of CSA and briefly explains the key attributes of Integrated landscape management & Climate-smart agricultural landscapes.

Section 5 presents insights about the current advancements of CSA in different countries; Section 6 examines the prevailing complications and challenges in CSA; Section 7 endorses the future prospects and directions for CSA. This review provides innovative ideas and techniques for improving ecological environmental protection, fostering environmentally sustainable agricultural development, and strategies for reducing climate change.

Climate Change and Agriculture

Global warming is an undeniable scientific fact supported by decades of meteorological observations. Green House Gas emitted by human activities retains heat in the atmosphere, leading to increases in global average temperature, and subsequently global climate change. Temperature has risen by around 40% in the last 150 years, almost half of that increase has taken place over the past thirty years (IPCC, 2014; IPCC, 2016). The increased concentration of GHGs has far-reaching consequences, including more extreme weather events, lethal heat waves, severe drought, posing serious obstacles to agricultural production, and ultimately decreasing net crop income and farm value (Leisner, 2020; Hossain, et al., 2018; Arshad, et al., 2017). Agriculture has a huge carbon footprint, accounting for more than 25% of worldwide anthropogenic GHG emissions. Soil organic matter decomposition and agricultural residue burning are the primary sources of carbon dioxide (CO₂) emissions in agriculture. Agricultural methane (CH₄) emissions are caused by flooded soil during rice planting, intestinal fermentation in cattle digestive systems, and moist degradation of feces and crop leftovers. Nitrous oxide (N₂O) emissions from agriculture are mostly caused by nitrogenous soil, manure, and compost. Globally, economic and population growth are the most important driving reasons for rising GHG emissions, which are expected to rise further in the future (Jat, et al., 2022). As a result, lowering GHG emissions and ensuring food security are regarded as the most pressing concerns of the twenty-first century (Amundson and Biardeau, 2018).

Climate-Smart Agriculture (CSA)

CSA pledges to transform and reorient agricultural development to address the challenges of climate change (Lipper, 2014). The CSA framework provides a platform for examining how livelihood assets operate and how they are influenced by policy processes and institutions, as well as the technologies needed for rehabilitative transformation in agriculture (Palombi and Sessa, 2013). By accelerating cross-scale mitigation and adaptation partnerships, CSA aims to strengthen ties between global, national, and local agricultural stakeholders. As research and policy ties between climate change and agriculture progressed, the concept of 'climate-smart agriculture' has appeared as a framework that seeks to capture the idea that agricultural systems can be developed and implemented to enhance food security and rural livelihoods while simultaneously facilitating climate change adaptation and offering mitigation benefit since its inception in 2010, international institutions, primarily the United Nations Food and Agriculture Organization (FAO) and the World Bank, have fostered the development of this concept and its application [15,16]. As the concept grew, the Consultative Group on International Agricultural Research (CGIAR) delivered leadership to the international research community (Nelson et al., 2010; Moorhead, 2009). climate-smart agriculture

comprises many of the field-based and farm based sustainable agricultural land management practices such as conservation tillage, agro forestry, residue management, and others. Climate-smart agriculture (CSA) is a concept that intends to convert, refocus, and improve agricultural systems based on sustainable technology in order to contribute to increased global food security as part of climate change adaptation and mitigation efforts (FAO, 2010). CSA includes practices that contribute to better resource management (e.g., land and freshwater use), ecosystem development and management, and sufficient digital amenities for farmers to ensure the adoption of necessary changes (e.g., smart farming technologies). The concept of CSA emerged as a promising and viable solution to secure food for the world's rising population in the face of climate change (McCarthy et al., 2011). The Food and Agriculture Organization of the United Nations (FAO) describes CSA as "agriculture that sustainably increases productivity, strengthens resilience, reduces greenhouse gas emissions, and improves achievement of national food security and development goals." The concept indicates a desire to promote agricultural production and climate responsiveness. It strives to achieve food security and broader development goals in the face of climate change and rising food demand. The CSA includes both conventional and recent agricultural productivity and income-generating methods and technology. It also increases resistance to climate change and, where possible, reduces greenhouse gas (GHG) emissions. It is supported by three major pillars: (a) enhancing agricultural output; (b) improving adaptive capacity at various levels (from farm to nation); and (c) decreasing greenhouse gas emissions.

Integrated landscape management & Climate-smart agricultural landscapes

Integrated landscape management has emerged as an organizing framework for action and policy within the agricultural development and conservation sectors, parallel to the development of the climate-smart discourse. Integrated landscape management strategies are designed to enhance food production, ecosystem conservation, and rural livelihoods across overall landscapes. These are known under numerous terms including ecoagriculture, landscape restoration, territorial development, model forests, satoyama, integrated watershed management, agro forestry landscapes, and the ecosystem approach to managing agricultural systems, among many others. The integrated landscape strategy offers a way to accomplish climate-smart agriculture goals at scale and in all its components. Through coordinated action at the farm and landscape scales, significant advantages for agricultural production, climate mitigation and adaptation, as well as other socioeconomic and environmental objectives, can be developed through climate-smart agricultural landscapes. Climate-smart agricultural landscapes follow the concepts of integrated landscape management while openly incorporating adaptation and mitigation into their management goals. A investigation of the dynamics of climate change in agriculture identifies three crucial components, that describes the characteristics of a climate-smart landscape: Climate-smart field and agricultural techniques; landscape-scale land use diversification; and landscape-scale land use interaction management. Climate-smart landscapes are made up of a variety of field and farm activities on various types of land and tenure that serve both adaptation and mitigation goals. These methods encompass soil, water, and nutrient management, as well as agro forestry, livestock,

Geographical Perspective

husbandry, and forest and grassland management techniques (Bank, 2011). Achieving the adaptation and livelihood objectives of climate-smart agriculture also depends on more effective management of water, a resource that is under threat from climate change. To increase water use efficiency and conservation, best practices for irrigation, water harvesting technology, and terrace or contour farming methods can all be helpful (Milder et al., 2011).

Recent Advancements of CSA in Different Countries

Climate Smart Agriculture in Developing Countries

Agriculture serves as the primary economic engine for many emerging nations. In poor countries, climate change poses a variety of complicated threats to agricultural output and food security. Therefore, when adopting CSA development goals in these developing countries, enhancing agricultural production efficiency, safeguarding food security, and promoting economic growth should be given the highest priority.

Table 1 : Adaptation methods for CSA in different countries.

Country	Representative Countries	Major Difficulties	Adaptation Measures for CSA
Developing countries	Maharashtra of India in Asia	<ul style="list-style-type: none"> • Significant climate risks; • Lack of irrigation water; • GHG emissions. 	<ul style="list-style-type: none"> • Irrigation water management technologies, such as well digging, pipe well, rainwater collection, drip irrigation, and other groundwater extraction methods; • Combined with nutrient management methods, such as farmyard manure, earthworm compost, and straw residue incorporation.
	Namibia in Africa	<ul style="list-style-type: none"> • Significant climate risks; • Low yield; • GHG emissions. 	<ul style="list-style-type: none"> • Collecting nutrient rich earthworm compost leachate; • Carrying out hydroponic cultivation; • Planting mushrooms along the coast of the Namib Desert; • Gathering fog water.

Developed countries	California in the United States	<ul style="list-style-type: none"> • Flexibility of agricultural system; • GHG emissions; • Production efficiency. 	<ul style="list-style-type: none"> • Upgrading underground water pumps; • Installing drip irrigation or micro sprinkler irrigation systems; • Formulation and implementation of policies.
	Switzerland in Europe	<ul style="list-style-type: none"> • Impacts of climate change on agricultural development; • GHG emissions. 	<ul style="list-style-type: none"> • Recycling the waste generated by the farm itself to the biogas plant for free; • Production of renewable energy.

India's state of Maharashtra is home to a sizable climate risk area. The shortage of irrigation water during dry seasons is Maharashtra's major problem with agricultural production. Therefore, irrigation water management technologies like well digging, pipe wells, rainwater collection, drip irrigation, and other groundwater extraction techniques can be used to end the drought. Sprinkler irrigation and other micro irrigation technologies can be combined with nutrient management techniques like farmyard manure, earthworm compost, and straw residue incorporation to increase the efficiency of fertilizer and water use, increase agricultural productivity, and reduce greenhouse gas emissions (Rao et al., 2013; Khatri-Chhetri et al., 2019). Local cotton growers in Pakistan follow the CSA concept and level the field with bed seeders and lasers. Protective agricultural practices are utilized in Zambia in South central Africa, including organic mulching of farmland's surface crops, rotation of cereals and legumes, and enhanced crop types. These initiatives in Zambia have the power to increase soil fertility and carbon fixation capacities, significantly increase average grain yields, and effectively ensure local food security (Kaczan et al., 2013). Farmers in Nepal use management techniques, such as no tillage, crop rotation, and returning straw to the field, to enhance soil biological activity, consumption of water effectiveness, and physical attributes (Gairhe et al., 2021). In the Mekong Delta of Vietnam, using superior rice varieties, enhancing sowing and harvest dates, minimizing the use of chemical fertilizers, and changing irrigation designs have all assisted farmers in raising crop yields, lowering production costs, and ensuring food security (Ho and Shimada, 2019).

Climate Smart Agriculture in Developed Countries

For industrialized nations, this implies an advanced agricultural sector, high economic productivity of agricultural products, comparatively large per-capita land resources, and

Geographical Perspective

completely automated, intensive production. Because of this, the CSA's development goals in these advanced economies are largely concerned with reducing GHG emissions and enhancing agricultural capacity to adapt to climate change. They must include the latest technologies, pay careful consideration to the creation and execution of rules and regulations, boost the agricultural system's adaptability, and reduce emissions of greenhouse gases while increasing production efficiency. In order to attain CSA, California, a highly productive and resource-rich agricultural region in the United States, lays a greater emphasis on the sustainable management of water resources and the reduction of GHG emissions. The Californian government sees improving the effectiveness of agricultural water use as a strategy for managing water resources and finding a solution to the water resources problem. Through the use of LED horticulture technology, the Netherlands has improved the sustainability of horticulture and reduced its sensitivity to climate change. When compared to conventional lighting, this LED technology uses less energy, produces less heat, and improves light distribution, which benefits the development of gardening (Long et al., 2016). Switzerland minimizes greenhouse gas emissions through producing renewable energy, recycling farm waste into bio-gas, and supplying farms with excellent fertilizer and nutritional supplements that are strengthened by bio-gas production facilities (Loboguerrero et al., 2019).

Challenges in Climate Smart Agriculture

The production of food around the world and the sustainability of CSA are threatened by climate change induced by human activity. The distributions of light, heat, water, and other agricultural climate resources have been altered by climate variability and climate change. Smallholder agriculture is negatively impacted by climate change, which decreases crop yields, reduces income, and increases food insecurity (McKinley et al., 2021). Increased average temperatures, extended growing seasons, more hot days and nights, irregular precipitation patterns, and higher CO₂ concentrations are all direct effects of climate change on agriculture (Janowiak, 2016). Unexpected environmental factors and climate variability continue to jeopardize some regions' ability to maintain food security. The difficulties in CSA's sustainable development are increased by agricultural GHG emissions. Significant increases in greenhouse gas emissions from human activities have been caused by the use of fossil fuels, changes in land use, and deforestation. The Intergovernmental Panel on Climate Change (IPCC) has emphasized how GHG emissions affect climate change.

Future Prospects of Climate Smart Agriculture

Crop diversification techniques, no-till agriculture, and rice-wheat rotation are a few examples of diverse cropping patterns that can boost agricultural production and minimize greenhouse gas emissions. Utilizing crop residues, increasing nitrogen use efficiency, and minimizing planting are a few recommended soil protection strategies that aim to lower CO₂ emissions. The Internet of Things is mostly utilized in the agriculture sector to gather data from various types of sensors, including environmental and crop factors like temperature, humidity, pH value, leaf color, etc. Many facets of the Internet of Things' adoption in the agricultural sector have been studied, from assessing IoT applications to creating IoT architectures for food

control to examining how the IoT and agriculture UAV are integrated in smart agriculture. Several areas of the IoT's future development for CSA need to be strengthened: First, given the wide range of requests from farmers, the IoT system needs to be very adaptable and adjustable to local conditions. Second, each system's IoT deployment must be effective and configured. Reliable network connections, sound farm infrastructure, and a well-planned allocation of financial and human resources are all necessary. Another prospective focus area for CSA is the application of artificial intelligence. Artificial intelligence (AI) simulates, extends, and expands human intelligence by using a digital computer or other controlled technologies to observe the environment and learn pertinent information. In numerous domains, AI has already proven to have significant advantages. AI can increase crop productivity by precisely predicting the most optimal dates for planting and harvesting, tracking crop health, and reducing the cost of agricultural inputs like fertilizers, pesticides, and irrigation. Therefore, by addressing issues like insufficient precipitation, weed growth, and disaster losses, agricultural risks can be reduced.

Conclusion

This paper reviews the recent advancements, challenges, and future directions of CSA. The issues and difficulties in CSA persist, including the scarcity of agricultural water supplies, climate variability and change, agricultural GHG emissions, and the integration of information resources. In the future, improved crop management practices and the use of cutting-edge internet technologies will assure the security of agricultural data.

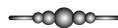
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IMPACT OF ALCOHOL PROHIBITION IN BIHAR : A CASE STUDY OF PATNA MUNICIPAL CORPORATION

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ABSTRACT

The term "Prohibition" refers to legal prevention of the manufacture, storage, transportation, distribution, sale and consumption of alcoholic beverages with the aim of obtaining total abstinence through legal means. On 26 November 2015, Bihar CM Nitish Kumar announced that alcohol would be banned in the state from 1 April 2016. However, even after the ban, majority of people still consume alcohol which indicates that alcohol is easily available in the state. Production of low-quality liquor has increased which leads to major health issues. Many suspected deaths due to consumption of spurious liquor continued being reported. Due to illegal sales, the price of alcohol has doubled. Other substances are replacing alcohol as a new addiction source such as nicotine, weed, drugs, syrup, LSD, etc. There are some positive sides to the prohibition too, such as an overall reduction in crime rate by 63.72 per cent, decrease in the cases of road accidents by 69.6 per cent, reduction in domestic violence against women by 76.47 per cent, etc. For the current study, a total of 102 respondents were selected from Patliputra and Kankarbagh circle of PMC Area. According to these samples, availability of alcohol in Bihar is 57.8 per cent. Recovery of liquor bottles was made by the municipal employees within the Kankarbagh colony drainage system. 55.9 per cent of data collected indicates that there is no ban on liquor sale. The success of liquor ban in limited but the decrease in consumption level have improved road safety and safety of women.

Keywords: Prohibition, Alcohol Ban, Addiction.

Introduction

The term "Prohibition" refers to legal prevention of manufacture, storage, transportation. Distribution, sale and consumption of alcoholic beverages with the aim of obtaining total abstinence through legal means. The anti-liquor movement in the West is nearly two-centuries old. Most countries that introduced prohibition have withdrawn or liberalized the measure like the U.S, Japan, China, etc. At present, there is complete prohibition of liquor in 5 countries in the Middle-East/ North Africa which include Afghanistan, Libya, Saudi Arabia, Somalia and Sudan. Entry 51 in the State List makes 'Alcohol for human consumption' a subject matter of States. At present, Alcohol Prohibition in India is in force in the states of Bihar, Gujarat, Mizoram and Nagaland. All other Indian states and union territories permit the sale of alcohol;

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while partial bans are existent in Lakshadweep and Manipur. The Directive Principles of State Policy (DPSP) in the constitution of India (Article 47) stated that "...the State shall endeavour to bring about prohibitions of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health." National Prohibition was advocated by Mahatma Gandhi, as well as by many Indian women. On 26 November 2015, Bihar Chief Minister Nitish Kumar announced that alcohol would be banned in the state from 1 April 2016.

The current study has analysed the impact of alcohol Prohibition in the State of Bihar with special reference to Patna Municipal Corporation Area, Bihar.

Literature Review

Singh (2016) in his study "Prohibition of Alcohol in Bihar: A Study of Socio-Economic Impact" stated the socio-economic impact of alcohol prohibition in Bihar and concluded that a total ban led to revenue losses and gave rise to the black market and underground production. But Bihar has entered into social and cultural evolution. Vatsyayan (2019), published an article entitled "Alcohol prohibition in Bihar: a policy analysis" which summarizes a policy analysis of positive and negative effects of alcohol prohibition in Bihar. Sexual violence research initiative (2020) published by Reddy and Bharti concluded that the policy results seem to be a decline in crime against women in Bihar.

There is no such study conducted in Bihar or Patna regarding if the ban exists in the State and the impact of the ban on the residents of Bihar. The current study is being conducted to fill the gap.

Objectives

Amid existing scenario, the main objectives of the current study are:

1. To analyze the success of liquor ban in Patna.
2. To find out the degree of ban implemented in Patna.
3. To examine the women's safety standards after the ban.
4. To examine the impact of the liquor ban in Patna.
5. To examine the changes in living conditions of the people of Patna after the ban.

Hypotheses

The present study is based on these working hypotheses:

1. The sale of alcohol continues even after the ban.
2. Ban on liquor has led to an increase in other forms of substance abuse.
3. Cases of domestic violence have decreased after the ban.
4. Women are safer in the city after the ban.

Methodology and Database

For a reliable and valid conclusion of present paper, pre-field survey, field survey and post field

Geographical Perspective

survey has been conducted. Pre field survey included the study of relevant literature, collection of study materials, data and maps, visiting libraries, concerned websites and concerned government offices. Data collection has been arranged for statistical and cartographic treatment. Questionnaire was prepared based on the response patterns noticed during the pilot survey. Field survey included primary data collection with the help of prepared questionnaire. Stratified Random Sampling was used in this study. Compilation, tabulation, and cartographic treatment of data collected through primary survey was done to find out the results in post field survey. Hypothesis testing was done with the help of Chi-square test.

A total of 102 samples of people between the age group of 16-75 years residing in Patliputra circle and Kankarbagh circle of Patna Municipal Corporation Area have been selected in this study. Among 102 respondents, 51 were from Kankarbagh circle and 51 were from Patliputra circle as well.

Study Area

The study area for current study is the Patna Municipal Corporation Area. Patna, the capital city of Bihar is situated on the southern levee of river Ganga backed by curvilinear depression and incidentally is one of the ancient cities of India as well. It is surrounded by three rivers: The Ganga, the Gandak and in the past the Sone. The river Punpun flows parallels to the Ganga and joins it at 12 kms east at Fatwa. It is situated at a crossroad of $25^{\circ}36'7.99''N$ latitudes and $85^{\circ}79.7''E$ longitudes. It is the largest city of the state spreading over an area of 108 sq. km. The Municipal Corporation Area has been divided into 75 wards, which has been further re-grouped into 6 circles, namely – Patliputra Circle, Bankipur Circle, New Capital Circle, Kankarbagh Circle, Azimabad Circle and Patna City Circle.

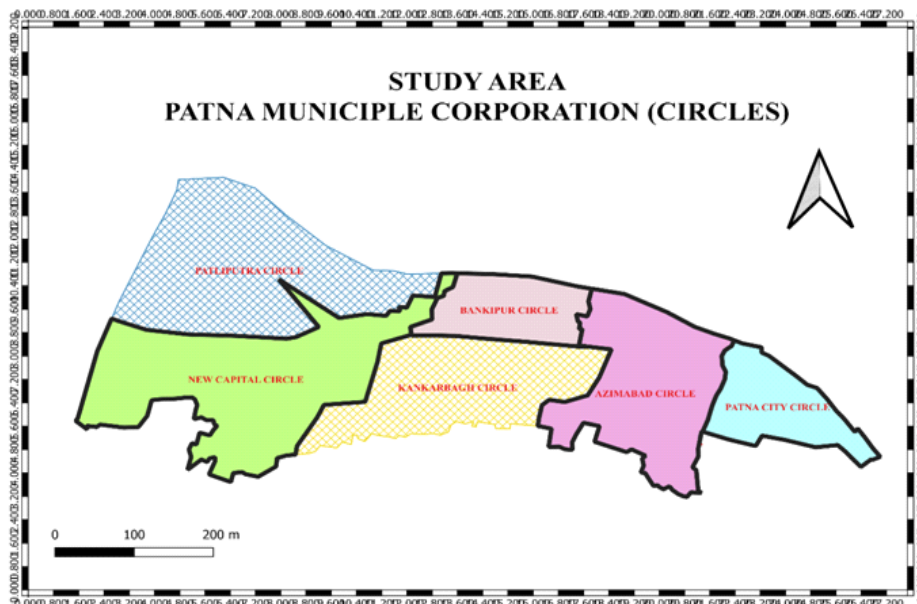


Figure 1 : Study Area : Patna Municipal Corporation

Alcohol Prohibition in Bihar

On November 26, 2015 a complete ban on alcohol was announced in the State which would be in action from 1 April 2016. On September 30, 2016 Patna High Court ruled that the ban is “illegal, impractical and unconstitutional.” Bihar government launched a new version of Bihar Prohibition and Excise Act on October 2nd 2016. The act brought in stricter measures, with all sections in the act being non-bailable. In 2018, the fine was Rs. 50,000 for first time offenders as per the amendment. If caught for the second time, he will be fined Rs. 1,00,000 and 5 years of jail. In a fresh amendment in 2022, it was decided that those caught drinking alcohol for the first time would be released after they pay a fine between Rs. 2,000 to Rs. 5,000. If he/she is unable to pay the fine, they have to undergo 30 days imprisonment, and if caught for a second time, they have to undergo 1 year of jail. This relaxation in punishment has led to fearless consumption in the people of the state.

Results and Discussion

With the above-mentioned background, the current study has been done in Patliputra and Kankarbagh circle of Patna Municipal Corporation Area, Bihar with the help of 102 respondents divided equally among both the circles.

Demographic Composition

Demographic composition is an important variable that is necessary for almost all classifications related to population characteristics. Young population of the State are vulnerable and interested in this vice. Table 1 shows age-sex composition of the respondents.

Table 1 : Demographic composition of respondents of PMC Area*

Age Group	Kankarbagh Circle (%)		Patliputra Circle (%)		Total(PMC) (%)
	Male	Female	Male	Female	
16-25	62.74	1.96	37.25	35.29	68.62
26-35	13.72	11.78	11.78	7.84	22.54
36-45	1.96	1.96	1.96	1.96	3.92
46-55	0	0	0	0	0
56-65	1.96	1.96	1.96	0	2.94
66-75	0	1.96	1.96	0	1.98
Total	100		100		100

*Based on Sample Survey, 2022

Geographical Perspective

It is evident from Table 1 that most of the respondents, i.e. 62.74 percent of male in Kankarbagh Circle, 37.25 percent male in Patliputra Circle and 35.29 percent female in Patliputra circle belonged to the age group of 16-25 years. A very few aged populations ranging between the age group of 56-65 and 66-75 were also selected as sample population. This survey has covered almost all the age-groups.

Level of Qualification

Level of education influences individuals' opinions regarding consuming alcohol. Education makes them aware about the long-term consequences of consuming alcohol, education creates awareness.

Table 2 depicts the level of education of respondents.

Table 2 : Level of Qualification of respondents of PMC Area*

Level of Qualification	Kankarbagh Circle (%)	Patliputra Circle (%)	Total(PMC) (%)
10 th	3.92	0	1.96
12 th	19.60	17.64	18.62
Graduate	47.08	54.92	52.94
MBA/Vocational	5.88	3.92	2.94
PG and Above	11.76	15.68	9.8
Not Educated	11.76	7.84	13.74
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 2 that majority of respondents, i.e. 47.08 percent in Kankarbagh circle and 54.92 percent in Patliputra circle were graduates. 19.60 percent in Kankarbagh circle and 17.64 percent in Patliputra circle had studied till 12th. 11.76 percent respondents in Kankarbagh circle and 15.68 percent respondents in Patliputra circle were pursuing higher education such as post graduate and above and a very few respondents, i.e. 5.88 percent in Kankarbagh circle and 3.92 percent in Patliputra circle had any vocational or technical degree.

Personal Income

Personal income of respondents is an important factor of socio-economic condition. Higher level of income ensures better living condition provided the consumption pattern is judicious. Table 3 indicates personal income level of respondents covering all segment of population in both circles of Patna M.C.

Table 3 : Personal Income of Respondents of PMC Area*

Income	Kankarbagh Circle(%)	Patliputra Circle(%)	Total(PMC) (%)
Less than 5000	49.1	52.9	50.9
5000- 15000	21.7	19.7	20.8
15000- 25000	17.6	13.7	15.7
25000- 50000	1.96	13.7	7.8
More Than 50000	9.9	0	4.9
Total	100	100	100

*Based on Sample Survey, 2022

It is clear from the Table 3 that the average income of the respondents in both the areas varied in the category less than 5000 and 5000 -15,000, which share 50 percent of the total population. There were very less percentage of respondents in Kankarbagh circle whose personal income was more than 25,000-50,000. The overall percentage of more than Rs.50,000 income group shared 4.9 percent of the total population.

Standard of Living

The living condition of common people reflects the socio-economic, political and environmental development of a country. Standard of Living is a tool used which includes wealth level, comfort, goods and necessities that are available for every individual. It is measured by income, employment opportunities, cost of goods and services. Figure 2 shows standard of living of respondents.

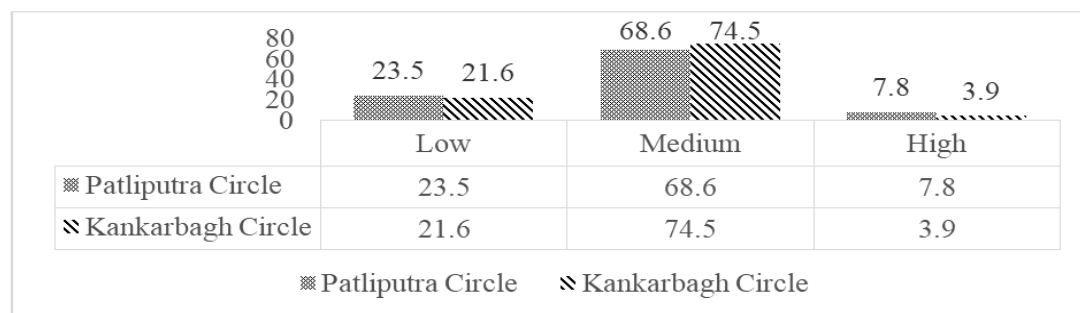


Figure 2 : Standard of Living of Respondents of PMC Area*

*Based on Sample Survey, 2022

Figure 2 shows that most of the respondents, 71.6 percent had medium standard of living. In Patliputra circle, 7.8 percent had high standard of living and 23.5 percent had low standard of living. In Kankarbagh circle only 3.9 percent had high, and 21.6 percent had low standard of

Geographical Perspective

living. This showed that due to low income and less employment opportunities in Patna municipal corporation area people could not afford high standard of living.

Consumption of Alcohol

Alcohol consumption significantly affects India's mortality and morbidity rates. The country rates high for years of life lost due to alcohol. Alcohol consumption in India amounted to about five billion litres in 2020 and was estimated to reach about 6.21 billion litres by 2024. The increase in consuming these beverages can be attributed to multiple factors including the rising levels of disposable income and a growing urban population among others. Table 4 shows the level of alcohol consumption in the PMC area.

Table 4 : Alcohol Consumption by Respondents in PMC*

Consume	Patliputra Circle(%)	Kankarbagh Circle(%)	Total (PMC) (%)
Yes	56.9	70.6	63.7
No	43.1	29.4	36.3
Total	100	100	100

*Based on Sample Survey, 2022

It is derived from Table 4 that majority of the respondents in both areas consumed alcohol. 63.7 percent of the total respondents consumed alcohol, 70.6 percent in Kankarbagh Circle and 56.9 percent in Patliputra Circle Area. Only 36.3 percent of respondents did not consume alcohol. The majority of respondents were young, consuming alcohol due to lack of employment opportunities and family disputes.

Frequency of Consumption of Alcohol

According to the U.S. Department of Health and Human Services, adults of the legal drinking age can choose not to drink or to drink in moderation by limiting intake to 2 drinks or less in a day for men and 1 drink or less in a day for women when alcohol is consumed. Drinking less is better for health than drinking more. Consuming more than two to three drinks per day ups the risk for cancer and heart problems. Table 5 shows the level of alcohol consumption by respondents in PMC.

Table 5 : Level of Alcohol Consumption by Respondent in PMC*

Consumption of Alcohol	Patliputra Circle (%)	Kankarbagh Circle (%)	Total (PMC) (%)
Rarely	49.0	45.0	47.1
Occasionally	25.5	31.4	28.4
Frequently	13.7	11.8	12.7
Daily	11.8	11.8	11.8
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 5 that, most of the Respondents in both areas very rarely consumed alcohol which was 45.0 percent in Kankarbagh Circle and 49.0 Percent in Patliputra Circle. 25.5 percent in Patliputra Circle and 31.4 Percent in Kankarbagh Circle consumed occasionally. Only 11.8 percent of surveyed respondents had a daily consumption. The data indicate high alcohol-drinking frequencies among younger adolescents, and confirms an extremely early contact with alcoholic beverages in PMC.

Availability of Alcohol in Bihar

Commercial and public availability of alcohol can have a reciprocal influence on the social availability of alcohol and thus contribute to changing social and cultural norms that promote the harmful use of alcohol. The level of regulation on the availability of alcohol will depend on local circumstances, including social, cultural, and economic contexts. Table 6 shows the availability of alcohol in PMC.

Table 6 : Availability of Alcohol in PMC*

Access	Patliputra Circle (%)	Kankarbagh Circle (%)	Total (PMC) (%)
Available	60.8	54.9	57.8
Not Available	39.2	45.1	42.2
Total	100	100	100

* Based on Sample Survey, 2022

It is evident from Table 6 that 54.9 percent of the respondent of Kankarbagh Circle and 60.8 percent of respondents of Patliputra Circle believed that they had access to alcohol in Bihar despite the alcohol ban in Bihar. 39.2 percent in Patliputra Circle and 45.1 percent in Kankarbagh Circle did not have access to alcohol in Bihar. 57.8 Percent of total respondents believed that Liquor prohibition was not being followed well in Bihar.

Price of Alcohol in Bihar after the Ban

After the ban, it is obvious that there would be an increase in price of alcohol within the district because of the risks involved as the transportation is not easy as there is strict checking by the officials.

Table 7 : depicts if there was an increase in price of alcohol or not.

Table 7 : Price of Alcohol in Bihar after ban*

Price of Alcohol	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample(PMC) (%)
Same as before	23.52	29.41	26.47
Increased	76.47	76.47	73.53
Total	100	100	100

*Based on Sample Survey, 2022

Geographical Perspective

It is evident from Table 7 that whereas 23.52 percent respondents in Kankarbagh circle and 29.41 percent respondents in Patliputra circle said that the price of alcohol was same as before, a total of 76.47 percent respondents in Kankarbagh circle and 70.59 percent respondents in Patliputra circle said that the price of alcohol had increased after the ban.

Effects of Alcohol Prohibition

The ban has some positive as well as some negative impacts. We will have a closer look on both aspects of the ban in the following sections.

Positive Effects of Alcohol Prohibition

Some of the positive effects of this ban were major health benefits, it was helpful in curbing gender violence and reduction in crime rate.

Crime Reduction after Alcohol Prohibition

One of the major problems with people consuming alcohol was the crime rates in the district during that time. Drunk people often committed crimes such as theft, burglaries, murder, etc.

Table 8 shows if the crime has decreased in the district after the ban.

Table 8 : Crime Reduction after Alcohol Prohibition*

Decrease in Crime	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample(PMC) (%)
Decreased	56.86	70.58	63.72
Not decreased	43.14	29.42	36.28
Total	100	100	100

*Based on Sample Survey, 2022

Table 8 clearly shows that 70.58 percent respondents in Patliputra circle and 56.86 percent respondents in Kankarbagh circle agreed to the decrease in crime after alcohol prohibition. A total of 63.72 percent respondents agreed that the crime in the district had decreased.

Decrease in Road Accidents after Alcohol Prohibition

Drunk driving is a major issue and majority of road accidents are caused due to drunk driving. After the ban, it is assumed that there would be a decrease in cases of road accidents.

Figure 3 shows if the road accidents have decreased after the ban.

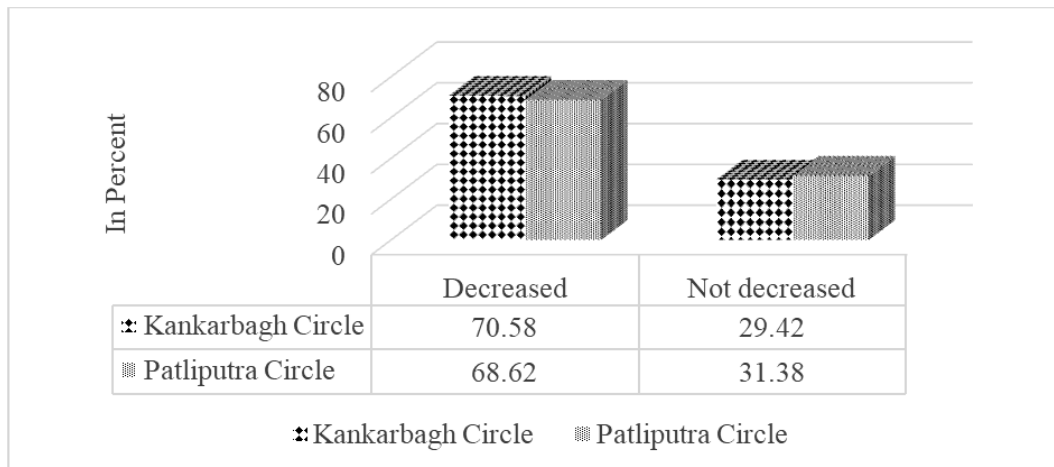


Figure 3 : Decrease in Road Accidents after Alcohol Prohibition*

*Based on Sample Survey, 2022

Figure 3 clearly indicated that there was a decrease in the cases of road accidents after the ban as 70.58 percent respondents in Kankarbagh circle and 68.62 percent respondents in Patliputra circle agreed that the road accidents have decreased. A total of 69.60 percent respondents from both the circle have agreed to decreased road accidents.

Decrease in Violence Against Women after Alcohol Prohibition

Cases of domestic violence due to alcohol consumption was at peak when alcohol was available in the district. Drunk husband beating up his wife was a very common scenario. Table 9 shows if the violence against women has decreased or not after the ban.

Table 9 : Decrease in Violence Against Women after Alcohol Prohibition*

Decrease in Violence	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample(PMC) (%)
Decreased	78.43	74.50	76.47
Not decreased	21.57	25.50	23.53
Total	100	100	100

*Based on Sample Survey, 2022

Table 9 clearly shows that the cases of violence against women have decreased as 78.43 percent respondents from Kankarbagh circle and 74.50 percent respondents from Patliputra circle agreed to the decreased violence against women after the ban of alcohol in the district.

Increase in Safety Standards of Women after Alcohol Prohibition

Catcalling, eve teasing, hitting women, kidnapping and rape are some of the crimes committed against women. Drinking has been associated with these crimes and it is assumed that these crimes have decreased after the ban of alcohol in the district.

Table 10 shows whether the safety of women has increased after the ban or not.

Table 10 : Increase in Safety Standards of Women after Alcohol Prohibition*

Safety of Women	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample(PMC) (%)
Safer	68.62	58.82	63.72
Not safe	31.38	41.18	36.28
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 10 that women were safe after the ban in the district as 68.62 percent respondents in Kankarbagh circle and 58.82 percent in Patliputra circle agreed to the safer environment for women in the district after the ban of alcohol.

Negative Effects of Alcohol Prohibition

Some of the negative effects were economic stress on the state because the taxes from alcohol stopped which were helpful in supporting the economy of the state, emergence of black market and bootlegging took place which defeats the purpose of prohibition of alcohol.

Revenue Loss Due to Complete Ban of Alcohol

Alcohol was a major source of revenue in the state. The ban caused an annual revenue loss of around Rs. 5,000 crore. The increased illegal sale of alcohol does not contribute to the economy of the state. Similarly, increased travel to neighbouring states to access alcohol has led to a loss of revenue to tourism industry. Many people looking for fun and recreational holidays skip Bihar as a tourism destination, solely because of Bihar being a dry state. This has been discussed in detail in the following sections:

Revenue Loss Due to Increased Travel to Other States for Consuming Alcohol

A complete prohibition on the sale and consumption of alcohol is driving more people to take travel breaks. Prohibition, a curse for the hotel industry, is turning out to be a boon for travel operators courtesy of a spurt in the outflow of tourists. Neighbouring states are experiencing more tourist visits. Table 11 shows that respondents travel to other States for Consuming Alcohol.

Table 11 : Revenue Loss Due To Increased Travel to the Other States for Consuming Alcohol

Travel to Other States?	Patliputra Circle (%)	Kankarbagh Circle (%)	Total (PMC) (%)
Yes	33.3	52.9	43.1
No	66.7	47.1	56.9
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 11 that majority of respondents did not travel to other states for consuming alcohol. Whereas 33.3 percent of respondents of Patliputra Circle and 52.9 percent of Kankarbagh Circle travelled to other states for consuming alcohol. Due to the liquor ban hotel occupancy in Bihar had plummeted by over half after declining in incoming tourists and increased the number of people taking a picnic break from the state.

The preferred states are Jharkhand, West Bengal and Uttar Pradesh.

Revenue Loss Due to Increase in Illegal Sale of Alcohol in the State

The study indicated that alcohol is easily available in the district through various loopholes.

Table 12 deals with the illegal sale of alcohol in the district after the ban of alcohol.

Table 12 : Revenue Loss Due to Increase in Illegal sale of Alcohol after Alcohol Prohibition*

Increase in Illegal sale of Alcohol?	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample (PMC) (%)
Increase	82.35	86.27	84.31
No change	17.65	13.73	15.69
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 12 that illegal sale of alcohol had increased in the district after the ban of alcohol as 82.35 percent respondents in Kankarbagh circle and 86.27 percent respondents in Patliputra circle agreed that the illegal sale had increased. A total of 84.31 percent respondents from both the circle agreed to the increased illegal sale of alcohol.

Increase in Production of Low-Quality Liquor after Alcohol Prohibition

Ban of alcohol would lead to production of low-quality liquor to meet the requirements of low class or poor people. Figure 4 shows whether production of low-quality alcohol is active in the district or not.

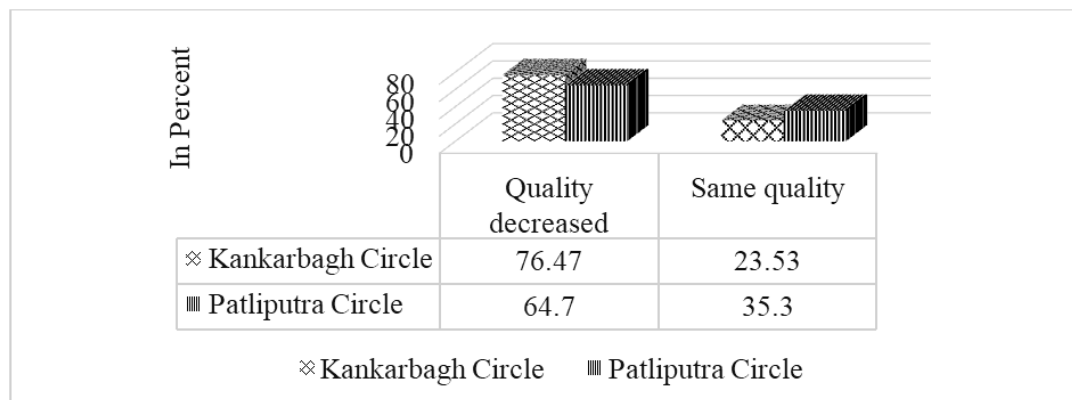


Figure 4 : Increase in Production of Low-Quality Liquor after Alcohol Prohibition*

*Based on Sample Survey, 2022

Figure 4 clearly indicates that the production of low-quality liquor was active in the district as 76.47 percent respondents in Kankarbagh circle and 64.70 percent respondents in Patliputra circle agreed to the active production of low-quality liquor in the district after the ban.

The consumption of low-quality liquor was causing severe health problems among the consumers which apparently led to an increased number of deaths due to alcohol consumption.

Increase in Deaths due to Consumption of Low-Quality Liquor

Alcohol is not good for health and low-quality liquor is even worse. Consumption of low-quality liquor is causing major health issues among the consumers which even leads to death.

Table 13 shows if consumption of low-quality liquor is causing more deaths within the district or not.

Table 13 : Increase in Deaths due to Consumption of Low Quality Liquor*

More Deaths due to Low Quality Liquor	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample(PMC) (%)
More deaths	86.27	90.19	88.23
No change in number	13.73	9.81	11.77
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 13 that consumption of low-quality liquor was causing more death within the district as 86.27 percent of respondents in Kankarbagh circle and 90.19 percent respondents in Patliputra circle agreed to more deaths from consumption of low quality alcohol.

Replacement of Alcohol by Other Intoxicating Substances

Cases of substance abuse have increased after the ban. Drugs, nicotine, weed, syrup are replacing alcohol.

Table 14 deals with the replacement of alcohol by other substances after alcohol prohibition.

Table 14 : Replacement of Alcohol by Other Intoxicating Substances after Alcohol Prohibition*

Are other substances replacing alcohol?	Kankarbagh Circle (%)	Patliputra Circle (%)	Total Sample(PMC) (%)
Replacing	74.50	64.70	69.60
Not replacing	25.50	35.30	30.40
Total	100	100	100

*Based on Sample Survey, 2022

It is evident from Table 14 that other substances are replacing alcohol as a new addiction source. 74.50 percent respondents in Kankarbagh circle and 64.70 percent respondents in Patliputra circle agreed that cases of substance abuse had increased.

Substances that were replacing alcohol were nicotine, weed, drugs, syrup and many more. 23.52 percent respondents voted that nicotine is replacing alcohol, 37.25 percent respondents voted for weed, 14.70 percent respondents said the drug use had increased such as LSD, OCG, etc and 13.72 percent respondents voted for syrup.

Conclusion and Suggestions

The current paper is a comprehensive study of Impact of Alcohol Prohibition in Bihar (A case study on Patna Municipal Corporation). The study clearly indicates that the ban is not implicated properly in Bihar and the prohibition rules are not being followed strictly. The availability of alcohol in Bihar, according to sample survey in April 2022 was 57.8 percent. The NFHS-5 (2019-2020) report said 15.5 per cent of all men consumed alcohol in Bihar, whereas according to the study conducted in April 2022, the consumption rate was 63.7 per cent. The success of the liquor ban in Bihar is not found, all the efforts are taken to ensure the total ban on liquor, but many suspected deaths due to consumption of spurious liquor continued being reported across the state.60.8 percent in Patliputra Circle and 54.9 percent in Kankarbagh Circle feel there is no liquor ban in Bihar and they have access to liquor in Patna Municipal Corporation. Recovery of liquor bottles of different sizes and brands was made by the municipal

employees within the Kankarbagh colony drainage system. Maintaining zero-tolerance against the laxity in duty in ensuring it, actions were taken by police officers. One of the biggest rationales behind the alcohol ban was that it played a role in violence against women. The cases of violence against women have decreased as 78.43 percent of respondents from Kankarbagh circle and 74.50 percent of respondents from Patliputra circle agreed to the decreased violence against women after the ban of alcohol in the district. 68.62 percent respondents in Kankarbagh circle and 58.82 percent in Patliputra circle agreed to the safer environment for women in the district after the ban on alcohol. A total ban has led to revenue losses in a poor state such as Bihar and gave rise to the black market and underground production activities. Positive impact of liquor prohibition has actually helped in reducing road deaths in the state. 70.58 percent respondents in Kankarbagh circle and 68.62 percent respondents in Patliputra circle agreed that road accidents have decreased. The crime rate in Bihar has come down after the liquor ban. Hence, Bihar has entered into a social and cultural revolution.

The first hypothesis of the current work is the sale of alcohol continues even after the ban, which was shown in Table 6. The hypothesis was tested with chi-square test and the tested hypothesis value came 0.34, which is lower than the critical value (at 95 percent level of significance = 0.711). Thus, the first hypothesis has been validated.

The second hypothesis of the current work is ban on liquor has led to an increase in other forms of substance abuse, which was shown in Table 14. The hypothesis was tested with chi-square test and the tested hypothesis value came 1.14, which is lower than the critical value (at 75 percent level of significance = 1.923). Thus, the second hypothesis has been also validated.

The third hypothesis of the current work is cases of domestic violence have decreased after the ban. It was shown in Table 9. The hypothesis was tested with chi-square test and the tested hypothesis value came 0.216, which is lower than the critical value (at 99 percent level of significance = 0.297). Thus, the third hypothesis has been validated.

The fourth hypothesis of the current work is women are safer in the city after the ban, which was shown in Table 10. The hypothesis was tested with chi-square test and the tested hypothesis value came 1.04, which is lower than the critical value (at 90 percent level of significance = 1.064). Thus, the fourth hypothesis has also been validated.

From this study, it can be derived that the ban in the state is not prominent. Some suggestions to improve the situation of ban in the state are given below:

- Conducting awareness program about Drug abuse and Alcohol. It needs involvement or not only public agencies but also of non-governmental agencies.
- Using the social media and making the Short films about alcoholic person's life style and treatments.
- Arrange the community-based meditation class for the alcoholic. It also need involvement of local bodies, non-governmental organisation & institutions.

- Provide legal and medical provisions for prevention, treatment and rehabilitation of alcohol addicts.
- The alcohol sensor that detects ethanol in the air should be placed in the car ignition the car won't start if the driver is under influence of alcohol.
- Create a serious infrastructure of de-addiction centres across the state.

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CONTEMPLATING COMMUNITY RESILIENCE TO CORONA VIRUS PANDEMIC: A STUDY OF JEEVIKA SELF HELP GROUPS IN DARBHANGA, BIHAR

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ABSTRACT

The lockdown associated with Covid-19 pandemic, created a situation of increased reverse migration of male migrants to rural areas. It brought to fore the precarious economic and living conditions of the rural migrants living in urban centres. Resultantly, loss of livelihood in the informal sector, economic hardships faced by women counterparts of the migrants and looming question over access to food and nutrition occurred as the major challenges.

The present research assesses the role of women led Self Help Groups (SHGs) in Bihar Rural Livelihood Mission(JEEViKA) as a coping strategy for post Covid-19 lockdown socio-economic impacts. The research questions of the study were drawn upon the understanding the Corona pandemic as a social phenomenon and attempted to explore answers for questions like, How JEEViKA SHGs were involved in the Covid related activities? What was the economic vulnerability of SHG members? How JEEViKA has gone beyond its call for promoting livelihood?

A combination of quantitative and qualitative research methods were adopted during data collection and analysis in the study area. Focus Group Discussions and Key Informant Interviews were administered on the selected JEEViKA SHGs. Respondents of the study were men and women of the household where migrants have returned, members and leaders of JEEViKA SHGs.

Keywords: Coronavirus Pandemic, Mitigation, Self Help Groups, Socio-Economic Impacts

Introduction

The Corona virus pandemic posed enormous challenges for humanity. The social and economic costs of pandemic containment for saving lives had been significant all across the globe. The prevailing inequalities in Indian society are rising and inequality has shaped the pandemic its course throughout the country (Bhalla, Bhasin and Virmani, 2022; Deaton, 2021). The vulnerabilities of marginalised families got exacerbated in the pandemic times, pushing them further into poverty and deprivation, in a multidimensional way. The United Nations Sustainable Development Goal Report (2020) found that the pandemic affected the poorest and the most vulnerable section of the population in a significant manner. One of the biggest impacts of the Covid-19 associated lockdown was the full or partial loss of livelihoods,

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especially in urban locations, as a result of which millions of workers across India moved back to their villages. To be precise, the COVID-19 associated lockdowns had a far reaching adverse impact on the urban labour market, particularly those in the informal employment. The global labour force participation rate reduced by 2.2 per cent in 2020, and global unemployment increased by 33 million (Jones et al., 2021). As per the All India Quarterly Establishment Based Employment Survey (AIQEES), 23 lakh people (16 lakh men, 7 lakh women) in India lost jobs in the top nine sectors during the first three months of the COVID-19 lockdown in 2020 (The New Indian Express, 2022). The impact of COVID-19 and its associated lockdown was even more severe on self-employed and casual wage labourers living in slums, resulting in reverse migration (Kundu, 2021). Overall, the impact of COVID-19 and associated lockdown unmasked the precarious economic and living conditions of the migrants, especially those from rural areas. It is estimated that there are roughly 100 million internal migrant workers in India and most of them are daily wage labourers who migrated from states like Uttar Pradesh, Bihar, Jharkhand, Odisha, West Bengal, etc. to other states in search of unskilled or semi-skilled jobs (Jesline et al., 2021). Therefore, the precarity of rural India need to be contemplated upon.

Moreover, the year 2020 when the pandemic happened, marked the 25th anniversary of the United Nations Fourth World Conference on Women, where the global community adopted the Beijing Platform for Action, and was intended to be ground-breaking for gender equality. However, in the era of the Coronavirus pandemic even the limited gains made in past decades are at risk of being rolled back (UN Women, 2020). It has been ignored that there can be differential impacts of the pandemic on men and women, and on different stratas of society especially in the prevalent socio-cultural– economic realm in Indian society (SDG Report, 2020; Kundu, 2021). There was a loss of livelihood in the informal sector, economic hardships faced by women counterparts of the migrants and limited access to food and nutrition (UNICEF and IHD, 2021).

Against this backdrop, the women- led Self Help Groups (SHGs) under Bihar Rural Livelihood Mission (JEEViKA), became a fundamental channel in managing the ramifications of the pandemic, particularly on the vulnerable communities and hence, attempted to promote the community resilience to the pandemic. Importantly, the women- led Self Help Groups (SHGs) under JEEViKA were already engaged with the community to reduce poverty and enhance gender equality by rolling out a variety of interventions, such as access to low- cost micro-credit, food security, and nutrition programs, cleanliness drives. The research paper will analyse the role of women-led Self Help Groups in Bihar Rural Livelihood Mission (JEEViKA) as a coping strategy for mitigating the post Covid-19 lockdown socio-economic impacts. In fact, there is an absence of research on relating to this dimension of women -led Self Help Groups, particularly in Bihar.

Objectives

- To understand the JEEViKA activities in mitigating socio-economic impacts of Covid-19.
- To analyse the role of JEEViKA SHGs as a coping strategy in the study area.

Geographical Perspective

Research Questions

Certain research questions are drawn based upon the understanding of the Corona pandemic as a social phenomenon. These research questions are:

- How JEEViKA has gone beyond its call for promoting livelihood?
- How JEEViKA SHGs were involved in the Covid related activities?
- What was the economic vulnerability of SHG members and home returnees?

Methodology

A combination of Quantitative and Qualitative research methods was adopted during the data collection and analysis in the study area. Data collection was done through the field surveys using short schedules, focus group discussions and key informant interviews administered on the selected JEEViKA SHGs. The sample size (n=175) respondents were selected based on random stratified sampling. The in-depth interview sample for the study was a 'purposive sample'. Respondents of the research were the men and women of the household where migrants have returned, home returnees, members and leaders of selected 110 JEEViKA SHGs. Data collection was done during the Post lockdown - February, 2021 and August-September, 2021 and September, 2022. Narratives of the respondents were incorporated to understand the gendered impacts of Covid-19 lockdown. Narratives have been collected from the respondents of Darbhanga district. In simple terms, narrative research is used to answer the question – 'what happened' (Zeller, 1995), and to make known or convey information (Lacey, 2000). JEEViKA Dashboard, Bihar Rural Livelihood Promotion Society (BRLPS), Government of Bihar documents and annual reports would be the secondary data sources were utilised to understand the JEEViKA activities in mitigating socio-economic impacts of Covid-19 in Bihar.

Study Area

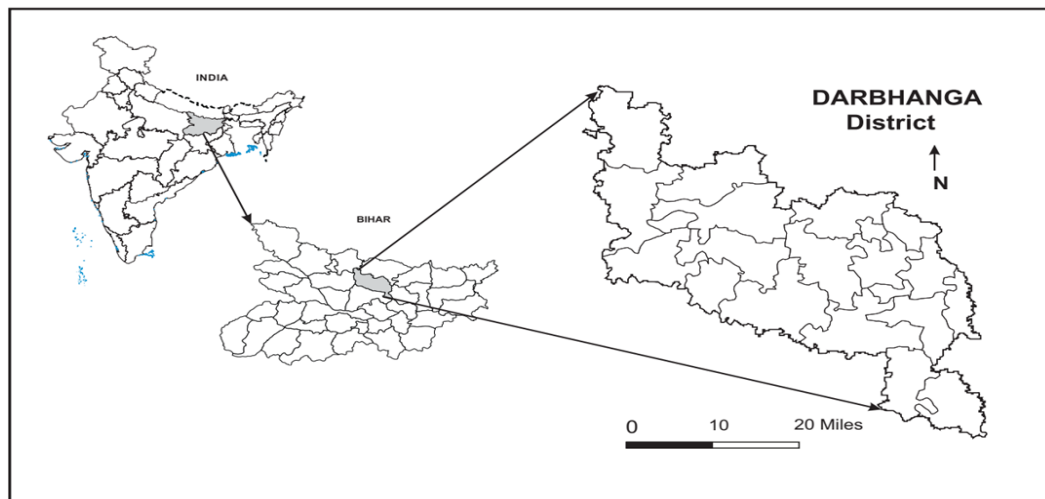


Figure 1: Location of Study Area

Darbhanga is in heart of Mithalanchal, North Bihar and is situated between longitude 85 degree 45 minute East and 25 degree 53 minute North. Darbhanga has an area of 2279 sq. km. and 18 development blocks. According to census 2011, the total population of the District is 3937385. The male population is 2059949 and female population is 1877436. Darbhanga district is having a total geographical area of 2279 Sq. Km. The district of Darbhanga has witnessed massive out-migration due to natural vagaries like floods, low production from agriculture and absence of employment opportunities. Darbhanga is one of the country's 250 most backward districts in the country under Backward Regions Grant Fund Programme (NIRD, 2009). Out of the total population of the district, 15% is Scheduled Caste population (Census of India, 2011) and the district ranks 13th in per capita income (Rs. 28232) (Bihar Economic Survey, 2022-23). The district also witnesses frequent floods causing a huge loss of lives, infrastructures, crops, etc. The headcount ratio under Multi-Dimensional Poverty Index in the district is 56.5% of which, the rural headcount is 59.4% (Niti Aayog, 2021), which is higher than the state's average. Data for this research was collected from Darbhanga block and Hanuman nagar Blocks. According to the data available on JEEViKA Dashboard, there are total number of 42,930 SHGs and 4,96,000 are members of the SHGs in Darbhanga.

Overview of JEEViKA

The Bihar Rural Livelihoods (JEEViKA) Project is a World Bank assisted community-driven, anti-poverty project implemented by the Government of Bihar. The Government of Bihar (GoB), through the Bihar Rural Livelihoods Promotion Society (BRLPS), an autonomous body under the Department of Rural Development is spearheading the JEEViKA project since 2007. It is aimed to reduce poverty and enhance gender equality by forming a network of women's Self-Help Groups to roll out a variety of interventions, such as access to low cost credit, food security, and nutrition programs. According to the Population Council Institute and UNICEF, Bihar, “More than 10 million women in Bihar are members of women self-help groups (SHGs), JEEViKA”.

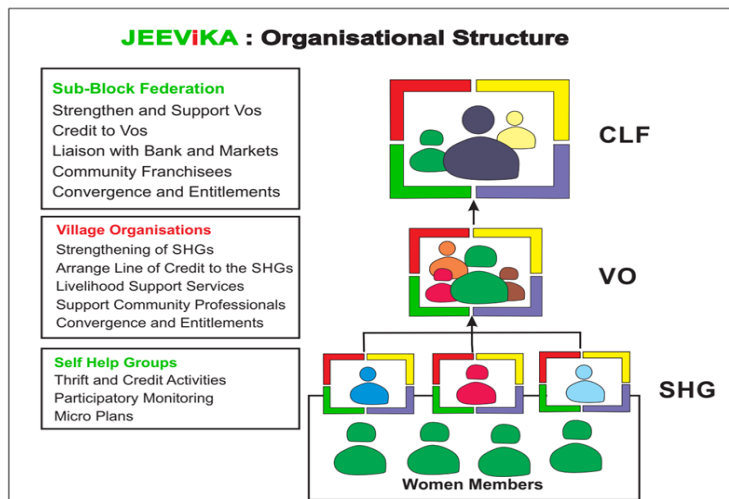


Figure 2: Organisational Structure of JEEViKA in Bihar

Source: BRLPS, Govt. of Bihar

Results and Discussion

Covid Resilience Activities by JEEViKA

Following multi-pronged approaches were adopted by JEEViKA for Covid resilience:

Awareness

Initiatives were taken by JEEViKA sisters to lift up awareness and distribute information for better preparedness amongst the rural population. Table 1 shows the awareness activities performed during Covid-19.

Table 1: Awareness Activities performed during Covid-19

S.No.	Activities	Total No.
1.	Number of COVID leaflets printed & disseminated	6,00,000
2.	No. of videos prepared & disseminated	15
3.	Number of audio spots prepared & disseminated	25

Source: BRLPS, 2021



Figure 3: Covid Awareness Leaflet

Source: BRLPS, 2021

JEEViKA Didis disseminated information through door to door visits in the community. Mobile Vani, an IVR based interactive platform (works on ordinary phones) was used to reach to 3.7 Lakh SHG members. 48,567 Community Professionals are trained on providing care at home to COVID patients by nominated District Resource Persons. JEEViKA Aapda Sahayaks identified from JEEViKA DiDis to support female community members visiting government hospitals for treatment. JEEViKA community professionals had participated in the vaccine awareness and motivated rural women and their family members to achieve maximum vaccination among rural populace.

Relief Work for Vulnerable Population

JEEViKA was assigned the ration card work by the Government of Bihar and more than 11 lakh ration cards were issued in Bihar. Under Satat Jeevikoparjan Yojana (SJY) to ensure food security at household level during Covid imposed lockdowns, JEEViKA workers provided a onetime cash grant of Rs. 2000/- to all the households. Rs.7.7 Crore was transferred to 38,764 extremely poor rural households.

Extended Capitalization support to home returnee migrants

More than two lakh migrant families were included in the self-help groups promoted by JEEViKA. 17,878 such returnee migrants had been extended loans for starting businesses. A capitalization support of Rs. 27 Crore has been extended to the returnee migrants.

Livelihood and Economic Activities

Didi Ki Rasoi (canteen) operated in public health centres and other institutions across 10 Districts of Bihar (Benefited 6235 Inpatients, quarantined patients and others). A total of 4.88 Crore double layered, 3 plated cotton mask were produced by 20,134 JEEViKA Didis who generated a business to the tune of Rs. 97.6Cr. in the 1st wave of Covid in FY 20-21. In the 2nd wave of the pandemic, 34,768 JEEViKA Didis have produced 6.89 Cr. quality mask and have generated a business of Rs. 88.10 Cr.

Role of JEEViKA SHGs as a Coping Strategy in the Study Area

During the field work, 95% SHG leaders and members reported that they were engaged in COVID- 19 related community awareness and infection prevention activities in their community. Figure 4 shows that JEEViKA sisters were involved in awareness on vaccination (95%), distribution of food grain (28%), distribution of masks (68%), preparation of masks (33%), awareness on spread of Covid (51%), use of masks (95%), physical distancing (92%) and shared information on regular handwashing (86%). The COVID-19 pandemic has had a severe impact on the food availability situation (UNICEF and IHD, 2021). Home returnees were more vulnerable than residents in terms of having enough food items like wheat, rice, pulses, and oil for meeting the requirement of at least two meals per day for the family. Moreover, prioritising food and nutrition needs of men in such times will further deteriorate women-specific anaemia. The Niti Aayog's Sustainable Development Goals (SDG) Index Report 2020 has flagged huge worries about hunger and food security in India. There has been

Geographical Perspective

a worst performance of India on SDG 2: Ending Hunger by 2030 and states like Bihar are leading from bottom in SDG Index is a matter of grave concern. In such situation, SHG specific interventions like the Food Security Fund improved the targeting efficiency of food security programmes. The data from the field is supported by the narratives of the respondents from the field. Ramsevak (40 years, home returnee migrant) said “There was no money to pay the rent and buy food in Delhi, so I was forced to return with the family. JEEViKA sisters supported my family here”. Food scarcity adversely affected the children in the families of home returnees. Among all the families with children in various age groups, the home returnees faced relatively more food scarcity vis-à-vis the residents in study area. In such difficult times, JEEViKA workers provided assistance to the families in distress. Usha (55 years, wife of a home returnee migrant) from Bhagwati SHG, Hanumannagar Block told that “The support under SJY scheme through JEEViKA was a saviour for her family during lockdown and the amount given was utilised for purchasing food”. Arya and Sunita (30 years) from Saraswati SHG were involved in mask preparation under JEEViKA and the income was useful for their families as the men of the household returned from the city due to lockdown.

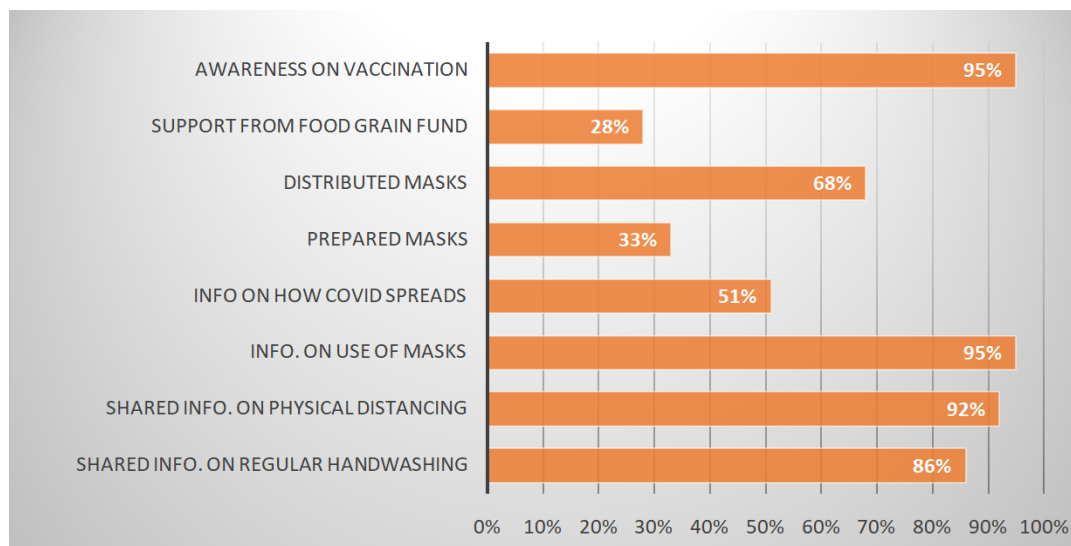


Figure 4: SHG Engagement in Covid Activities

The pandemic period saw SHGs evolving and assuming new roles to take on the challenges. These groups have been crucial in supporting the COVID-19 response of the government by manufacturing personal protective equipment and sanitizer providing free meals to the needy in addition to helping health and administrative officials on the field (Banerjee, 2020), and also ensuring last mile delivery and awareness about the pandemic (World Bank, 2020). A study by the Population Council also found that almost half of the SHG leaders were engaged in COVID-19 related community awareness and prevention activities in Bihar. JEEViKA was a saviour for millions of home returnees who were facing the dual challenge of displacement from their place of livelihood and inadequate food availability.

Conclusion

JEEViKA, become a fundamental channel in managing the ramifications of the pandemic particularly on the vulnerable communities and hence, built the community resilience to the pandemic. JEEViKA sisters have contributed towards ensuring sanitation, spreading awareness about wearing of masks, vaccination and maintaining social distance, managing food distribution, quarantine situations, reaching to pregnant women and lactating mothers, and supporting the home returnees. The crisis emerged after Covid-19 and associated lockdown has revealed the exclusiveness of urban spaces and socio-spatial fault lines between the cities and countryside in India. Ultimately, it can be stressed upon that the JEEViKA SHGs is a community led instrument and a gender equality initiative, which should be strengthened and substantiated with greater support and resources from the state. This institution values women as agents of change for strengthening community resilience. It highlights the importance to empower women to participate and have a voice and agency in promoting resilience. The present research justifies such initiatives for the geographies experiencing high levels of social exclusion, poverty and destitution. The study invoked the idea of the use of a participatory and more democratic approach to creating community resilience to critical situations such as pandemic. JEEViKA would play an important role in mitigating the regional disparities in socio-economic development and achieving targets in United Nations Sustainable Development Goals (UN-SDG).

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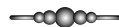
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AN ANALYSIS OF COMMERCIAL AND POLITICAL ATTRIBUTES OF A CASH CROP IN DISTRICT BIJNOR, UTTAR PRADESH

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ABSTRACT

Agriculture plays dominant role in India's economy. About 54.6 per cent of the population is engaged in agriculture and its allied activities (Census 2011) and it contributes 17.8 per cent to the country's gross value added for the year (2019-2020) at current prices. The chief constituent of the agronomy in the agricultural sector of the country's economy is monetary or the cash crop. Apart from the Kharif and Rabi crops, the monetary or cash crop is very crucial attribute in terms of net area sown and its commercial and political significance in the political economy of region. A monetary crop or the cash crop is an agricultural crop which is grown to sell for profit. It is typically purchased by parties separate from farm. The term is normally applied to differentiate the market crop from the subsistence crop. The net area sown under cash crop [here, sugarcane the crop under reference] in the country is 48.84 lakh hectares and 23.12 lakh hectares in Uttar Pradesh. While in the district Bijnor it is 21.07 thousand hectares.

In this backdrop, the current research paper seeks to investigate and explore the spatial analysis of commercial and political attributes of the selected monetary crop under reference that is sugarcane. The present study has undertaken the District Bijnor [located in Western Uttar Pradesh] of the Indian State of Uttar Pradesh as the core area of the study. The area of study from its agro - ecological demarcation is geographically very conducive for the cultivation of sugarcane. The role and the pivotal place of agricultural research institutes and factors of localization in the area of study will also be taken into account for the fundamental structuring of the theme.

Keywords: Agronomy, Monetary Crop, Net Area Sown, Agro - Ecological Demarcation and Agricultural Research Institute.

Introduction

According to various religious scriptures and mythology, the *Grain* [Ann] is accorded the status of God [Devta] as the '*Ann Devta*' and agriculture is one of the most pious and noble occupation. The grain is the source of nutritional dietary and develops the wisdom through which all virtues emerged. The Human civilizations throughout the human history emerged and developed with the human agriculture. The year 8000 B.C witnessed the first revolution in human society that is the - *AGRARIAN REVOLUTION* i.e., the art and science of the tillage of land. The agrarian revolution was somehow responsible for emergence of social life, providing

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Geographical Perspective

permanent mode to human life and human settlements; and progressive and sequential [hierarchical] development of society which was particularly of rural or sedentary in character.

Whereas, much later in the human history the so – called *The Scottish Agricultural Revolution* [17th and 19th century A.D.] provided the transformation of European Agricultural Systems into the modern and productive system of agriculture. Since, then the agriculture geography has witnessed progressive diversification and transformation of rural non- farms encompassing the social, economic, ecological and environmental dimensions of space, leading towards interdisciplinary areas of collaboration with social sciences. It is now more focused and policy oriented. Agriculture geography has thus, the potential of influencing regional development policies.

Paradoxically, however the Green revolution which was witnessed in the year 1966 A.D. in India and more particularly in Northern India [especially in Punjab and Haryana] has had meteorically uplifted the production and self -sufficiency of food grains especially wheat and rice with the advancement in high variety yield [H.V.Y.] seeds. The policies, programs and scientific research conducted and carried out by Indian Council of Agriculture Research [I.C.A.R] New Delhi is the core governmental agency which has had made the impossible as possible.

Conversely, on the other hand *The Central Sugarcane Research Institute* [C.S.R.I] established in 1912 A.D. located in Coimbatore, Tamil Nadu and *The Indian Institute of Sugarcane Research* [I.I.S.R], Lucknow in the Indian State of Uttar Pradesh were established in 1952 A.D. is an autonomous institute of higher learning and advanced research in SUGARCANE agriculture was responsible for development and popularization of monetary / cash crop in the form of sugarcane immediately after independence in tropical and sub –tropical regions of the country. The centre efficiently provides globally competitive and vibrant sugarcane agriculture across the country. It also assists the farming community for the betterment of agricultural production and overall socio – economic development of community. The both of the premier agricultural research institutes of the country works under the jurisdiction of the Indian Council of Agricultural Research, New Delhi.

Sugarcane (*SACCHARUM OFFICINARUM*) is a tropical plant and grown as a major commercial or cash crop in the World. It is grown over 49.18 lakh hectares in India. Sugarcane is the main source of sugar (80.0 percent) globally and holds a prominent position as a monetary crop. The rural economy in the traditional sugarcane growing areas and in the area of study is primarily linked with the sugarcane crop and sugar and allied industries [commonly termed as *Khandsari Udyog*]; and, also with the Krishi Vigyan Kendras / Agricultural Science Centre [K.V.K. / A.S.C.] in the area of study.

This has led to the consolidation and strengthening of the sugarcane crop associated vital scientific infrastructure. Certainly, this has put the district Bijnor in the sugarcane map of the India as a leading producer of sugarcane in the Western Uttar Pradesh having international memorandum of agreement with countries like Philippines, Korea and Japan.

Statement of Problem

It goes back to the memory lane of 1981 during my childhood. Those were the days when I was in standard VI th in kendriya Vidhayalaya Army, Jodhpur. Some of my classmates were from

Bulandshahar, Muzzafarnagar, Saharanpur and Meerut. They narrated the stories of sugarcane industries and the prosperity of these districts. At that point of time I didn't had any idea of its significance. I just take it as tale of the West Uttar Pradesh.

Now, as I am preparing the discourse on the theme; I imagined and realized how true they were? I still vaguely remembered their faces.

Certainly this tale has had forced and inspired me to take up the challenge.

In the foregoing discourse on the analysis of commercial and political attributes of the cash crop evolves two elements:-

- I. Commercial Element of Cash Crop, and;
- II. Political Element of Cash Crop.

Under the *Commercial Element* pertaining to the selected cash crop of sugarcane will evolve production and productivity especially of sugarcane crop and the state of *khandsari udyog* which involve manufacturing processes. This element of cash crop will be spatially investigated at Sub-Divisional [Tehsil] level.

On the other hand, the *Political Element* which has been selected for the analysis will confines to *Power / Energy Resources* and the crucial issue of *Minimum Support Price* [M.S.P] will be deal with full length and breadth. The selected indicator of political element will be scanned microscopically during the reins of different political parties who had ruled over the state.

Thus, the present study has had two variables, namely:-

1. Commercial Attributes of Sugarcane; and ,
2. Political Attributes of Sugarcane.

Likewise, the selected variables have the following determinants:-

1. Production and Productivity along with Khandsari Udyog; and ,
2. Power / Energy Resources and the issue of minimum support price.

Methodology

The Research Methodology pertains to the analytical tools adopted by the principal investigator to carry forward the research process (ranging from collection and gathering of information and data, data analysis and their spatial analysis and logical interpretation) it has been selected. The current study is primarily based upon secondary database sources. Under this study, the two variables and the corresponding two determinants has been selected. However, it was observed that both are proportionally directly correlated with each other.

The discussions, results and interpretation were based upon the exploratory and investigative approach which was centered upon:-

1. Inductive Approach,
2. Deductive Approach, and;
3. Generalization of Facts.

Geographical Perspective

Area of the Study

The present study confines to the district of Bijnor which lies in between $29^{\circ} 2'$ and $29^{\circ} 58'$ N longitude and $78^{\circ} 0'$ and $78^{\circ} 59'$ S latitude. The maximum length from north to south is about 102Kms. and breadth from east to west about 90 Kms. In the north it is bounded by the district of Pauri Garhwal and Haridwar of Uttarakhand State. In the south it is bounded by the newly created district Jyotiba Phuley Nagar and in the east Moradabad and Udham Singh Nagar district of Uttarakhand State; and, separated by the river Ganga on its extreme west top. In the west it is bounded by the districts of Muzaffarnagar and Meerut. The elevation of the study area is 223metres from the mean sea level. The total geographical area under the study area encompasses an area of 4561 sq. kms. and out of which the rural and urban area confining to 4422.50 and 138.50 sq. kms. respectively.



Figure 1: Location of Study Area

Period of the Study

The present study is temporal in nature which involves time perspective. The period of study confines to selective length of time span upon which the temporal analysis of trends will be interpreted. The period of study has had the following perspectives:-

1. Triennium Span (2020 - 2021); and (2021 -2022)
2. Quinquennial Span (2007 – 2012, 2012 – 2017 and 2017 – 2022).

Fundamental Structuring

The extent of polar latitudinal limit for sugarcane cultivation is marked by 39 degree north latitude in the northern hemisphere (Andreae, 1979). The history of Sugar Cane cultivation in India was dates back to Vedic period 4000 B.C. Whereas, the history of sugarcane production illustrates, that Europeans obtain sugar from either Sugar Cane or Sugar Beet. Sugar Cane was introduced into the Mediterranean Basin by the Arabs after 7TH Century A.D. and taken to America in the XVI TH Century A.D. Sugar was extracted from sugar Cane as late as 1850's . The International Conference on Sugar Cane in Brussels (1903 A.D.) has had transcended into Asia and India (Grigg, 1984).

The cultivation of Sugar Cane has occupied the predominant place in the area of study which accounts for 2,10,269 thousand hectares followed by Rice 2,01,435 thousand hectares and Wheat 1,11,407 thousand hectares of area under cultivation. The agricultural development by the cultivation of Sugar Cane has increases the purchasing power of the ruralites and helps the growth of non – agricultural sector by providing a market for increased production of sugar by the sugar industries / Khandsari Udyog (Mohan and Thakur, 2014).

Till recently, the agro –ecosystems in most part of the study area were almost in tune with local natural environment. The cropping pattern and farming methods practiced in the cultivation of Sugar Cane were largely determined by the prevalent ecological conditions and socio –cultural traditions (Bhagabati, 2007).

Table 1 : Bijnor: Agro – Ecological Zones

S.Nos.	Categories	Agro – Ecological Zone
01	Agro – Ecological Sub – Region (Indian Council of Agricultural Research)	Northern Plains , Hot – Sub – Humid (Dry) Eco - Region
02	Agro – Climatic Zone (Planning Commission)	Upper - Gangetic Plains
03	Agro – Climatic Zone (National Agricultural Research Project)	Bhabhar and Tarai
04	Zonal Research Station (Z.R.S)	Zonal Research Station (I.C.A.R), Nagina.
05	Concerned K.V.K	Krishi Vikas Kendra, Nagina.
06	Agricultural Research and Technological Development Unit	Sardar Vallabh Bhai Patel Agriculture and Technology University, Meerut.

Source: Report on the Agriculture Contingency Plans for District Bijnor.

Sugar cane is a versatile crop being a rich source of food, fiber, fuel, fodder and chemicals and the only raw material for all major sweeteners in the country and in the study area (Yadav et al., 2006).

Sugar cane is the only commercial crop in the Western Uttar Pradesh which governs the regional politics and administrative affairs of the Western Uttar Pradesh (Rahman and Nida, 2019).

Geographical Perspective

As a result, there is an overall improvement in the way of life which gets expression in the level of education, health care, better housing and so cultivators are able to make use of technology and practice improved methods of farming researched and scientifically developed by the (Krishi Vigyan Kendra) agricultural research institute in the area of study.

Discussion and Interpretation : The Spatial and Temporal Trends

The present study which is focused on the Spatial and temporal trends in the commercial and political attributes of the sugar cane cash crop will be analyzed in the upcoming segment under following sections:-

- I. Section -A : The Spatial-Temporal Trends at Sub-Divisional Level
- II. Section-B : Production of Sugar (Khandsari Udyog)
- III. Section-C : Analysis of Political Attributes of Commercial Crop (Sugarcane)
- IV. Section-D : Endnotes

Section -A : The Spatial-Temporal Trends at Sub-Divisional Level :-

The Sub – Divisional i.e., Tahsil level spatio – temporal interpretation of the commercial crop (Sugarcane) to the spatial changes in three quantitative indicators at tehsil level visa.viz :-

1. Total Agricultural Area ,
2. Annual Production; and,
3. Average Yield.

The Tahsil level quantitative analysis of the data on the theme reflects the spatio – temporal changes in the area of study for the period 2020 – 2021 and 2021- 2022.

Table 2 : Sugarcane: Spatio - Temporal Change in Bijnor (2020 -2021)

S.Nos.	Tahsils	Area [Hect.]	Production [Lakh Tonnes]	Avg. Yield [Qtls. / Hect.]	% Change
1.	Nagina	18,709	223.0	699.96	+02.55
2.	Dhampur	52,000	306.0	838.34	+ 03.00
3.	Seohara	20,563	460.0	744.02	+03.75
4.	Noorpur	23,501	145.6	627.75	+ 01.95
5.	Nehtaur	19,456	187.0	780.74	+ 02.65
6.	Chandpur	11,267	102.0	784.06	+ 02.25
7.	Najibabad	57,216	272.6	941.17	+ 04.15
8.	Bijnor Tahsil	12,752	062.0	677.41	+ 01.75
	Total	215,763	17,575,637	859.52	+02.75

Source: District Statistical Cell: Ganna Vikas Karyalaya, Bijnor.

As per the inferences drawn from the Table - 02, there has been a quite significant positive qualitative and quantitative spatial-temporal change in the commercial attributes of sugarcane in the area of study in terms of area sown, production as well as yield per hectares in triennium span of 2020 -2021 and 2021 -2022.

Out of 08 Tahsils, of the study area 03 Tahsils namely Najibabad, Seohara and Dhampur has recorded (+4.15, + 3.75 and +3.00) percent spatio – temporal change which is well above the Sub – Regional level (District Level) which was +2.75 percent. They were also the leading agricultural zone of the study area. This had been due to effective implementation of policies and guidelines of sugarcane development committee and cohesive research and awareness promotional programs of krishi Vikas Kendra of the study area. There is a strong positive correlation between sugarcane development and social development in the period under reference.

II. Section-B : Production of Sugar (Khandsari Udyog)

The sugarcane crop which is highly predominated by khandsari udyog and involve optimum utilization of its crop residuals. The sugarcane has had more than eight byproducts namely:- Jaggery , Shakkar , Desi Khand, Khurra , Bura, Brown Sugar and Sugar / Chinni and the popular thirst quencher the cane juice.

As far as the operational trends of sugarcane production were concerned it involves:

1. Procurement of Sugarcane
2. Purchase of Raw Sugarcane by Khandsari Udyog / Sugar Industries
3. Payment Released or Payment made towards ganna kisan
4. Production of Sugar and Jaggery.

Table 3 : Production of Sugar: (2020 -2021 and 2021 – 2022)

S.Nos.	Sugar Industries	Production (in Lakh Tonnes)
01	Dhampur	13.77
02	Seohara	11.89
03	Billai	09.47
04	Badharpur	07.35
05	Barkatpur	07.69
06	Bundki	07.96
07	Chandpur	04.87
08	Bijnor	02.40
09	Najibabad	08.60
	Total Sugar Production	74.0

Source: District Statistical Cell, Ganna Vikas Samiti , Bijnor , 2022.

Geographical Perspective

The spatio – temporal trends in the study area as per Table -3 reflects that , the production of sugar by the sugar industries reveals that the khandsari udyog of the region has had prime place in the production of sugar in the country. With the '*Dhampure*' emerged as popular and most trusted trade brand of North India having *ISO* and *FSSAI* quality control and certification. Other popular and trusted brands of the sugar in the study area are Najibabad , Bundki and Seohara sugar industry which has international collaboration with countries like Phillipines, Taiwan and Mexico. The area under study had had emerged as the leading growth pole region of the country for its unique operations of sugarcane cultivation and manufacturing as well as operational processes; and, the leading consumer marketing brand in terms of competitiveness and competency.

On the other hand the crucial indicator of economic prosperity and progressive change in the standard of living is the quantitative change in per capita income (PCI) of the target segment of the area of study . The facts and figures were testimony to the variable (Table –4).

Table 4 : Progressive Change in the Per Capita Income (2007 – 2023)

S. Nos.	Years	Per Capita Income / Bighha
01	2007 - 2012	19,250
02	2012 - 2017	23,745
03	2017 - 2022	30,450
04	2022 - 2024	34,970
	Projected	Above 40,000

Source: Analysis and Results of Field Survey, By Author.

However, the years / time span corresponds to the rein of the different state governments affiliated with different political parties; although had shown quantitative change in the per capita income per bighha sown under sugarcane. But the expenditure incurred in cultivation of sugarcane in one bighha of agricultural field and the state and situation of inflation has had altogether different story to narrate and interpret.

There had been observable significant change in the monetary capabilities of the targeted segment of the sugarcane cultivators which has also reflected through their standard of living, economic prosperity and the purchasing power. The probable factors which led to the spatial change and spatial organization of sugarcane cultivation in the area of study were extension of advance agricultural services, state of the art research and development programs of agricultural universities and district agriculture science institutes, highly advance rural service centers, rural network connectivity and decentralized rural planning.

III. Section-C : Analysis of Political Attributes of Commercial Crop (Sugarcane)

The Politics of *Minimum Support Price* (M.S.P) of Sugarcane in the State of Uttar Pradesh and in the District Bijnor has a far greater and effective role play in the political scenario of Politics

on sugarcane. The Foodgrains and Price Committee of 1947 recommended agricultural price policy in India. While, the Food Corporation of India (FCI) is the agency to purchase foodgrains at the minimum support price to help administer food security in the country. The two major objectives of the mechanism of minimum support price were:-

1. The first major objective of price policy is to impart stability to the prices of important agricultural commodities like foodgrains and commercial crop like sugarcane.
2. Secondly, is to give price assurance to cultivators/ farmers through a system of minimum support prices to increase their production and simultaneously to keep prices low for consumers for food security and public distribution system.

The political attributes of commercial crop of sugarcane are confined to the followings:-

- [A] The Sugarcane Prices in the reins of Different State Governments from 2007 to 2022. Spatio – Temporal Changes in Minimum Support Prices of Sugarcane.
 - [B] Expenditure incurred on the various operations of sugarcane cultivation.
 - [C] State and Situation of Inflation.
- [A] The sugarcane prices that is the minimum support prices during the reins of different political party's state government; and, spatio –temporal changes therein has been appended in Table: 5,6 and 7 respectively.

Table 5 : Minimum Support Price: Under B.S.P Government (2007-2012)

S.Nos.	Years	Samanay Prajati (In Rs. / Qtls.)	Early /Agetar Prajati (In. Rs. /Qtls.)
01	2007 -2008	110	115
02	2008 - 2009	140	145
03	2009 -2010	165	170
04	2010 -2011	205	210
05	2011 -2012	240	250

Source: Commission For Agricultural Costs and Prices, Government of Uttar Pradesh, Lucknow.

During the reins of Bahujan Samaj Party (BSP) government which came into power after landslide verdict in 2007 and their highly acclaimed 'Social Engineering ' political manifesto has had a full majority government. There are two major variety of sugarcane for which the minimum support price was affixed. The first is Samanay Prajati and the second Agetar Prajati and the difference between their M.S.P were merely of Rs. 05/- as shown in Table - 5. During their tenure from 2007 to 2012 the M.S.P for samanay prajati were move from 110/- to 240/- an increase of Rs. 130/- . While in case of agetar prajati it move from Rs. 115/- to Rs.250/- an increase of Rs .135/- . During the election year in 2012 the government aim to please sugarcane cultivators and increase it marginally to Rs. 35/- and Rs.40/- respectively. Their politics of

Geographical Perspective

appeasement didn't work and the government loss the assembly election miserably in 2012. The politics of vote bank based on caste card didn't works in their favor.

Table 6 : Minimum Support Price: Under S.P Government (2012-2017)

S.Nos.	Years	Samanay Prajati (In Rs. / Qtls.)	Early /Agetar Prajati (In. Rs. /Qtls.)
01	2012 -2013	280	290
02	2013-2014	280	290
03	2014-2015	280	290
04	2015-2016	280	290
05	2016-2017	305	315

Source: Commission For Agricultural Costs and Prices, Government of Uttar Pradesh, Lucknow.

The Table -6 narrates the same story as in case of Samajvadi Party government. During their tenure the minimum support price were Rs. 280/- and remains so in next four years from 2012 - 2013 to 2015-2016 in case of samanay prajati of sugarcane. During the fag end of their tenure in 2016-2017 it increased to Rs.305/- an increase of Rs. 25/-. Similarly, in case of agetar prajati it moved from Rs.290/- to Rs. 315/- during 2012 to 2107.

The both political parties of the state were vanished from political map of Uttar Pradesh probably due to their proactive political policies which were against the interest of sugarcane farmers.

Table 7 : Minimum Support Price: Under B.J.P Government: (2017-2022)

S.Nos	Years	Samanay Prajati (In Rs. / Qtls.)	Early /Agetar Prajati (In. Rs. /Qtls.)
01	2017 -2018	315	325
02	2018-2019	315	325
03	2019 -2020	315	325
04	2020-2021	315	325
05	2021- 2022	330	340

Source: Commission For Agricultural Costs and Prices, Government of Uttar Pradesh, Lucknow.

Although, there was hardly any change in their approach as in case of Table -7. The minimum support price currently for sugarcane for 2022 -2023 were Rs. 340/- and Rs.350/- respectively. But the state government has had come with progressive visionary agricultural policy in which the innovations and research expertise were involved to promote and develop sugarcane cultivation involving bilateral multinational corporation, improvement in agricultural infrastructure, road connectivity and I.T based agricultural education programs with the support of the agricultural scientists of regional krishi vigyan kendras.

[B] Expenditure Incurred on the Various Operations of Sugarcane Cultivation.

Table 8 : Expenditure Incurred in the Cultivation of Sugarcane in (01Biggha)*

S.Nos.	Sugarcane Operations	Expenditure Incurred in 2010 (In Rs.)	Expenditure Incurred in 2020 (In Rs.)
01	First Tillage	350	1750
02	Pumping Set Irrigation	380	2480
03	Second Tillage	500	2700
04	Seeds and Seedling	2000	5600
05	Sowing of Seed	550	1550
06	Pumping Set Irrigation	1000	1875
07	Digging	700	2100
08	Plough Work	575	1500
09	Removal of Weeds and Patties	470	1000
10	Chilai and Dhulai	1200	3500
	CHANGE IN TEMPORAL EXPENDITURE	7725/-	24355/-

Source: Based On Field Survey by Author

As per the Spatio - Temporal trends as represented by Table – 8, reflects that the scenario of inflation and cost price of various agricultural operations associated with the cultivation of sugarcane in the area of study during the period 2010 – 2020. There had been three times increase in the cost price of various agricultural operations. This had inflicted the financial burden on cane farmers in terms agricultural cooperative loan. Therefore, the per unit cost of input had increased sharply in the study area.

[C] State and Situation of Inflation:-

Table 9 : Bijnor: State of Inflation (2017 - 2023)

S. Nos.	Years	Urea (In Rs.)	DAP (In Rs.)	NPK (In Rs.)	Diesel (In Rs.)	Petrol (In Rs.)
01	2017	310.75	1025	1030	59.25	70.74
02	2018	326.50	1076	1060	60.77	72.25
03	2019	226.50	1400	1375	63.34	68.91
04	2020	230.50	1200	1190	68.45	76.41
05	2021	240.50	1275	1195	74.24	83.74
06	2022	266.90	1350	1450	96.84	105.75
07	2023	280.95	1390	1475	84.40	96.25

Source: Based On Field Survey by Author.

Geographical Perspective

The crucial role and contribution of power resources and agro – fertilizers in the spatial and temporal development of sugarcane cultivation and its productivity in the area of study has been reflected through Table – 9. Although, the state and situation of inflation during the study period from 2017 to 2023; shows, that there were mild variation in prices of agro – fertilizers and moreover its prices has been came down appreciably; but, the fertilizers companies had reduced the gross packed weight of sacks from 50 K.Gms. to 45 K.Gms. in 2018 – 2019. Thus, price has been reduced and; also, the quantity of materials.

On the other hand, the power resources like – petrol, diesel; and, electricity coupled with their associated price hike has been very significant affecting the economic and financial stability of cane farmers in the area of study. The Bhartiya Kisan Union [BKU] has had resorted to strike and dharna pradarshan in Western Uttar Pradesh under Bhanu group in the associated Collectorate and Secretariat. This attribute of sugarcane cultivation has sometimes uprooted the governments because of their anti - sugarcane policies and unconstitutional actions.

The crisis of sugarcane cultivators has been aggravated in last few years in Uttar Pradesh. As farmers has witnessed slump in income and rising input costs. The crisis revolves around three major core contentious issues :-

1. Unchanged Prices,
2. Delayed or Staggered Payment Strategy ; and,
3. Exponential Growth in Input Cost.

Sugarcane cultivation was traditionally quite popular in western Uttar Pradesh, with the state government raising the State Advisory Price Committee (SAPC) every year to ensure that it remained profitable for farmers, given the increasing inflation and input costs. However, the cane SAP has remained unchanged for almost three years now, since 2017-18.

On top of this, farmers' distress has been aggravated by the delays in payments. The U.P State Sugarcane (Control) Order, 1966, mandates payment to farmers within 14 days from the date of supply of sugarcane, failing which an interest of 15 per cent per annum is applicable on the due amount.

IV. SECTION : D - ENDNOTES:-

In the present ongoing research article which confines to the in depth interpretation and retrospection of – “An Analysis of Commercial and Political Attributes of a Cash Crop In District Bijnore, Uttar Pradesh”. The following endnotes were found and are of paramount importance and worth mentionable has enlisted below:-

1. With respect to the spatio –temporal trends at sub –divisional level it was found that the Sub – divisions of Najibabad, Seohara; and, Dhampur were the leading tahsils in terms of productivity and yield. Moreover, they maintained the positive correlation in terms of quality and quantity of sugarcane cultivation in the area of study. Also, there has been a strong positive correlation between sugarcane development and social development in the period under reference.

2. With regard to production of sugar (khandsari Udyog) in various sugar mills of the study area Dhampur, Seohara and, Billai sugar mills were ranked in top three sugar mills of district. The study area has had emerged as the leading growth pole region of the country for its unique operations of sugarcane cultivation and manufacturing as well as operational processes; and, the leading consumer marketing brand in terms of competitiveness and competency. The purchasing power capacity has had increased in the area of study as the per capita income of target segment has increased marginally.

3. As far as the commercial and political attributes of the cultivation of sugarcane were concerned it was observed that the agricultural cultivation of the sugarcane had been greatly affected and shaped by ruling political parties and the strong lobby of the owners of sugar mills of the kahndsari udyog. There had been inter – state level variations in terms of the minimum support price. Thus, this issue escalates the problems of farmers as their financial dues were not paid in prescribed time limit as laid down by U.P State Sugarcane (Control) Act of 1966. Moreover, the state and situation has had been further accentuated as the State Advisory Price Committee were not exercising its duties and obligations as per acceptable standards.

List of Abbreviations

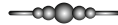
1. A.S.C: Agricultural Science Centre.
2. B.K.U: Bhartiya Kisan Union.
3. C.S.R.I: Central Sugarcane Research Institute.
4. F.C.I: Food Corporation of India.
5. F.S.S.A.I: Food Safety and Standards Authority of India.
6. I.C.A.R: Indian Council of Agricultural Research
7. I.I.S.R: Indian Institute of Sugarcane Research
8. K.V.K: Krishi Vigyan Kendra.
9. M.S.P: Minimum Support Price
10. N.A.R.P: National Agricultural Research Project
11. S.A.P.C: State Advisory Price Committee
12. U.P.S.S.C.C.A: Uttar Pradesh State Sugarcane Control Act.
13. Z.R.S: Zonal Research Station.

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A STUDY OF THE SOCIO-ECONOMIC CONDITION OF THE HANJIS COMMUNITY IN SRINAGAR DISTRICT OF JAMMU AND KASHMIR

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ABSTRACT

The boatmen in Kashmir are known as *Haenz* in the Kashmiri and *Hanjis* in the Hindi language. Hanjis are also called *Kishtiban* (boatmen) or *Jalbashi* (water dwellers). They are ancient residents and can also be traced from the Pandit Kalhana's *Rajatarangani* in 826 BC, it is the first written historical record of the Valley of Kashmir. They carry out livelihood activities from the lake, such as water transportation, fishing, vegetable growing, loggers, construction material dealers, and collectors of various lake products. The main objective of this paper is, to identify the social and economic conditions Hanjis in the Srinagar district of Jammu and Kashmir. This descriptive study is based on both secondary and primary data (schedule and observation-based). The investigation pertains to only four specific groups of Hanjis, the *Shikara Haenz*, the *Houseboat*, the *Dunga* and the *Gaad Haenz*. From the study, it is clear that in the Hanjis community, houseboat haenz are economically developed people. They have all the comforts of a good life. Shikara haenz are also economically good but not as good as houseboats Haenz, Dunga haenz, and Gad Haenz belong to the lower middle-level income class. Hanjis living on the bank of the lake and in the periphery of the lake always have the danger to their life because of floods during the rainy season. Hanjis are forced to leave their profession because of a decrease in tourist flow day by day in the valley due to political instability and continuous strikes. The government needs to take positive steps toward normalcy.

Keywords: Shikara, Hanjis/Haenz, Srinagar, Socio-Economic conditions, Tourism.

Introduction

The boatmen of Kashmir are known as *Haenz* in the Kashmiri and *Hanjis* in the Hindi language. "Hanjis are also called as *Kishtiban* (Boatman) or *Jalbashi* (Water-dweller)" (Lawrence, 1998). The Hanjis are directly dependent on the lake for their livelihood. They are called *Dhivaror Korijian* in India, boatmen are usually called by the Hindustani name *Manji*,

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and in Kashmiri, they are called *Hanji* or *Haenz* (Zutshi, 2013; Mar Walter, 2013). The Hanji people are considered some of the earliest inhabitants of the Kashmir Valley. They are also the most significant tribe in the region. There are still a lot of unanswered mysteries about their beginnings, where they came from, their ethnic backgrounds, and their level of boat-building expertise (Ahmad, 2011). It is not possible to obtain any information as to the origins of the Hanjis, but their profession is very deep-rooted (Lawrence, 1992). History affirms that Raja Parbat Sen introduced Hanjis (the Boatmen of Kashmir) from Sangaldeep, presently which is located in Sri Lanka. It is believed that before their conversion to Islam, they were Kshatriyas. They are primordial inhabitants and may be traced back to Pandit Kalhana's *Rajatarangani*, written in 826 B.C. According to the recorded history of Kashmir, the Hanji people are descended from a group of people known as the Nishada, who were descendants of the Naga Race. The Naga Race is described in this history as being the most powerful chieftains in this region. Nishada is mentioned in the Vedas, Manusmriti, Mahabharata, and Kalhana's *Rajatarangani* (Lawrence, 1895). Hanjis are considered to be some of the oldest inhabitants of the Kashmir valley. They carry out their livelihood from the lake by carrying out activities, like fishing, collectors of various lake products, water transporters, construction materials dealers, vegetable-growers, wood-cutters, tourist guides, and by running paying guest (PGs), etc. (Fasal, 2012). The Hanjis are considered to be strong and hardworking active people, their children start paddling on the boat at a very early stage, and they have mastery of the art of living on the water (Ray, 1970). The majority of Hanjis can be found in and around the regions of Dal Lake, Wular Lake, and the Jhelum River, stretching from Khannabal in the Anantnag District to Srinagar Kashmir. The Hanji people have a long history of living on the Dal, and the infrastructure of their community within the lake is so developed that they very rarely need to travel to dry land (Wani, Gulzar Amed Lateef, 2018). As Hanjis in north India, in northeast and south India boatmen are called *Nishada* or *Mallahs* by both Hindu and Muslims. *Mallahs* are to be found everywhere in the subcontinent, Bengal, Odessa, Sindh, Khyber Pakhtoonwala, and Punjab. According to historians that the Nishada tribe actually lived on the bank of River Saraswati and they were engaged in ferrying people across the river and also collecting timber and fuel from forests (Lawrence, 1895). They moved to a different part of the county for their livelihood after the river dried. According to some historians, the Boatmen in Kashmir was introduced by Raja Parbat Sen from Sangaldeep, Sri Lanka and it is believed that they were Vaisya or sundra caste. Hanjis claim themselves to be the descendants of Prophet Noah. Hanjis segregated themselves into numerous sub-sects depending upon the occupation they adopted (Sufi, 1949, Shahab and Amin, 2012). These sub-sects were primarily called, (i) Demb Haenz (Vegetable growers) (ii) Gari Haenz (Water-nuts gatherers) (iii) Dunga Haenz (Owners of passenger boats) (iv) Maer Haenz (Boat men of MaerNallah) (v) Gaad Haenz (Fishermen) (vi) Shikara Haenz (Shikara owners) (vii) Houseboat Haenz (Houseboat owners) (viii) Haka Haenz (wood Collectors from water bodies).

Hanjis are regarded as a separate caste in Jammu and Kashmir. Despite pursuing the same name, traditions, rituals, and ceremonies and performing similar traditional occupations, they are a unique homogeneous community (Amin, 2013). The socio-economic condition of Hanjis is not too good; the present study tries to find out the reason behind the socio-economic

condition of Hanjis. Hanjis community is the largest community of the valley, it is considered as the backbone of the Valley economic structure, so it is important to study their social and economic setup. Many researchers are doing research on Hanjis community in Jammu and Kashmir, but limited to only one sect, especially fishermen, the socio-economic study of the whole Hanjis community is not yet studied. The historical recital is most important for this study because the set of facts and circumstances of the society are not the same as that of modern society. For that purpose, the present study analyzes the socio-economic status of Hanjis community in detail.

The primary objective of the study is to identify the socio-economic condition and factors working behind the present social and economic conditions of Hanjis in Srinagar district Jammu and Kashmir.

Study Area

Srinagar city lies in the center of Kashmir Valley and is surrounded by five other districts, Kargil is in the north, Pulwama in the south, and Budgam in the north-west. Srinagar is situated between $33^{\circ}53'49''$ to $34^{\circ}7'14''$ north latitude and $74^{\circ}36'16''$ to $75^{\circ}01'26''$ east longitude. Dal Lake (Dal Lake) is located at a height of 1584 meters above sea level on the right bank of river Jhelum in the Srinagar district of Jammu and Kashmir. Dal Lake is situated in the northeast of Srinagar, between $74^{\circ}08'$ and $74^{\circ}48'$ east longitudes and $34^{\circ}3'$ and $34^{\circ}13'$ north latitude. Dal Lake holds a significant position in the world. Many tourist attractions have been built around it, including Mughal gardens, Cheshama Shahi, Shalimar Bagh (garden), Botanical Garden, Naseem Bagh, Pari Mahal, Nishat Bagh, and various spiritual shrines such as Shankaracharya temple, Hazratbal, and others (Raina, 1977).

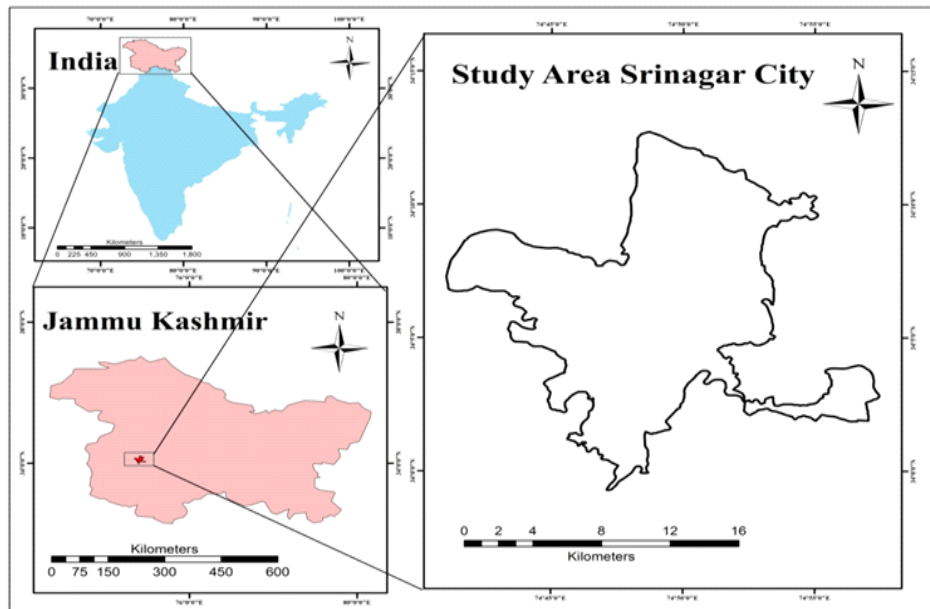


Figure 1 : Study Area

Methodology

This study has been carried out around Dal Lake located on the fragile hill of the Kashmir valley of Jammu and Kashmir. In this descriptive study, both primary, and secondary data, are used. The primary data is collected by the field survey through an appropriate schedule using a systematic and stratified random sampling method, especially for Hanji's socio-economic characteristics. The primary data accordingly gathered was processed, classified, and quantified by applying simple and sophisticated statistical techniques (Khan,1998). In the present investigation, an empirical approach was adopted to study the participation of Hanjis in different economic activities. The study area, Dal Lake is divided into two regions i.e., Area around the periphery of Lake and the area in the interior of Lake. The samples were collected from four different categories of Hanjis community, and correlated each section of Hanjis with others to check the difference in their socio-economic status, lifestyle, food, and other aspects. A total of 160 samples are collected to carry out the study, five sites were selected for sampling where the concentration of Hanjis population is very high, Kohan Khan, Dar Mohallah, and Jaffari Mohallah from the periphery of Dal Lake, and Bujal Mohallah and Bakir Mohallah lying interior of Dal Lake. Statistical and cartographic tools are also used to easily identify and analyze the data to get accurate and reliable results for the study.

Limitations of the study

The study could not be conducted in the entire Kashmir Valley (only Srinagar district around Dal Lake) due to time and resource restraints.

Results and Discussion

The localities of the Hanjis community in Srinagar city are located at Abi Kakpora, Mir Mohalla, Dar Mohalla, Nishat, Kohn Khan, and Shalimar are lies in the periphery of the lake and the localities Bujal Mohalla, Gogal Mohalla, Bakir Mohalla are lies in the interior marshy area of the lake (Fasal, 2012).Some localities have more than hundreds of households, while others have only five to ten households. Dal Gate and Gagribal areas of the lake have the largest number of Hanjis (Ruhe, 1985). Despite their dispersed locations within and around Dal Lake, Hanji localities are mainly connected by waterways and rarely by land pathways. Traditional Hanjis rarely venture outside of their lake houses due to their strong embedded attachment to the surrounding lake environment (Amin, 2013).

Basic Amenities and Social Setup of The Hanjis

The basic amenities and social status are co-related with each other. The basic amenities include drinking water, sanitation, and other things used in day-to-day life, directly effect upon social condition and lifestyle of the people. These basic amenities provide comfort, and these basic amenities are a sign of a healthy and safe life. The good basic amenities describe the social-economic condition of people of any area.

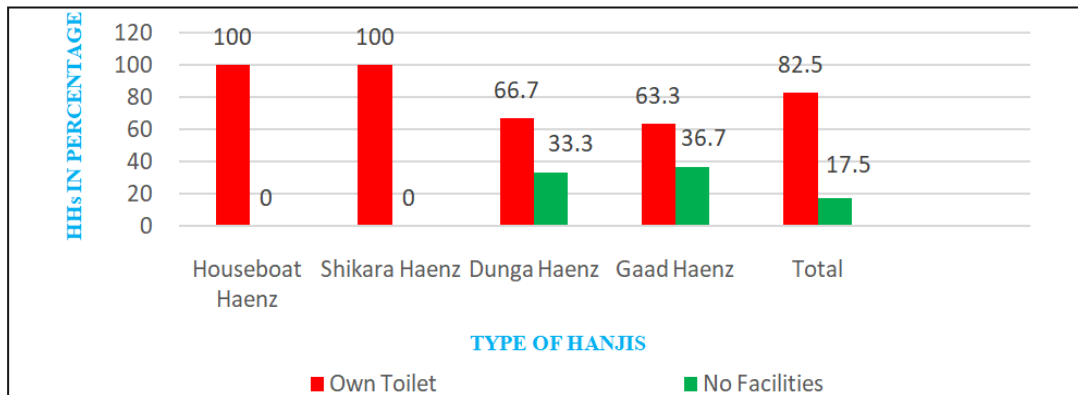


Figure 2 : Toilet facilities

Source: Primary field survey in Srinagar District, Jammu and Kashmir.

Fig. 2 depicts the Haenz category-wise toilet facility in the study area. 82.5 percent of the household from all selected groups of Hanjis community have their toilet only 17.5 percent of households have no facilities for toilets or they are sharing a toilet. But the percentage of toilet facilities varies greatly among the selected four groups of Hanjis. Both residents living on the outskirts of the lake and those who live on the lake itself are affected by the severe lack of facilities in their area, (Jahangeer A. Parry, 2012). Most of the Hanjis live in the lake, so it is difficult for the municipality authorities to install sewage pipes or other sanitation setups in the lake.

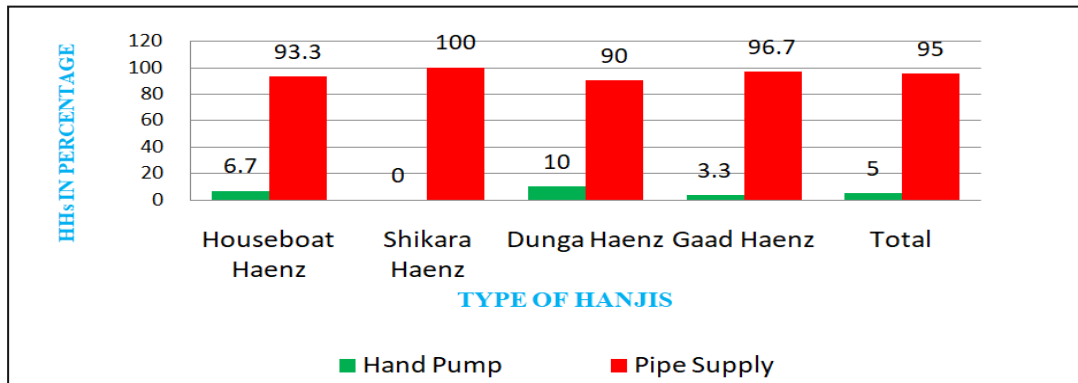


Figure 3 : Main source of drinking water

Source: Primary field survey in Srinagar District, Jammu and Kashmir.

The above Fig.3 shows that the Houseboat haenz and Shikara haenz are at the top in terms of drinking water facilities. 100 percent from Shikara haenz and 93.3percent respondents from houseboat Haenz said they have drinking water facilities. All the respondents said that they have drinking water facilities either they have tap water, hand pump, and pipe supply. No doubt in the Hanjis community most of the households have drinking water facilities but the problem is that they have no proper arrangement for water. Respondents report that the water supply is

not on regular basis, some days we go through a shortage of water. The municipal authority said it occur sometimes due to the freezing of water in the pipes in extreme cold weather in winter.

Table 1 : Hanjis problems with drinking water and separate rooms for kitchen

Types of Haenz	problem with Drinking Water in percentage		separate rooms for kitchen		Total sample
	Yes	No	Yes	No	
Houseboat Haenz	60 (18)	40 (12)	100 (30)	0	30
Shikara Haenz	53.3 (16)	46.7 (14)	100 (30)	0	30
Dunga Haenz	90 (27)	10 (3)	93.3 (28)	6.6 (2)	30
Gaad Haenz	96.7 (29)	3.3 (1)	90 (27)	10 (3)	30
Total	75 (90)	25 (30)	95.8 (115)	4.2 (5)	120

Source: Primary field survey in Srinagar District, Jammu and Kashmir.

It is observed that most of the respondents have the problem of drinking water, but it is different in four different categories of haenz. Above 90 percent of Gad haenz and Dunga haenz have drinking water problems i.e., shortage of drinking water, no regular water supply, difficulty to access, dirty water and cost, etc. the issues of the drinking water are due to the settlement of the Hanjis. It is difficult to the installation of water supply pipeline in the dal lake area, where there is no land, and people move in boats. most of the Hanjis live around water bodies in slums and shanty houses, it is difficult to provide water in such congested areas (Fasal et al., 2013). With all other basic amenities like rooms in the house, source of lightening and separate toilet, etc. separate room for the kitchen is also an important part of basic amenities of any household, the separate kitchen has great effects on the health of the members of the family. Table 1 below shows the percentage of the population having a separate kitchen in households in the study area. The overall percentage of the separate kitchen in households in the study area is 95.8 percent, and only 4.2 percent of Hanjis have no separate kitchen. But the situation is a little bit different from the total percentage in the selected four groups of Hanjis. Hanjis do not like to use the room within the house as a kitchen because smoke, dust, and ash generated in the kitchen cause the diseases like cough, asthma, chest problem, etc.

Status of women in Hanjis

The Hanjis women of the Srinagar district of Jammu and Kashmir are living in accusatory lack due to poverty, illiteracy, early wedding, traditional neglect, and lack of awareness about welfare schemes by the Government for women. The Hanjis women are unaware of their rights and government programs for their education, health, and social advancement. In Kashmir, Hanjis women have been the backbone of economic growth. They worked side by side with men to perform a variety of agrarian tasks, from sowing to harvesting (Bhat, 2016).

Improving the health of Hanjjs women requires a strong, long-term commitment from the government and other stakeholders, that works in their favor. Long-term progress in education and awareness prospects will play an optimistic role in the health of Hanjjs women and their families. In the short term, improving policies, and promoting more positive attitudes and behaviors towards Hanjjs women's health.

Table 2 : Hanjjs community women are allowed to avail higher education and women own property on their name					
Types of Haenz	Women allowed to avail higher education		Women allowed to own property on their name		Total sample
	Yes	No	Yes	No	
Houseboat Haenz	100 (30)	0	73.3 (22)	26.7 (8)	30
Shikara Haenz	96.7 (29)	3.3 (1)	76.7 (23)	23.3 (7)	30
Dunga Haenz	100 (30)	0	83.3 (25)	16.7 (5)	30
Gaad Haenz	100 (30)	0	86.7 (26)	13.3 (4)	30
Total	99.2 (119)	0.8 (1)	80 (96)	20 (24)	120

Source: Primary field survey in Srinagar district, Jammu and Kashmir.

Table 2 shows the percentage of girls of Hanjjs who are allowed to avail higher education because they provide equal opportunity to girls to get an education, only 0.8 percent. Hanjjs do not allow their girls to avail higher education, because of poverty, to help their mother with household work and taking care of a young sibling, etc. Education, as well as property in the name of women of the household, are also signs of women's freedom and their status in the community. The total percentage of women in the Hanjjs community who are allowed to occupy property in their name is 80 percent and 20 percent are not allowed to occupy the property on their name. They are greedy people and afraid that if in future any problem occurs in the family the women will claim the property so they do not allow women to occupy the property. This condition is the same in all groups of Hanjjs but less in Dunga and Gaad haenz as compared to the other two Houseboat and Shikara haenz. Along with education freedom and property in their name bank account of women in the bank is also a sign of freedom and shows the status of women in society. The below table shows the data bank account of Hanjjs women which is itself a representation of the status of women in the community. After India's independence in 1947, Kashmiri women improved as reforms in several spheres, especially education, disrupted conventional roles and conservative expectations (Bhat, 2016).

Locating Education and Health Status of Hanjjs

Education is the most important instrument of human development and its importance has been stressed through basic rights, principles, and acts in an enormous variety of nations. The progress and prosperity of a nation or community is set by the progress of education as per

Geographical Perspective

Article twenty-six of the Universal Declaration of Human Rights (UDHR), “Everyone has the right to education. Education shall be free, a minimum of within the elementary and basic stages. Education is most important for the development of any society or community, education development is directly related to economic development. Education also helps in the development of society in every field social development; cultural development, etc. Educationally backward communities are remains socially and economically backward. Hanjis communities are divided into groups on the base of their profession, some of them are educationally backward and economically as well. In the last few years, Hanjis are taken education seriously and sent their children to school regularly, they want to educate their children.

Literacy Rate of Hanjis

The level of literacy in a class or community reflects its socioeconomic and cultural characteristics. There are also direct effects of literacy on fertility, mortality, as well as participation in the workforce in a community. The literacy rate among Hanjis is uneven as it recorded during the field survey. It varies from one class to another class and from one income group to others concerning their occupations. The literacy rate of Hanjis community in the present study is found very poor. The literacy rate is different in a different group of Hanjis i.e., in Houseboat Haenz literacy percentage is 65 percent. In Shikara Haenz literacy percentage is 63.5 only, in Dunga and Gad haenz literacy rate is very low 43 percent and 19 percent respectively. The Hanjis community around Dal Lake had an overall literacy rate of about 23 percent, with 30 percent of men being literate and only 15 percent of women which shows the backwardness of the community. Several factors might contribute to a low literacy rate, including the socio-economic position of the respondents, oblivion, limited income, and large families. Literacy and socio-economic positions are mutually reliant on one another, which helps us to explain the low social and economic standing of Hanjis, whether this is caused by their low-income status or vice versa (Imtiyaz Qayoom et al., 2016).

Education Status of Hanjis community

The Hanjis want to educate their children but educating up to what limit is a question mark. Some are sending their children to school up to the primary level. When the children can learn, read, write and count they are dropped from school and are involved in ancestral professions. Insurgency, continuous strikes, and curfew in the past and even today have hampered education in the Valley of Kashmir. The insurgency has caused frustration among unemployed youth, less visible economic development, and psychological tension, which are major factors when studying Kashmir's educational structure (Tanveer Ahmed Dar, 2012; Imtiyaz Qayoom et al., 2016). The overall percentage of Hanjis of all groups in the study area is different as comparing a single group of Hanjis, 65 percent of Hanjis want to educate their children above PG level, 28.3 up a Graduate level, 5.8 percent Post Graduate level. At present Hanjis community has started educating their children, and most of them wanted to give higher education to them for a better future.

Types of Haenz	Hr. Secondary	Graduate	Post Graduate	Above PG	Total sample
Houseboat Haenz	3.3 (1)	23.3 (7)	6.7 (2)	66.7 (20)	30
Shikara Haenz	0	40 (12)	0	60 (18)	30
Dunga Haenz	0	26.7 (8)	10 (3)	63.3 (19)	30
Gaad Haenz	0	23.3 (7)	6.7 (2)	70 (21)	30
Total	0.8 (1)	28.3 (34)	5.8 (7)	65 (78)	120

Source: Primary field survey Srinagar district Jammu and Kashmir.

The above table shows the level of education but the safety of girls in school is a huge barrier to the education of girls in the Hanjis community as in other communities of the nation. The safety of girls in schools is very important if parents feel that girls are not safe, they cannot send their girls to school. Most of the respondent says yes education raises their standard, 97.7 percent of respondents said education raise the standard, and 3.3 percent of respondent said no. 97.7 percent of respondent said education play important role in the development of any society, education tells us how to live, how to talk and to behave, the perception about the education rise their social standard are almost same in all groups of Hanjis. Their difference is only 5 percent.

Table 4 : Reason of Drop-out Girls and Boys from school in Hanjis community

Girls Drop-out					
Types of Haenz	School to far	Poverty	Schooling is costly	Security Reason	Total sample
Houseboat Haenz	7.1		0	78.6	30
Shikara Haenz	21.4	0	7.1	71.4	30
Dunga Haenz	0	0	28.6	71.4	30
Gaad Haenz	0	0	66.7	33.3	30
Total	9.1	4.5	20.5	65.9	120
Boys Drop-out					
Types of Haenz	School to far	Poverty	Security Reason	Schooling is costly	Total Sample
House boat Haenz	0	0	33.3	66.7	30
Shikara Haenz	0	0	42.9	57.1	30
Dunga Haenz	0	0	50	50	30
Gaad Haenz	0	66.7	33.3	0	30
Total	0	11.1	38.9	50	120

Source: Primary field survey in Srinagar district Jammu and Kashmir.

Geographical Perspective

The table 4 below shows the dropout boys and girls of Hanjis from school due to several reasons. Most boys and girls dropout or never attended school because they have no interest in the study. Boys are not interested in studying because they do business or they help their parents in their work on houseboats Shikara etc. Costly schooling is also the main cause of not attending school, the proportion of girls who dropout from school or never attended school is higher than boys. The Gaad haenz has the highest number of dropouts due to security issues and the high cost of schooling. Parents may find it hard to pay for the huge amount of admission fees, Stationery items like books, notebooks etc., printing fees, uniforms, shoes, and other school supplies throughout the year, as well as tuition fees during the two-to-three-month winter break (Tanveer Ahmed Dar, 2012). Many direct and indirect repercussions of the Kashmir conflict affect children's school attendance.

Health Condition of Hanjis

Most of the community advocates personal involvement in fitness rather than a dependency on treatment and institutionalized solutions. Improvements in the fitness of humans give modification and enjoy the full lifestyle and professional choice. Health is a dynamic process that always keeps changing. The life of people in urban areas is affected by several issues like air pollution, noise pollution, improper sanitation conditions, etc., and overpopulation. Overpopulation causes several problems and issues. These problems are the root causes of several diseases and other health-related issues for the population of that area.

The health problems of Hanjis are discussed below.

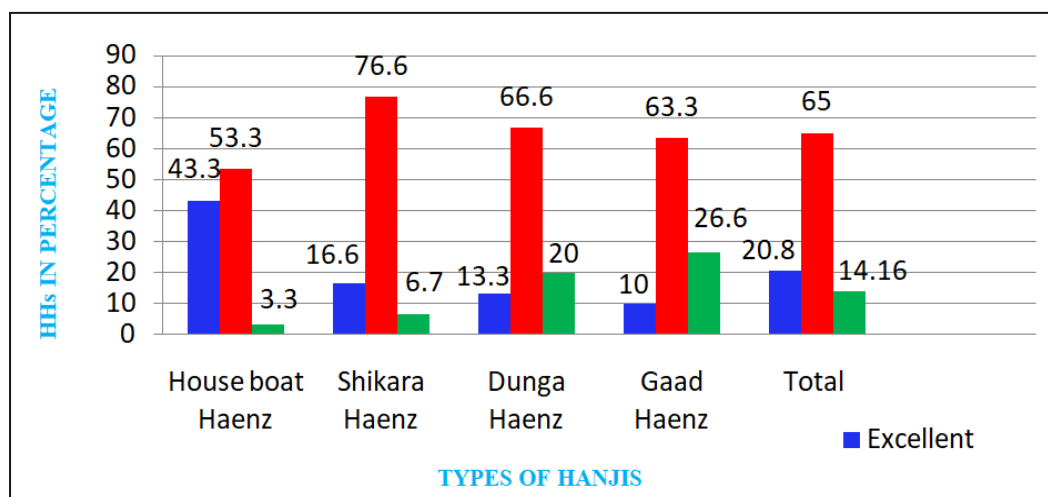


Figure 4 : Health condation of family in Hanjis household

Source: Primary field survey in Srinagar district Jammu and Kashmir.

Figure 4 above shows the health conditions of the Hanjis population in the study area. The data shows that most people have good health. 65 percent of the total population of the Hanjis has

good health and 14.16 percent show excellent health conditions, 20.8 percent have bad health conditions from all groups. The data shows houseboat haenz has extremely good health condition among all groups because houseboat haenz are economically sound, as they have all comforts of life and get proper medicine, and they got sufficient nutrition that their body needs. 43.3 percent of houseboat Haenz have an excellent health condition, 53.3 has very good health conditions, and only 3.3 percent show bad health. Most of the hanjis said they have good health, and a small portion of the respondents hanjis are highly satisfied with their health. Those who are satisfied with their health conditions are from houseboat haenz because they are rich people, they have all luxuries of life as compared to other groups in the study area.

Table 5 : Common Health Problems of Hanjis

Type of Haenz	Mental Stress	Chest problem	Thyroid	Sugar	No	Total
Houseboat Haenz	46.7(14)	30.0(9)	6.7(2)	3.3(1)	13.3(4)	30
Shikara Haenz	40.0(12)	13.3(4)	23.3(7)	20.0(6)	3.3(1)	30
Dunga Haenz	26.7(8)	36.7(11)	16.7(5)	13.3(4)	6.7(2)	30
Gaad Haenz	20.0(6)	26.7(8)	36.7(11)	16.7(5)	0.0(0)	30
Total	33.3 (40)	26.7 (32)	20.8 (25)	13.3 (16)	0.0 (0)	120

Source: Primary field survey, Srinagar district Jammu and Kashmir.

The data shows two major health problems faced by Hanjis population which are mental stress and thyroid problems, 60 percent of the Hanjis population from all groups has mental stress and thyroid problems. The mental stress caused by political instability and terrorism, chest problems are due to pollen and calibers from the tree's poplar and willow, and continuous paddling of the boats on the lake and river is also a factor of chest problems. Sugar and joint pain are also found in the Hanjis. These problems are arising due to improper supply of nutrition. Health problems are varying in all groups of Hanjis Thyroid is highest in Gaad haenz and Shikara haenz. Sugar problem is highest in Shikara haenz and Gaad Haenz with 20 percent and 16.17 percent respectively. Several direct and indirect repercussions have a consequence for the people of Kashmir as a result of the conflict in Kashmir valley. Mental stress, anxiety, and depression are common in people, especially the young generation have a direct effect on the ability to work, and health (Tanveer Ahmed Dar, 2012). The conflict has affected people's lives through many indirect means such as increased economic uncertainty, loss of their family members, friends, relatives, and loss of adult protection and so on. A psychiatric institution in Kashmir found that 36 percent of children have post-traumatic stress disorder (Dasgupta, 2008). Mental stress, anxiety, and depression affect children's school attendance and performance (Tanveer Ahmed Dar, 2012).

Economic Conditions of The Hanjis

The continuous unrest in Kashmir has also affected people's capacity to work, especially for those who are reliant on daily wage employment, the tourism and handicraft industries, and those who travel to towns and cities daily or for longer periods. Most of the Hanjis communities are still engaged either in Houseboats, Shikara, and Gaad haenz (fishermen), engaged in collecting and selling fish. Hanjis economic condition depends upon the tourists except for the Gaad haenz all three selected groups of Hanjis are dependent upon tourists. Political instability, and continuous strikes in the valley effects too much Hanjis economy. Despite settling in an urban area, Hanji's community lacks most city amenities. They live traditionally and are one of Kashmir's backward populations (Rather, 2004). Due to continuous strikes and political instability, the tourist inflow in the valley decreases day by day, the decrease in the tourist inflow put the Hanjis economy backstage, especially the Houseboat, Shikara, Dunga haenz. Gaad Haenz economy is affected by tourist but not at a large stage, Gaad haenz collect fishes from the river Jhelum and Dal Lake. Government restriction on fishing in the lake and Jhelum River also affects the economy of the Gaad Saenz. The economic conditions of Hanjis vary from group to group based on their occupation. Houseboat Haenz is economically sound compared to other groups. Gaad haenz stands at the bottom in terms of economic condition in all selected groups of Hanjis in the study area. The average monthly income of any household represents their economic conditions. The development is also affected by the income of any household.

Table 6 : Average Monthly Income of Hanjis

Typeof Haenz	10000	15000-25000	25000-35000	35000-45000	Above 45000	Total Sample
	Rupees	Rupees	Rupees	Rupees	Rupees	
Houseboat Haenz	0	0	23.3 (7)	43.3(13)	33.3(10)	30
Shikara Haenz	0	26.7 (8)	50 (15)	23.3 (7)	0	30
Dunga Haenz	33.3(10)	33.3(10)	23.3 (7)	10 (3)	0	30
Gaad Haenz	43.3(13)	33.3(10)	13.3 (4)	10 (3)	0	30
Total	19.1(23)	23.3(28)	27.5(33)	21.6(26)	8.33(10)	120

Source: Primary field survey in Srinagar district Jammu and Kashmir.

Table 6 shows the average monthly income of four groups of Hanjis. This table shows the houseboat haenz are economically strong as compared to others. The average monthly income of Shikara haenz is 30000-45000, which is the highest in all groups of hanjis. 43 percent of Shikara haenz, have a monthly income is 35000-45000. 23.3 percent of Shikara Hanjis have 25000-35000 monthly income, and only 33.3 percent of Shikara haenz have monthly income above 45000. The table shows that the Gaad haenz has the lowest income. 43.3 percent have

only 10000 monthly income. Dunga haenz have 66.6 percent people having 10000-25000 monthly income. Shikara Haenz 50 percent of people have 25000-35000 monthly income. The table shows that most Hanjis have a moderate monthly income. The population below the poverty level is found in Gaad haenz and Dunga haenz. In Dal Lake in Srinagar, the entire Hanjis community lives on wooden boats and depends on the lake for their livelihood. In the entire community, Houseboat Hanjis has a better economic and social position due to the inflow of tourists to the Kashmir Valley from all over the world. They are considered rich people with rich assets (Hussain, 2001).

Due to continuous strikes and curfew, the market remains closed and no one can buy their fish, the government ban on fish picking in lakes and river affect the economy of Hanjis directly. So, the Gaad Haenz is poorer among other groups. The monthly income of any household depends upon their primary work and extra/secondary work they do for their better economic development.

Table 7 : Secondary Source of Income of Hanjis					
Type of Haenz	Labor	Trade	Business	Other	Total Sample
Houseboat Haenz	6.7 (2)	26.6(8)	63.3(19)	3.3 (1)	30
Shikara Haenz	30 (9)	23.3(7)	40 (12)	6.7 (2)	30
Dunga Haenz	63.3 (19)	0	36.7(11)	0	30
Gaad Haenz	70 (21)	16.6 (5)	3.3 (1)	10 (3)	30
Total	42.5(51)	16.6(20)	35.8(43)	5 (6)	120

Source: Primary field survey in Srinagar district Jammu and Kashmir.

The above table 7 shows the secondary source of income of the Hanjis community. From the above table, it is clear that 63.3 percent of Houseboat haenz are engaged in business activities as their secondary source of getting income. 26.6 percent are engaged in trade, and 6.7 percent are engaged in labor work. The table shows that 40 percent of Shikara haenz are also engaged in business but this percentage is very less than compared to houseboat haenz, 30 percent of Shikara haenz are engaged in labor work. The table shows most of the people of Dunga and Gaad haenz are engaged in labor work which is very high as compared to the other two groups. Dunga haenz has 63.3 and Gaad haenz has 70 populations in labor as a secondary source of income. Their monthly income is dependent on tourist flow in the valley, during the last decade the insurgency, political instability, continues strikes, and curfew affects the tourism industry which eventually affects the income of the Hanjis and other residents of the valley. following circumstances force the Hanjis to leave their ancestral profession and join other professions to run their family smoothly. The laborer did not get work for maximum days due to continuous strikes. But the trade and business may continue during the strikes; they sent their goods by bus to the seller, so they are not much affected by strikes and earn income.

Conclusion

Hanji community play important role in the Kashmiri society, they provide their services in every field in the valley. At present they are economically not good enough, and few years back they were considered economically sound people.

The maximum population of Hanjis has their toilets, and a large number of Hanjis from Dunga haenz and Gaad haenz have no toilet facilities. Most of the population has toilet facilities but the problem is that they have no proper arrangement for waste material of the toilet. Toilets are linked to lakes and rivers, the toilet material flows into water bodies. This problem is associated with those people who are living on the periphery of the lake and houseboats on the river and lake.

Women of Hanjis have equal opportunity and freedom, women are free to make their decision, free to avail of education of their own choice. Most of the Hanjis start educating their children. Hanjis give equal opportunity to their children. But during the last few years so many changes found among them.

In Hanjis community houseboat haenz are considered economically rich people, after that Shikara and Dunga haenz stand second in terms of economic status. Hanjis economic condition depends upon the tourists flow in the valley. Houseboat haenz also did trade and business other than work on a houseboat. Most of them have all comforts of life. The economic condition of haenz does not remain the same, it varies with the flow of tourism. When the flow of tourist increase, they get sufficient income but it goes to a low level when tourist flow decreases.

From the study, it is clear that in the Hanjis community, houseboat haenz are the economically developed people. Shikara haenz are also economically good but not as good as houseboat haenz, Shikara haenz are middle-level income people. Dunga Haenz is economically backward as compared to Houseboat and Shikara haenz, most of them come under lower-level income are lower middle income. Hanjis After the analyses about the health condition maximum prefer to avail private health services in private hospitals and Private clinics. Most of them in the present time are not dependent on the traditional treatment like that of traditional healers, they are now availing modern services of healthcare.

In the present time, Hanjis are leaving their ancestral profession as they think there are no more benefits in this profession. Hanjis think that several issues affect their business very badly, one is the continuous strikes and political instability due to which tourist flow in valley goes to a low level it affects the business, and secondly, the rich people of the valley have started working on houseboats, Shikara and passenger boats which effects Hanjis income.

Now Hanjis take interest in other work like business, trade, and construction. In earlier times major part of their income came from houseboat Shikara dongas and fishing. But now their sources of income are shifted towards other categories like trade, labor works, business, government jobs etc. So, in short, we can conclude that day-to-day changes have been coming in their life due to the impact of urbanization and modernization.

The selected groups of Hanjis community of the study area are directly linked to tourism, any changes in tourism directly hit the daily life of Hanjis. From the above study, it is clear that the socio-cultural, economic as well as environmental of Hanjis are affected by tourism.

Hanjis living on the bank of the lake and in the periphery of the lake always have danger to their life because of floods during the rainy season.

The Hanji who are living in the periphery of the lake and on the bank of the lake has no arrangement of toilet waste material which is drained into the lake, due to that the ecology of the lake is badly affected and government must take steps toward this issue.

Hanjis are forced to leave their profession because of a decrease in tourist flow day by day in the valley due to political instability and continuous strikes, government needs to take positive steps toward normalcy.

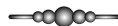
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CAUSES OF URBAN FLOODS IN THE NATIONAL CAPITAL TERRITORY OF DELHI

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ABSTRACT

Urbanisation in India has been haphazard and poorly planned. Expanding cities are putting a strain on the city environment that exacerbates people's vulnerabilities. This is posing numerous challenges of which, urban flood is becoming increasingly important. Urban flood is a result of inadequate or poor stormwater drainage, improper planning, encroachment of drains and water bodies, infringement of flood plains and climate change. With climate change, they have become more frequent and devastating, are likely to inundate for a longer duration, and affect newer areas. This paper makes an in-depth study of the causes of urban floods with reference to the National Capital Territory (NCT) of Delhi.

Keywords: Urbanisation, Urban flooding, National Capital Territory, Urban Stormwater.

Introduction

The world has faced many disasters in recent years of which floods have been the most recurrent and devastating threatening food security and livelihoods of millions of people. It is estimated that about 23% of the world population is directly exposed to the risk of intense flooding of which a vast majority resides in low- and middle-income countries (Singh et al., 2023). Catastrophic floods have hit almost all continents in 2023 as climate change-induced extreme rainfall events have become more frequent. IPCC's Sixth Assessment Report (AR6) 2023, released in March, calls for an urgent climate action. It warns that if the current development pathway is not reversed, global warming will exceed 1.5°C during the 21st century (Arora, 2023). This means that every incremental rise in global temperature, amongst others, will increase the frequency, duration, and spatial impact of floods from a local to a global scale. (Arora, 2023).

Urban floods are a growing issue of concern for both the developed and developing countries. The increasing number of such events and their devastating impact is posing a serious challenge to planners all over the world. Inundation may last from a few hours to several days and is affecting urban areas that otherwise may not be prone to flooding. The impact of such disasters is very complex in growing mega cities like National Capital Territory (NCT) of Delhi, which is vulnerable to intense and frequent rainfall events during the Indian summer monsoon season intensified by the growth in built-up areas, inadequate and congested stormwater drainage leading to water logging and increased surface run-off.

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NIDM defines Urban floods as being significantly different from rural flooding. This is because urbanisation leads to the development of catchments, which increases the frequency of floods from 1.8 to 8 times and flood volumes by up to 6 times. Consequently, flooding occurs very quickly due to faster flow times (in a matter of minutes) (*NIDM*, 2010). The *Federal Emergency Management Agency* (*FEMA*) Report 2016 defines urban flooding as the inundation of property in a built environment, particularly in more densely populated areas, caused by rain falling on increased amounts of impervious surfaces and overwhelming the capacity of drainage systems (*Galloway et. al*, 2018). Urban flooding may also be defined as a hazard caused by heavy rainfall overwhelming the drainage capacity. Thus, the term Urban flood can be defined as “excessive runoff in developed urban areas caused by heavy rainfall, where the water doesn’t have anywhere to go due to poor drainage system capacity, causing inundations” (*Kumar*, 2010). Besides these, human activities such as rapid urbanisation, deforestation, encroachment and unplanned development have also contributed to urban floods.

The NCT of Delhi

Delhi is located in northern India and is bordered by the states of Haryana and Uttar Pradesh. It covers an area of 1,483 sq. km. To its west and south-west lies the great Indian Thar desert and to the east lies the river Yamuna. The terrain of Delhi is generally flat except for the ridge of the Aravalli range which extends towards the western side of the city, giving an undulating character to some parts of Delhi. Delhi can be divided into three major drainage basins, ultimately discharging into the Yamuna River: Najafgarh, Barapulaah, and Shahdara basins (*Tomar et al.*, 2021). The Delhi NCT is prone to flooding from the Yamuna River, which has a catchment in Haryana, and the Sahibi River (Rajasthan) via the Najafgarh drain (*Tomar et.al* 2021) (*Figure 1*).

Being one of the most urbanised cities in the country, Delhi is always at risk of urban flooding (*Tomar et al.*, 2021). Nearly every year, there is flooding in the River Yamuna, the intensity of which may be low, medium, or high according to the classification set up by the Irrigation and Flood Control Department, Delhi Government.

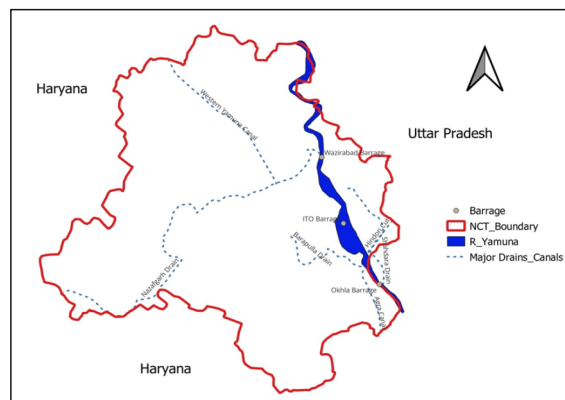


Figure 1 : National Capital Territory of Delhi
(Compiled by Dr.Satya Raj)

Table 1: Classification of Flood

(According to the Irrigation and Flood Control Department, Delhi Government)

Gauge Level (in mts)	Classification
Below 204.22	Low
204.22-205.44	Medium
Above 205.44	High

Source: Tomar et al., 2021

The water level of river Yamuna in summer is found to be nearly 201.0 m. The water generally remains within its confines, and no danger is created to life and property. This is thus referred to as the *low-category flood*. The floods are considered *medium-category* when the water overflows its boundaries and touches the embankments constructed on both sides. The water level rises between 204.22 to 205.44m. If the level of water rises above the level of 206mit is considered as *high- category flood*. The floods recorded in the river Yamuna in 1967, 1971, 1975, 1976, 1978, 1988, 1995, 1998, 2010, 2013, and 2018 have been the major ones (Tomar et al., 2021). The national capital territory of Delhi witnessed one of the worst floods in July 2023. The highest flood level recorded was 208.66 m. The water entered the city and inundated many low-lying areas of East, North-East, and South-East Delhi. 16,000 people were evacuated and thousands were affected (TOI, 2023). A critical analysis of the flood zoning pattern reveals that, the high-risk zones are the areas that are occupying low-lying areas and have earlier been identified as unplanned or poorly planned areas having high population densities and sub-standard housing structures (Tomar et al., 2021). However, in these floods, newer areas were inundated making it important to understand and address the complex problem.

Table 2: Major Flood Events in R. Yamuna in Delhi

Year	Gauge (m)
1976	206.70
1978	207.49
1988	206.92
1995	206.93
1998	206.36
2010	207
2013	207.32
2018	206.05
2023	208.66

Source: Gupta, S 2017 Impact of floods in Delhi, SPA, New Delhi & TOI, 2023

Objectives

This research work is done for the fulfilment of following objectives:

- to comprehensively understand the causes of urban floods in the NCT of Delhi through an extensive review of the existing literature and
- to identify common factors and patterns, assess the state of knowledge, and suggest potential directions for flood mitigation and urban planning.

Methodology

This research is a work based of review of available literature related to urban floods in general and NCT of Delhi in particular. The following steps were involved in the study:

- **Literature Search:** A comprehensive literature search was conducted using academic databases, government reports, and reputable sources. Some of the keywords used for search were "urban floods," "Delhi," "flooding causes" and related terms. On the basis of this relevant publications and reports were collected.
- **Data Extraction and Organisation:** Relevant information was extracted from the selected literature. Details about flood causes, data sources, and methodologies used were collected.
- **Categorisation of Causes:** Categorisation of identified causes of urban floods in Delhi was done.

Results and Discussion

The factors that cause urban floods in the NCT of Delhi are very diverse. Based on the review of literature three major factors were identified causing floods in the NCT of Delhi.

- Meteorological Factors
- Hydrological Factors
- Anthropogenic Factors

These factors have further been sub-divided for a further detailed analysis.

Meteorological Factors

Intensity of Rainfall: Often incidents of urban flooding are related to rainfall. Data shows that the amount of rainfall received in Delhi NCT has varied over the last two decades. However, the intensity of rainfall is increasing. There is a sharp rise in rainfall intensity from 13.2 mm/hour in 1986 to 22.9 mm/hour in 2016, the latter leading to the inundation of over 50 percent of the city in 2016 in three hours (Gupta, 2017).

Within a short spell of time, bulk of the rainfall is received which overwhelms the entire system and urban flooding happens. In July 2023, Delhi recorded 261mm of rain in a day, which accounted for 125% of the amount it received on an average over the entire month of July (HT, July 12, 2023). This can be attributed to global warming and climate change and associated increasing temperatures which are posing several challenges.

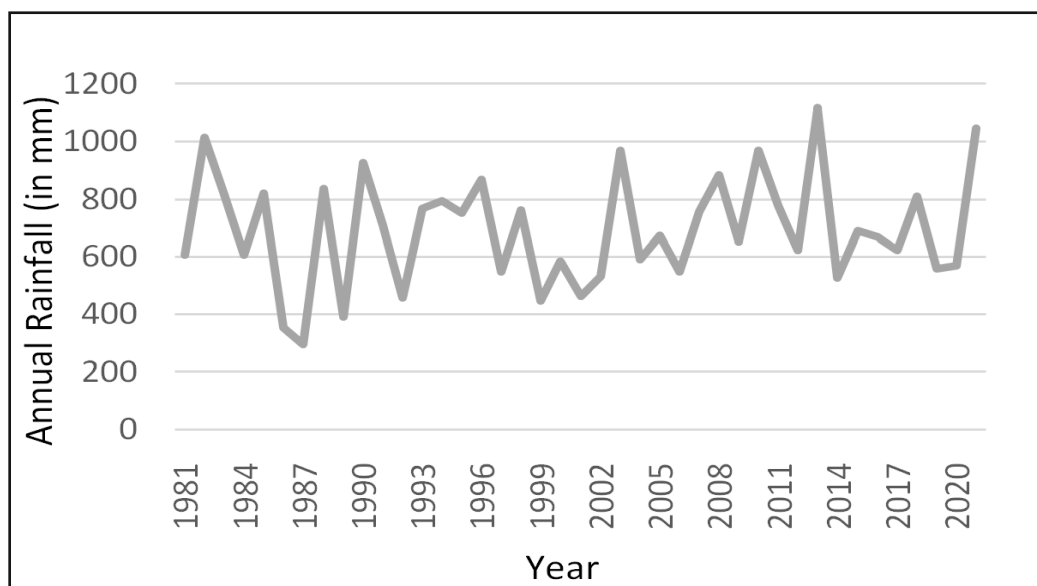


Figure 2 : Annual Rainfall in Delhi (1981-2021)

(Source: Grid data from power.larc.gov)

Hydrological Factors

Change in the course of the river: In the last few decades, River Yamuna has been reported alteration in its course. The river has experienced a major shift. This shift has exposed new areas to the threat of flood.

Inadequate development of Infrastructure: As the city grew the supporting infrastructure like solid waste disposal, sewer lines, stormwater drainage, etc. has not been able to keep pace with it. The result is that waste either finds its way into water bodies or lies uncollected on the streets clogging the drainage channel. Several drains release untreated water into the river adding to the woes.

Anthropogenic Factors

Anthropogenic activities have led to an irreversible impact on the urban ecology. The physical environment of Delhi has been strained beyond its limits and capacities. This has resulted in undesired alterations to the urban ecosystem exposing a larger population and areas in the city to floods every year.

Increase in population: Urban population has been increasing rapidly in Delhi since 1911. Between 1901-2011 urban population in Delhi has increased from 52.76% to 97.5% (Economic Survey of Delhi, 2022-23, ref. Table 3). The number of rural villages in Delhi has decreased from 214 in 1981 to 112 in 2011 (delhiplanning.delhi.gov.in) highlighting a steady increase in urban way of life. The rapid pace of development has brought a change in the land use of the city exposing a large population to floods.

Table 3: Urban Population to Total Population of Delhi, 1901-2011

S. No.	Census Year	% of urban population to total population	S. No	Census Year	% of urban population to total population
1.	1901	52.76	7.	1961	88.75
2.	1911	57.50	8.	1971	89.70
3.	1921	62.32	9.	1981	92.73
4.	1931	70.33	10.	1991	89.93
5.	1941	75.79	11.	2001	93.19
6.	1951	82.40	12.	2011	97.50

(Source: Economic Survey of Delhi, 2022-23)

In-migration: The growth of population is an outcome of both natural increase and migration. In Delhi, immigration is steadily increasing. Between 2003 and 2021 in migration has increased from 0.63 lakh to 2.83 lakh as against a natural increase of 1.01 lakh in 2021 (Economic Survey of Delhi, 2022-23). With Delhi continuing to grow as a world city immigration will always be a concern. Settlements are becoming more crowded and people's vulnerability to multiple hazards especially urban floods is increasing.

Increase in Built-up Area: Rapid urbanisation has led to haphazard growth in built-up areas in Delhi NCT. Over the years the built-up area has increased. This has further intensified the risk of flood as the surface run-off is more than the infiltration rate during precipitation. According to Yadav and Kapoor, the built-up area has increased from 16.35% in 1977 to 62.99% in 2017 (ref. Table 4). This increase has come at the cost of open spaces and waterbodies which would not only have helped the city tackle its gap in water demand and supply but also manage the flood water.

Table 4: Change in Land use in Delhi, 1901-2011

Land Use	1977		1989		2002		2017	
	Area (in Hec)	Percent	Area (in Hec)	Percent	Area (in Hec)	Percent	Area (in Hec)	Percent
Built-up	2288.32	16.35	4180	29.88	7740.21	55.32	8812.89	62.99
Open Land	3080.21	22.01	4271.43	30.53	1501.33	10.73	1065.56	7.62
Waterbodies	1451.76	10.38	1269.19	9.07	912.98	6.53	827.66	5.92
Vegetation	7171.38	51.25	4270.93	30.52	3837.15	27.42	3285.56	23.48
TOTAL	13391.67	100	13391.67	100	13391.67	100	13391.67	100

(Source: Yadav, M. Kapoor, A. 2023)

Geographical Perspective

Encroachment: As more people demand land for housing and other urban activities, open spaces and waterbodies are getting encroached upon. Out of 1045 water bodies that existed in Delhi as per the Department of Parks and Gardens, the Government of Delhi; majority of them have been encroached on for built-up purpose legally or illegally, are now only dry a few gets sewages into it and in true sense they do not exist. The River Yamuna floodplain has been fragmented into pieces and put under various land uses (SANDRP, 2023). In stretches along the river, constructions have happened beyond the embankment. This has obstructed the natural drainage pattern of the land. Over the years several bridges and barrages have been made along the 22 km stretch of the river affecting the drainage pattern of the river (SANDRP, 2023).

Rise in Riverbed: In addition to this, it has been observed that the level of riverbed in River Yamuna is gradually rising as more sediment load from the Himalayas and upper catches of the river has been on the increase. The river also receives significant sediments from the stormwater and sewage drains (SANDRP, 2023). This along with the absence of dredging exercise means deposition of more silt and sediment into the riverbed. The outcome is that in case of surplus rainfall rivers are unable to carry extra water and floods occur.

The sudden release of water from the Dams: Unplanned and sudden release of water from the dams also lead to flooding in urban areas, without leaving enough time for response. In July 2023, floods 3.6 lakh cusecs of water was released from the Hathnikund barrage which led to the inundation of land along the river since the channel was unable to accommodate the flow of so much volume (SANDRP, 2023).

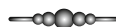
The absence of an administrative framework and lack of disaster risk control preparedness are also some other causes of urban floods in Delhi. Delhi's urban planning is completely against nature's systems (Suri, 2023). Town planning has been done either in a radial pattern (Lutyens Delhi) or a block pattern (New Delhi). However, water neither follows radial pattern nor block pattern, but flows along the contours of the earth (Suri, 2023). The town planners failed to consider the contours of the land, leading to waterlogging as a natural outcome of such a lack of foresight (Suri, 2023).

Conclusion

Urban floods are caused mostly due to anthropogenic causes. Though climate change is rapid and vulnerable, people's exposure has become hazards. Even the emerging climatic hazard is also related to anthropogenic factor. On analysing the causes, it has been observed that rapid urbanisation results in change in land use and increase in run-off which is the underlying issue that needs to be addressed. Emerging heat islands are also multiplying climatic vulnerability vis-à-vis sudden rainfall as flash flow. Understanding who gets hit worse and how will provide a better way towards a flood-resilient future (Kumar, 2020). Addressing the challenges posed by urban flooding requires a multifaceted approach (Vaidya, 2023). Protection of water bodies, restriction and removal of encroachments from flood plains and drainage channels, environment protection, pollution abatement, afforestation, designing proper drainage systems, and adopting green measures like green roofs, and rainwater harvesting are some of the steps that need to be taken up with more intent, and planning interventions should be aimed at addressing them.

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SOCIO-ECONOMIC DETERMINANTS OF HOUSEHOLD SIZE : A SPATIAL ANALYSIS OF BIHAR

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ABSTRACT

The number of persons who normally live together and take their meals from a common kitchen, is referred to as a household. In literature, either the household size is often taken as a determinant of socio-economic condition, or its determinants are investigated. Past literature finds that the size of households is determined by demographic factors like- nuptiality, fertility, adoption, mortality, migration, and divorce. We posit that the household size is also affected by the socio-economic conditions prevailing in a particular region and therefore investigate whether literacy rate, caste, and work participation rate affect the household size or not. To test the effect of these three socio-economic factors on the size of household, we use the 2011 Census data for the state of Bihar spanning its 38 districts. We also highlight the regional differentials found in the tested factors through thematic mapping using the standard deviation method.

Key words: Household size, literacy, scheduled caste, work participation rate, thematic mapping

Introduction

A 'household' is usually a group of persons who normally live together and take their meals from a common kitchen unless the exigencies of work prevent any of them from doing so. Persons in a household may be related or unrelated or a mix of both (Census of India, 2011). It should not be mistaken for a house which is simply a building or a structure which may be used as a dwelling or an establishment. There may be single person households, two persons household or multiple person households. The socio-economic conditions of a region or an area have a profound impact on the household size, i.e., the number of people constituting a household. Generally, it is observed that in a socio-economically developed region, the household size tends to be smaller while in a socio-economically backward area, it is just the opposite (Bongaarts, 2001).

Small average household sizes – fewer than three persons per household – are concentrated in Europe and North America while large average household sizes – five or more persons per household are observed across much of Africa and the Middle East. In India, it varies from 4-5 persons per household (United Nations, Department of Economic and Social Affairs, Population Division, 2017).

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A household is an important socio-economic institution, and the size of household is an important area of research for scholars. Bonga arts (2001) uses the data of household surveys in 43 developing countries to describe the main dimensions of household size and composition in the developing world. Meenakshi and Ray (2002) have examined the impact of household size its composition, on a household's poverty status. Nayak & Behera (2014) have explored the trend and spatial pattern in the changes of the average household size in India using state level data. Meyer & Nishimwe-Niyimbanira (2016) have analyzed the relationship between household size and poverty in low-income communities of Northern Free State Region in South Africa. Fusco & Islam (2017) have analyzed the effect of household size on poverty.

It is evident from these studies that very few studies investigate the household size in India. We specifically aim to address this lacuna and investigate the factors influencing the household size in Bihar because the state suffers many socio-economic issues (Sharma, 1995) as well as is one of the most populous states of India.

Hypotheses

H1: An Increase in literacy rate leads to a significant reduction in the household size

Literature shows that an increase in literacy rate especially female literacy rate creates a positive mind set regarding small family where the needs of every individual of the family can be successfully met and a high or better standard of living can be maintained (Jain, 1985). Thus, it is assumed that there would be an inverse relationship between the literacy rate and household size.

H2: The higher the SC population, the larger the household size

Indian society is caste ridden and the population belonging to the scheduled caste is oppressed both socially and economically. Acute poverty prevails amongst this section of the Indian society and that supports a large household size. Thus, both in literature and policy, an easy identification of poor households is caste based (Thorat, 2010). Every new addition to a poor family is an extra earning hand and so they tend to go for large families and are not interested in family planning. Thus, it is assumed that in areas where the percentage of scheduled caste population is higher, the size of household is also bigger.

H3: As work participation rate increases, the household size decreases

Work participation rate is an important indicator regarding the prevailing economic conditions. If work participation rate is high, it denotes that a higher number of people are employed in economically gainful work. Gainful employment ensures a better standard of living and income that in turn encourages people to go for a smaller family size where a comfortable living standard can be maintained (Bastagli, 2000) thus reducing the household size.

Therefore, this paper analyzes the impact of socio-economic factors on household size in Bihar. We select literacy rate and percentage of scheduled caste population as social factors influencing household size and work participation rate as the economic factor influencing household size. The spatial analysis of these variables has been done at the district level.

Study Area, Data and Methodology

Study area

Located in east India, the state of Bihar covers an area of 94,163 sq. km and extends from 24°20'10" N to 27°31'15" N latitude and 83°19'50" E to 88°17'40" E longitude. It is bordered by Uttar Pradesh in the west, Jharkhand in the south, West Bengal in the east and Nepal in the north. The mighty river Ganga traverses the state through its middle and divides it into two parts – North Bihar and South Bihar. While North Bihar is a flood prone area South Bihar is drought prone. The state constitutes of 38 districts. In the census of 2011, the state of Bihar recorded a total population of 18,867,444 persons and was the fourth most populous state in the country. However, it emerged as the most densely populated state in the country with a density of 1106 persons per sq. km. It recorded an average literacy rate of 61.8% which was lowest amongst the states of India. The sex ratio was 918 females per thousand males. 15.91 % of the state's population comprised of scheduled caste. The work participation rate was recorded as 33.36%.

Data

The paper is based on 2011 census data of Bihar. The district average of household size across the 38 districts of Bihar taken as the dependent variable was obtained by dividing the total population of the district by number of occupied houses in the district. The date for this is obtained from Census of India 2011, Tables on Houses, Household, Amenities & Assets, Bihar, Series -11. Data regarding Percentage of literacy, Scheduled castes population, work participation rate in the 38 districts of Bihar taken as the independent variables to be tested as socio-economic determinants of household size was obtained from District Census Handbook Series – 11, Part XII-B for different districts of Bihar. The population density of each district was taken as the control variable in the model (See Appendix I for all Variables). Descriptive statistics of the variables are reported in Table 1.

Table 1: Summary Statistics

	<i>HH size</i>	<i>Lit Rate</i>	<i>SC pop</i>	<i>Work Pprate</i>	<i>Pop Den</i>
<i>Min</i>	4.820	11.42	6.69	26.32	488.0
<i>Max</i>	6.940	73.37	30.39	41.33	1880.0
<i>Mean</i>	5.749	60.59	16.09	33.53	1145.0
<i>1st</i>	5.093	55.98	12.82	31.45	902.5
<i>Quartile</i>					
<i>Median</i>	5.570	62.78	15.45	32.80	1121.0
<i>3rd</i>	6.393	66.75	18.75	36.07	1421.5
<i>Quartile</i>					

Source: Authors' own calculation on R software

Methodology

Authors have used linear regression to test the three hypotheses.

To investigate the three socio-economic determinants of household size namely, literacy rate, scheduled caste, work participation rate, the model is specified as below:

$$HH_size_i = a + bLit_Rate_i + cSC_pop_i + dWork_PRrate_i + mPop_Density_i + e_i$$

where, HH_size denotes household size

Lit_Rate denotes percentage of literacy

SC_pop denotes percentage of SC population

Work_Prare denotes work participation rate

Pop_Density denotes population density and is taken as the control variable in our model

Authors also thematically map three socio-economic variables using the standard deviation method (Nelson and Brewer, 2017).

Results and Discussion

The primary model was tested, and the results are presented in Table 2. It is evident that the changes in the percentage of Scheduled caste population and work participation rate significantly affect the household size in a district. We find that with an increase in Scheduled caste population, the household size increases, supporting H2 and with an increase in the work participation rate, the household size decreases, supporting H3. The model has an adjusted R-square of 0.6 and is significant as indicated by the significant F-statistic. However, changes in literacy rate did not significantly lead to a change in the household size. This can be one indication of multicollinearity which is tested through some diagnostic checks.

Table 2 : Summary of Results-Model 1

Independent variable	Estimate	Std. Error	t value
Intercept	8.9311***	1.3984	6.387
<u>Lit_Rate</u>	0.0098	0.0088	1.117
<u>SC_pop</u>	0.0783***	0.0177	4.403
<u>Work_Pprate</u>	(-)0.1182***	0.0301	-3.926
<u>Pop_Den</u>	(-)0.0009***	0.0002	-3.902

R squared= 0.6395, Adjusted R squared= 0.5959

F-statistic: 14.64***

Notes:***p<0.001, **p<0.01, *p<0.05

Source: Authors' own calculation on R software

Diagnostic checks

To check for issues of multicollinearity, first a check through plotting the variables against one another was done (see Figure 1). From the figure, it appears that there may be some issue of multicollinearity in the data with respect to SC population and work participation rate, and work participation rate and population density.

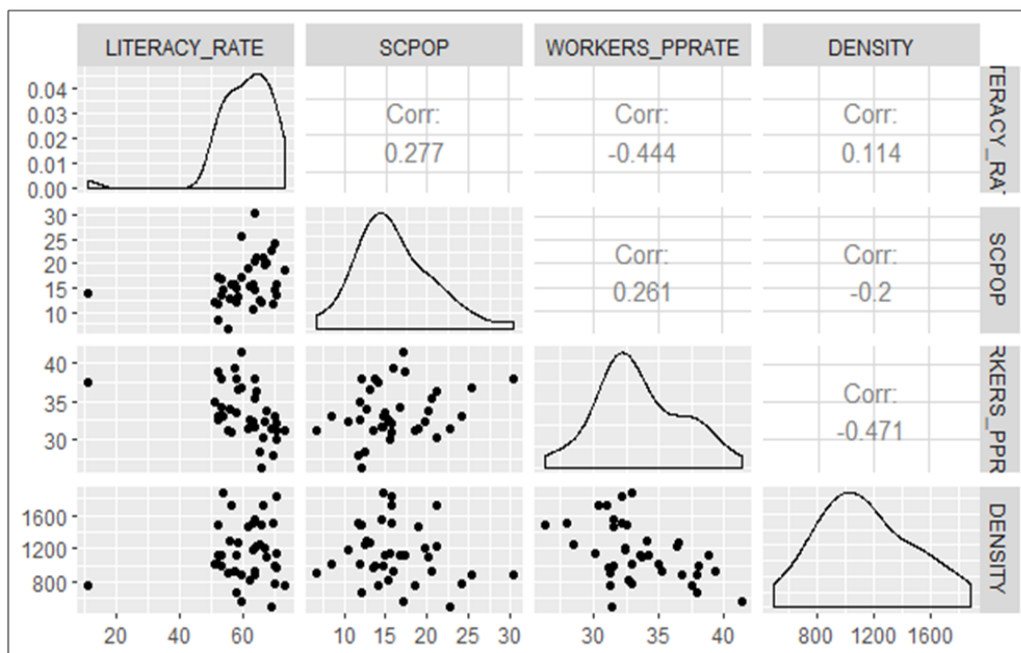


Figure 1: Correlation Plots

Source: Created on R software by the authors

To check for multicollinearity, overall multicollinearity of the model was tested through the Farrar Chi-Square (refer to Table 3). The Farrar test of chi-square is a test for the presence of multicollinearity (Farrar and Glauber, 1967) that tests whether the variables are orthogonal. If they are, there is no multicollinearity otherwise, there is some multicollinearity.

Table 3 : Overall Multicollinearity Diagnostics

	MC Results	Detection
Determinant $ X'X $	0.4548	0
Farrar Chi-Square	26.588	1
Red Indicator	0.3205	0
Sum of Lambda Inverse	6.1276	0
Theil's Method	(-)0.5854	0
Condition Number	53.4759	1

Notes: 1: Collinearity detected, 0: Collinearity not detected

Source: Authors' own calculation on R software

Though values of Klien test (0 for all independent variables) do not give enough evidence for collinearity, collinearity cannot be completely ruled out due to the insignificant coefficient of literacy rate (see Table 2). Therefore, a correlation matrix was created to check the same.

This correlation matrix has been reproduced in Table 4. There is significant correlation between literacy rate and SC population percentage (0.4483**), literacy rate and work participation rate (-0.5407***), SC population percentage and work participation rate (0.3873*), and work participation rate and population density (-0.4194*).

Table 4 : Correlation Matrix

	<i>Lit_Rate</i>	<i>SC_pop</i>	<i>Work_Pprate</i>	<i>Pop_Den</i>
<i>Lit_Rate</i>	1***			
<i>SC_pop</i>	0.4483**	1***		
<i>Work_Pprate</i>	(-)0.5407***	0.3873*	1***	
<i>Pop_Den</i>	(-)0.0897	(-)0.0401	-0.4194*	1***

Notes: ***p<0.001, **p<0.01, *p<0.05

Source: Authors' calculation on R software

A possible solution is to drop an explanatory variable. By convention, the variable with the highest VIF (Variation Inflation Factor), that in our data is work participation rate (with VIF of 1.8859 as shown in Table 5) was dropped and the alternative model as below was tested. The results of this second model are reported in Table 6.

$$HH_size_i = f + qLit_Rate_i + rSC_pop_i + nPop_Density_i + e_i$$

Table 5 : Individual Multicollinearity Diagnostics

Independent variable	VIF	TOL	Wi	Fi	Leamer	CVIF	Klein
<i>Lit_Rate</i>	1.5819	0.6321	6.595	10.184	0.7951	1.7425	0
<i>SC_pop</i>	1.3538	0.7387	4.01	6.1914	0.8595	1.4912	0
<i>Work_Pprate</i>	1.8859	0.5302	10.04	15.504	0.7282	2.0773	0
<i>Pop_Den</i>	1.306	0.7657	3.468	5.3542	0.8751	1.4385	0

Notes: 1: Collinearity detected, 0: Collinearity not detected

Source: Authors' own calculation on R software

Table 6: Summary of Results-Model 2

Independent variable	Estimate	Std. Error	t value
Intercept	3.8153***	0.6052	6.303
<i>Lit_Rate</i>	0.0285***	0.0088	3.228
<i>SC_pop</i>	0.0512**	0.0195	2.621
<i>Pop_Den</i>	(-)0.0005**	0.0002	-2.082

R squared= 0.4712, Adjusted R squared= 0.4246

F-statistic: 10.1***

Notes: ***p<0.001, **p<0.01, *p<0.05

Source: Authors' own calculation on R software

The tests of multicollinearity are reported in Tables 7, 8 and 9.

Table 7 : Overall Multicollinearity Diagnostics

	MC Results	Detection
Determinant X'X	0.8578	0
Farrar Chi-Square	5.1122	0
Red Indicator	0.2078	0
Sum of Lambda Inverse	3.3462	0
Theil's Method	(-)0.6341	0
Condition Number	16.9750	0

Notes: 1: Collinearity detected, 0: Collinearity not detected

Source: Authors' calculation on R software

Table 8 : Individual Multicollinearity Diagnostics

Independent variable	VIF	TOL	Wi	Fi	Leamer	CVIF	Klein
<u>Lit_Rate</u>	1.1193	0.8934	2.0880	4.2954	0.9452	1.4798	0
<u>SC_pop</u>	1.1507	0.8690	2.6370	5.4247	0.9322	1.5212	0
<u>Pop_Den</u>	1.0762	0.9292	1.3329	2.7420	0.9640	1.4227	0

Notes: 1: Collinearity detected, 0: Collinearity not detected

Source: Authors' calculation on R software

Table 9 : Correlation Matrix

	<u>Lit_Rate</u>	<u>SC_pop</u>	<u>Pop_Den</u>
<u>Lit_Rate</u>	1***		
<u>SC_pop</u>	0.3080	1***	
<u>Pop_Den</u>	0.1795	(-)0.2420	1***

Notes: ***p<0.001, **p<0.01, *p<0.05

Source: Authors' own calculation on R software

It was clear from the modified model from Table 6 that though the adjusted R-square of the model dropped from 0.6 to 0.43. The model's F-statistic is still significant. Further diagnostic checks for multicollinearity did not show any evidence of collinearity from overall multicollinearity diagnostic (as indicated in Table 7), individual multicollinearity diagnostic (as indicated in Table 8) and collinearity matrix (as indicated in Table 9). Thus, the alternative truncated model was accepted.

This model shows that the size of household is significantly affected by the literacy rate (0.0285**). However, we find a counter-intuitive relationship between household size and literacy rate. We find that with an increase in the literacy rate, the household size has also increased. Therefore, in reference to Bihar, it means that if the literacy rate is increases, the size of household will also increase.

This counter-intuitive finding may be explained by the fact that Bihar is still in the initial stage of development and in this stage, literacy may stimulate growth in family size. With an increase in literacy, awareness about health services increases and mortality rate goes down. It is only in the later stages that the fertility rate also comes down as more and more people begin to realize the benefits of a small family. Also, this state has the lowest literacy rate amongst the states of India and any jumps in the literacy rates have only been recent. Another possible reason could be the fact that the definition of a literate person (“A person aged seven and above who can both read and write with understanding in any language” is defined as literate according to Census 2011) is very basic and does not necessarily mean that the expected change in the world view of people who are now considered literate has actually occurred. So, for literacy to become a positive check on population growth and subsequently the size of household, another couple of decades are required.

A significant positive relationship was found between the percentage of scheduled caste population and the size of household (0.0513*) implying that as the percentage of scheduled caste population will increase in a district, so will the size of household. This is because this section is plagued by acute poverty and a bigger family size and subsequently a bigger household is a means to fight poverty because of additional earners. Therefore, the policy implication of this finding is that this group requires better policies for enabling them to come out of the vicious cycle of poverty.

Spatial Analysis of Variables

Spatial variations are observed among the districts of Bihar in the context of literacy rate, percentage of scheduled caste population and household size

Literacy in Bihar

As per the census of 2011, Bihar has an average literacy rate of 61.8% which is the lowest amongst the states of India. There are regional variations in the literacy rate within the state. While in the districts of Paschim Champaran, Purba Champaran, Sheohar, Sitamarhi, Madhubani, Supaul, Araria, Kishanganj, Purnea, Katihar, Madhepura, Saharsa, Darbhanga, Khagaria, Banka, Nawada and Jamui the literacy rate recorded was less than the state average, in the remaining districts of Muzaffarpur, Gopalganj, Siwan, Saran, Vaishali, Begusarai, Bhagalpur, Munger, Lakhisarai, Sheikhpura, Nalanda, Patna, Bhojpur, Buxar, Kaimur (Bhabhua), Rohtas, Aurangabad, Gaya, Jehanabada and Arwal it was more than the state average. Samastipur has the same literacy rate as the state average. The highest literacy rate was recorded in Rohtas district and the lowest was recorded in Purnea district. Based on the literacy rate the districts of the state can be grouped under three categories.

Geographical Perspective

Areas having a high literacy level (70.99-81.39%): Only the district of Rohtas with a literacy rate of 73.37% falls in this category

Areas having moderate literacy level (60.59-70.99%): Twenty districts fall under this category namely Muzaffarpur, Gopalganj, Siwan, Saran, Vaishali, Samastipur, Begusarai, Bhagalpur, Munger, Lakhisarai, Sheikhpura, Nalanda, Patna, Bhojpur, Buxar, Kaimur (Bhabhua), Aurangabad, Gaya, Jehanabad and Arwal. Majority of these are in South Bihar.

Areas having low literacy level (50.19-60.59%): It includes the districts of Paschim Champaran, Purba Champaran, Sheohar, Sitamarhi, Madhubani, Supaul, Araria, Kishanganj, Purnea, Katihar, Madhepura, Saharsa, Darbhanga, Khagaria, Banka, Nawada and Jamui.

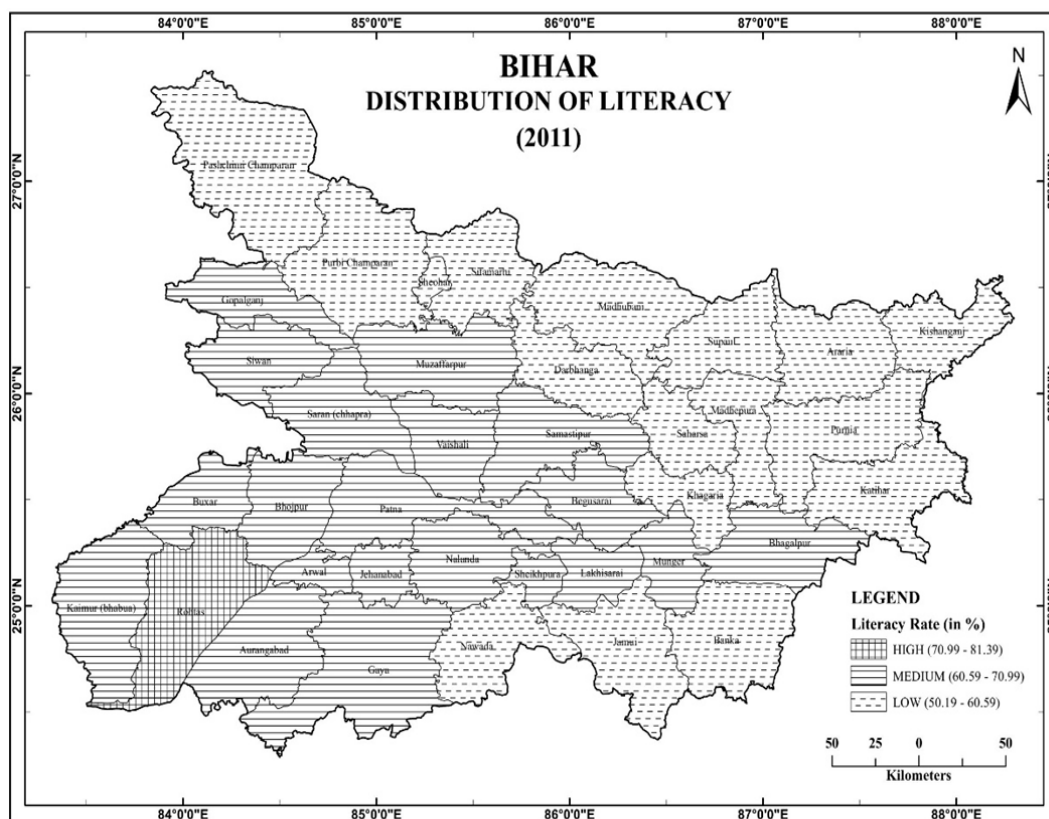


Figure 1 : Bihar Distribution of Literacy, 2011

Source: Authors' own

Thus, except the three districts of Nawada, Jamui and Banka all other districts of South Bihar have a high or moderate level of literacy while the districts falling in North Bihar enjoy a medium to low level of literacy.

Scheduled Caste Population in Bihar

In the census of 2011, 15.91% of the total population of Bihar comprised of Scheduled Caste population. In the districts of Madhepura, Saharsa, Vaishali, Samastipur, Shekhpura, Nalanda, Kaimur (Bhabhua), Rohtas, Aurangabad, Gaya, Nawada, Jamui, Jehanabad and Arwal the percentage of scheduled caste population is more than the state average while in the districts of Paschim Champaran, Purba Champaran, Sheohar, Sitamarhi, Madhubani, Araria, Kishanganj, Purnea, Katihar, Gopalganj, Siwan, Saran, Begusarai, Khagaria, Bhagalpur, Banka, Munger and Buxar it is lower than the state average. In the districts of Supaul, Drbhanga, Muzaffarpur, Lakhisarai, Patna and Bhojpur the percentage of scheduled caste population was remarkably close to the state average. The highest proportion of scheduled caste population was in Gaya district while the lowest was recorded in Kishanganj. Based on the district wise variation in the distribution of Scheduled Caste population the districts of the state can be grouped under the following five categories:

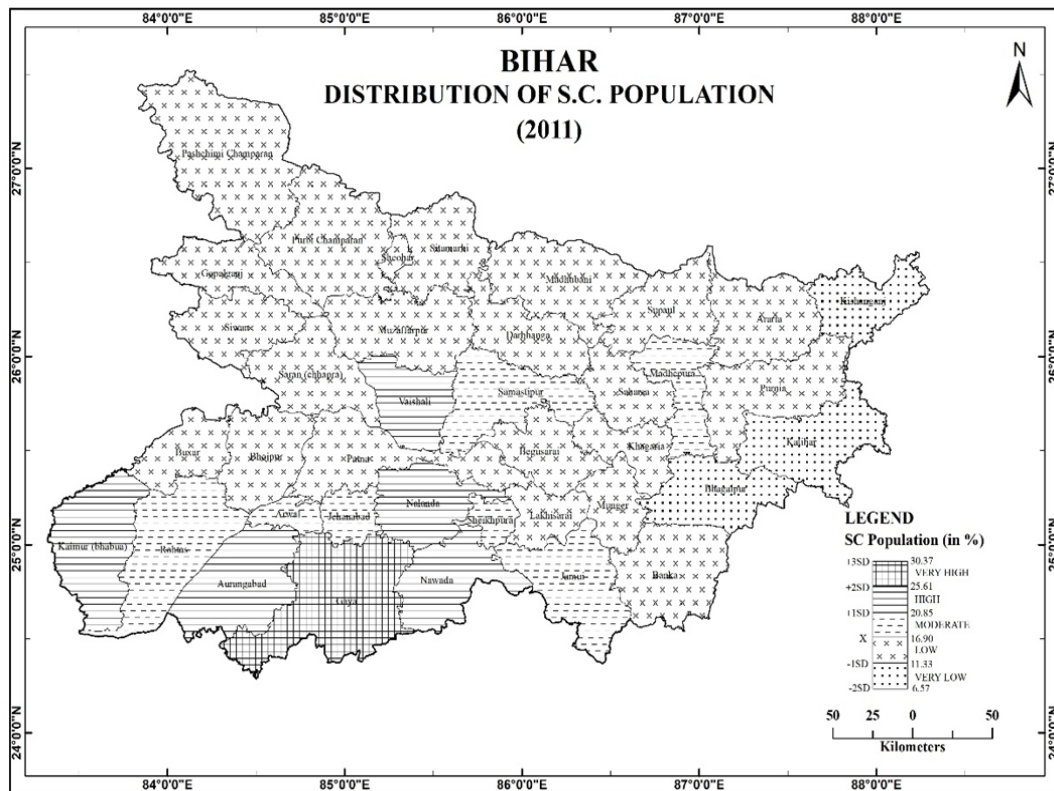


Figure 2 : Bihar Distribution of S.C. Population, 2011

Source: Authors' own

Areas having a Very High percentage of S.C. Population (25.61-30.37%): Only Gaya district is included under this category.

Geographical Perspective

Areas having a High percentage of S.C. Population (20.85-25.61%): The districts of Vaishali, Nalanda, Kaimur (Bhabhua), Aurangabad and Nawada fall in this category. Except Vaishali all the other districts are in South Bihar.

Areas having a medium percentage of S.C. Population (16.09-20.85%): Three districts of North Bihar viz. Madhepura, Saharsa and Samastipur and five districts of South Bihar namely Sheikhpura, Rohtas, Jamui, Jehanabad and Arwal are included under this category.

Areas having Low percentage of S.C. Population (11.33 – 16.09%): Maximum districts i.e. twenty-one, lie in this category. It includes the districts of Paschim Champaran, Purba Champaran, Sheohar, Sitamarhi, Madhubani, Supaul, Araria, Purnea, Darbhanga, Muzaffarpur, Gopalganj, Siwan, Saran, Begusarai, Khagaria, Banka, Munger, Lakhisarai, Patna, Bhojpur and Buxar.

Areas having a very Low percentage of S.C. Population (6.57 – 11.33%): It includes the districts of Kishanganj, Katihar and Bhagalpur.

Therefore, we conclude that the proportion of S.C. Population is comparatively more in South Bihar except a few cases.

Household size in Bihar

The average size of household in Bihar was calculated as 5.64 persons for the census year 2011. As seen in Table 3 in the districts of Paschim Champaran, Gopalganj, Siwan, Saran, Vaishali, Lakhisarai, Sheikhpura, Nalanda, Patna, Bhojpur, Buxar, Kaimur (Bhabhua), Rohtas, Aurangabad, Gaya, Nawada, Jamui, Jehanabad and Arwal the size of household was bigger than the state average while in the districts of Purba Champaran, Sheohar, Sitamarhi, Madhubani, Supaul, Araria, Kishanganj, Purnea, Katihar, Madhepura, Saharsa, Darbhanga, Muzaffarpur, Samastipur, Begusarai, Khagaria, Bhagalpur, Banka and Munger the size of household was smaller than that of the state average. The largest size of household was registered in Bhojpur district while the smallest size of household was registered in Sitamarhi district.

The average size of household in Bihar for the census year 2011 was calculated as 5.64. Regional differentials are observed in the size of household at district level in the state. Based on the standard deviation method proposed by Nelson to calculate class-interval, the households have been grouped under four distinct categories which are as follows:

Areas having small household size (4.37-5.06 persons): It includes the districts of Sheohar, Sitamarhi, Madhubani, Araria, Kishanganj, Katihar, Madhepura and Darbhanga. All these districts are in North Bihar. The literacy rate in all these districts is low (between 50.19-60.59%). In the districts of Sheohar, Sitamarhi, Madhubani, Araria and Darbhanga the percentage of scheduled caste population was found to be low (between 11.33-16.09%) while in Kishanganj and Katihar it is incredibly low (between 6.57-11.33%). Madhepura has a medium percentage of scheduled caste population. Thus, low level of literacy and low proportion of scheduled caste population have effectively reduced the size of household in these districts.

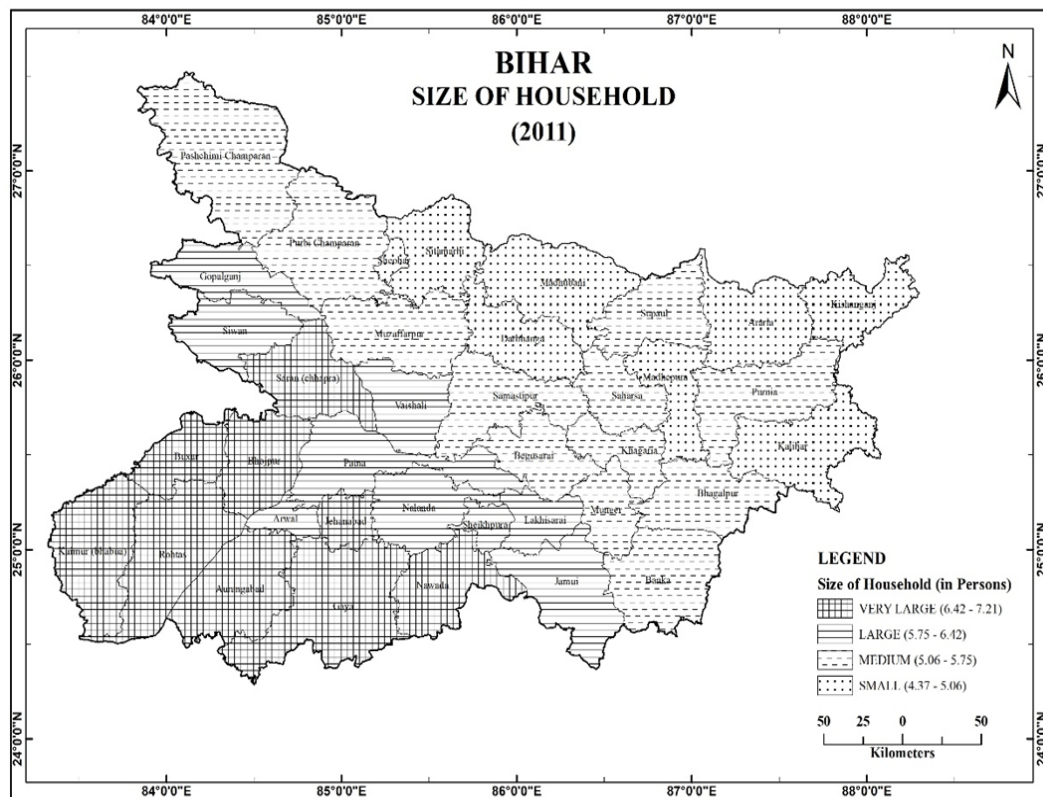


Figure 3 : Bihar : Size of Household, 2011

Source: Authors' own

Areas having medium household size (5.06-5.75 persons): It includes twelve districts of Bihar namely Paschim Champaran, Purba Champaran, Supaul, Purnea, Saharsa, Muzaffarpur, Samastipur, Begusarai, Khagaria, Bhagalpur, Banka and Munger. Out of these five districts i.e., Paschim Champaran, Purba Champaran, Muzaffarpur, Samastipur and Begusarai fall in agro-climatic zone I, four districts viz. Supaul, Purnea, Saharsa and Khagaria, lie in agro-climatic zone II and three districts of Bhagalpur, Banka and Munger fall in agro-climatic zone III A. In Paschim Champaran, Purba Champaran, Muzaffarpur and Begusarai the proportion of scheduled caste population is low while in Purba Champaran it was found to be medium. In Samastipur it was medium. The work participation rate was very high in Paschim Champaran and was medium in Purba Champaran, Muzaffarpur, Samastipur and Begusarai. Literacy was low in Paschim Champaran, Purba Champaran, Muzaffarpur and Begusarai and was medium in Samastipur. The medium work participation rate has led to medium size of households. Though this rate was very high in Paschim Champaran since it is a border district and people are basically employed in primary sector i.e., agriculture and also it has a low proportion of scheduled caste population, it has made the family size moderate. Of the four districts that are

located in I zone II, all have a low level of literacy. The work participation rate was found to be very high in Supaul while in Purnea, Saharsa and Khagaria it was medium. Saharsa had a medium proportion of scheduled caste population while in Supaul, Purnea and Khagaria it was low. In Bhagalpur, Banka and Munger which lie in agro-climatic zone III the percentage of scheduled caste population was low. The work participation rate was very high in Banka and was medium in Bhagalpur and Munger. In Bhagalpur and Munger the literacy rate was medium which along with medium participation rate have led to medium size of households. Though participation rate is very high in Banka and literacy rate is low the workers are engaged in primary sector of economy. So, it has made the size of households medium.

Areas having large household size (5.75-6.42 persons): It includes the districts of Gopalganj, Siwan, Vaishali, Lakhisarai, Sheikhpura, Nalanda, Patna, Jamui and Arwal. Majority of these areas i.e., six districts of Lakhisarai, Sheikhpura, Nalanda, Jamui, Patna and Arwal belong to agro-climatic zone III while the remaining three belong to agro-climatic zone I. Gopalganj, Siwan and Vaishali have a medium literacy rate varying between 60.59-70.99%. While in Gopalganj and Siwan the proportion of scheduled caste population is low (between 11.33-16.09%), in Vaishali it is high. In Gopalganj and Siwan the worker's participation rate was found to be low (below 30.2%) while in Vaishali it is medium (between 30.2-33.52%). Thus, in these three districts low worker's participation rate supported by medium literacy rate has been the reason behind the large size of households. In Patna and Lakhisarai literacy rate is medium, percentage of scheduled caste population is low, however, the worker's participation rate is low (below 30.2%). Because of low worker's participation rate and medium literacy rate in these districts the household size has become large. In Sheikhpura, Nalanda and Arwal literacy rates are medium and the worker's participation rate was found to be high. However, Nalanda has a high percentage of scheduled caste population while Sheikhpura and Arwal have a medium percentage of scheduled caste population. Thus, in these districts, higher percentage of scheduled caste population has been the main stimulus behind large size of household. Jamui has a very high worker's participation rate and low level of literacy. However, here also the percentage of scheduled caste population was found to be medium.

Areas having very large household size (6.42-7.13): It includes the districts of Saran, Bhojpur, Buxar, Kaimur (Bhabhua), Rohtas, Aurangabad, Gaya, Nawada and Jehanabad. All of these districts except Saran lie in agro-climatic zone III B and are in the south-western part of Bihar. Saran lies in agro-climatic zone I. It has a medium literacy rate, low percentage of scheduled caste population but a low worker's participation rate. Low worker's participation rate is the main reason behind the large size of household in this district. In Gaya worker's participation rate is very high while the literacy rate is medium. But in this district the percentage of scheduled caste population is very high (between 25.61-30.37%) due to which size of household have become very large. In Nawada the worker's participation rate is high but literacy rate is low, and the percentage of scheduled caste population is high due to which the household size has become very large. Bhojpur and Buxar have a low proportion of scheduled caste population and medium literacy rate. However, in Bhojpur the worker's participation rate is low while in Buxar it is medium. Thus, in these two districts also the economic factor has led

to creation of large size of household. In Kaimur high proportion of scheduled caste population is responsible for large household size. In Rohtas and Jehanabad the proportion of scheduled caste population is medium, but in Rohtas literacy rate is high while in Jehanabad it was found to be medium. Worker's participation rate was high in Jehanabad but medium in Rohtas. Thus, it may be stated that in these two districts as well the presence of a good proportion of scheduled caste population is the main reason behind the large size of household.

Conclusion

A household is an important socio-economic institution, and the size of household is an important area of research for scholars. It is evident from extant literature (Bongaarts, 2001; Meenakshi & Ray, 2002; Nayak & Behera, 2014) that very few studies investigate the household size in India. This paper addresses this lacuna and investigates the factors influencing the household size in Bihar.

This paper examines how changes in literacy, percentage of SC population (two social factors) and work participation rate (economic factor) affect household size. We find a counter-intuitive relationship between household size and literacy rate. We find that with an increase in the literacy rate, the household size has also increased. Therefore, in reference to Bihar, it means that if the literacy rate is increases, the size of household will also increase. We explain this counter-intuitive finding through three reasons. First, is that Bihar is in its initial stage of development and at this stage, literacy may stimulate growth in family size because it leads to increase in awareness about health services pushing the mortality rate down. Second, Bihar has the lowest literacy rate amongst the states of India and any jumps in the literacy rates have only been recent. Third, that the definition of a literate person is very basic and does not necessarily lead to a change in the world view of people that education will facilitate.

A significant positive relationship was found between the percentage of scheduled caste population and the size of household implying that as the percentage of scheduled caste population will increase in a district, so will the size of household. This is because this section is plagued by acute poverty and a bigger family size and subsequently a bigger household is a means to fight poverty because of additional earners.

Therefore, the policy implications of this paper are:

- (a) literacy needs a longer time to become a positive check on population growth and subsequently the size of household,
- (b) the definition of literacy needs to change
- (c) the SC population requires better policies for enabling it to come out of the vicious cycle of poverty

This paper also thematically maps three socio-economic variables using the standard deviation method. The findings show that the districts of South Bihar which lie in agro-climatic zone III generally have a high percentage of scheduled caste population and it has been one of the responsible factors for large household size in this region, at times even negating the impact of

higher work participation rate which was found to be having a negative relationship with the size of household. It may be stated that in North Bihar higher worker's participation rate has restricted the size of household while in South Bihar the higher proportion of scheduled caste population has increased the size of household.

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APPENDIX -I

Bihar : District Wise Household Size, Literacy Rate, Scheduled Caste Population, Work Participation Rate & Density of Population, 2011

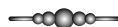
Sr No	District	HH Size**	Literacy Rate (%)*	SC Population (%)*	Worker's Participation Rate(%)*	Density* (persons /km ²)
1	Paschim Champaran	5.71	11.42	14.06	37.58	753
2	PurbiChamparan	5.36	55.79	12.74	34.07	1285
3	Sheohar	4.85	53.78	14.73	32.97	1880
4	Sitamarhi	4.82	52.05	11.85	32.56	1492
5	Madhubani	5.02	58.62	13.08	36.48	1282
6	Supaul	5.08	57.67	15.89	39.37	919
7	Araria	5.03	53.53	13.62	38.05	993
8	Kishanganj	5.05	55.46	6.69	31.3	897
9	Purnea	5.13	51.08	11.98	35.02	1011
10	Katihar	4.99	52.24	8.57	33	1005
11	Madhepura	5.02	52.25	17.3	38.84	1120
12	Saharsa	5.22	53.2	16.69	34.19	1127
13	Darbhanga	4.95	56.56	15.64	31.08	1728
14	Muzaffarpur	5.3	63.43	15.66	32.23	1514
15	Gopalganj	6.41	65.47	12.49	28.42	1260
16	Siwan	6.34	69.45	11.61	28	1501
17	Saran	6.58	65.96	12	26.32	1496

Geographical Perspective

18	Vaishali	5.78	66.6	21.12	30.34	1717
19	Samastipur	5.17	61.86	18.85	31.52	1467
20	Begusarai	5.07	63.87	14.55	31.58	1549
21	Khagaria	5.13	57.92	14.83	33.64	1122
22	Bhagalpur	5.43	63.14	10.49	32.38	1182
23	Banka	5.38	58.17	12.18	37.9	674
24	Munger	5.24	70.46	13.44	31.19	964
25	Lakhisarai	6.17	62.42	15.31	32.63	815
26	Sheikhpura	6.29	63.86	20.6	35.3	924
27	Nalanda	6.12	64.43	21.12	36.33	1222
28	Patna	6.21	70.68	15.77	32.23	1823
29	Bhojpur	6.94	70.47	15.59	30.15	1139
30	Buxar	6.79	70.14	14.75	31.55	1002
31	Kaimur	6.73	69.63	22.69	31.43	488
32	Rohtas	6.74	73.37	18.57	31.25	763
33	Aurangabad	6.74	70.32	24.1	32.98	769
34	Gaya	6.61	63.67	30.39	37.89	883
35	Nawada	6.49	59.76	25.47	36.82	890
36	Jamui	5.84	59.79	17.19	41.33	568
37	Jehanabad	6.57	66.8	19.81	32.47	1209
38	Arwal	6.18	67.43	20.16	33.72	1099

Sources:

- * District Census Handbook Series – 11, Part XII-B for different districts of Bihar
- ** Census of India 2011, Tables on Houses, Household, Amenities & Assets, Bihar, Series -11



ASSESSMENT OF HEALTHCARE AVAILABILITY AND ACCESSIBILITY IN DODA DISTRICT, INDIA

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ABSTRACT

Access to a well-developed, accessible, and effective healthcare infrastructure is crucial for the health and well-being of citizens in any region, state, or country. In India, which has the world's second-largest population, nearly 68 percent of the population resides in rural areas. Unfortunately, the healthcare infrastructure in rural India is inadequate, which makes it difficult to assess the effectiveness of healthcare policies and welfare systems. The issue is more prevalent in Doda district, where the majority of the population resides in rural areas and there is a noticeable disparity in the availability and accessibility of healthcare infrastructure, including physical infrastructure, human resources, and necessary equipment and medications. The present study aims to investigate the current situation in the Doda district and its consequential impact on the healthcare sector. This study employs a secondary data analysis methodology. The availability assessment is based on a weighted index method, while the accessibility assessment is based on average geographic distance. The Geographical Information System (GIS) is used for mapping healthcare facilities and analyzing healthcare distribution. A simple statistical method is used to determine the percentage of health resources, and population ratios are drawn to determine the gap/requirements. The analysis reveals that the number of health centers, workforce, and infrastructure is not increasing in the same proportion as the population, leading to a population overload on the existing health centers, workforce, and infrastructure facilities. There is a shortage of physical infrastructure and health workforce in the study area, measured against the norms prescribed by the government.

Keywords: Healthcare Facilities; Availability; Accessibility; Disparities; Geography

Introduction

Accessibility to healthcare has been a major concern of policymakers and researchers across several disciplines, such as public health, geography, economics, and sociology (Kindig, 2007; Brondeel et al., 2014; Curtis and Rees Jones, 1998). Geographers have explored healthcare access through various factors, including distances, travel times to facilities, and the

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distribution of services available (Comber et al., 2011; Guagliardo, 2004; Arcury et al., 2005). However, proximity to healthcare services alone does not guarantee greater access, as socioeconomic factors such as cost can impede access (Jacobs et al., 2012). Economists have focused on affordability, healthcare expenditure, and supply and demand, particularly identifying demand-side barriers that hinder access to health services" (O'Donnell, 2007; Ensor, 2004). These barriers can have a more significant impact on vulnerable groups, such as the unemployed, low-income individuals, women, children, and the elderly (McFadden et al., 2014; Israel, 2016). Consequently, access to effective healthcare has been central to discussions on achieving health-related goals such as the Millennium Development Goals (MDGs) and the Sustainable Development Goals (Vereinte Nationen, 2017).

Access is a crucial concept in health policy and healthcare services research, and it requires a clear definition and usage to be fully understood. (Penchansky and Thomas, 1981) have highlighted the significance of access by identifying two stages: "potential" access to healthcare, followed by "realized" access to healthcare. (Guagliardo, 2004) has further elaborated on this concept by identifying its stages and dimensions. The term "access" can refer to the utilization of healthcare services (Aday and Andersen, 1974) or to the factors that influence the use of healthcare services. Our study specifically focuses on the availability and accessibility of healthcare facilities.

Availability in healthcare refers to the ability of healthcare resources, infrastructure, and services to meet the needs of people in terms of the type and volume of healthcare services required (Majumder et al., 2022; Akhtar and Ram kumar, 2023). It encompasses the circumstances that enable access to healthcare services when needed, and can be measured based on the adequacy of healthcare resources such as drugs, finances, and healthcare professionals (Mbunge et al., 2022; Malik, 2022; Gandhi et al., 2022). Infrastructure including hospitals, health posts, and clinics, as well as services like emergency and maternal/neonatal care, are also critical components of healthcare availability" (Ganle et al., 2014; Stafford et al., 2014).

Access to healthcare services is often measured by assessing the balance between demand and supply. This involves evaluating the per capita distribution of healthcare resources, including human resources, drugs, and equipment, among a particular population (Saini et al., 2022; Kheraj et al., 2019; Dave et al., 2022). To calculate supply ratios, specific geographic boundaries or healthcare service areas are examined, with the numerator representing the availability of healthcare services, such as the number of health personnel or equipment in a hospital, and the denominator being the population of the area (Simkovich et al., 2022; Guagliardo, 2004; Kaur et al., 2022).

Access to healthcare services is a multifaceted concept that involves not only the availability of healthcare services but also the availability of healthcare providers to meet the needs of the population (Vaiyapuri et al., 2023; Kheraj et al., 2017). Gulliford et al., 2002 highlighted that an adequate level of availability of healthcare services is necessary to enable individuals to use them. However, (Khan and Bhardwaj, 1994) argue that achieving access to healthcare services also depends on the availability of healthcare providers, including their number, location, and

coverage, to ensure that the demand and needs of the population are met. Thus, ensuring access to healthcare services requires a comprehensive approach that considers the availability of both healthcare services and providers.

Access to healthcare facilities is vital in achieving the SDGs set by the United Nations and the World Health Organization (WHO) (Pereira and Marques, 2022). It is crucial to ensure equal access to healthcare across different geographic locations as this has been associated with improved health outcomes, reduced disease burden, and mortality rates, all of which are critical targets of the SDGs, particularly goal 3 (Das et al., 2023). “Many countries have been revising their health policies to align with the achievement of these targets, with a focus on strengthening primary healthcare services” (Adhikari et al., 2022). This is because primary healthcare is crucial to realizing sustainable development. Therefore, it is essential for national governments to focus on measuring progress towards delivering primary healthcare to effectively address the SDGs (Krishnan et al., 2023; Mhlanga, 2022).

Health is a crucial factor to consider when analyzing the socio-economic development of a region. The WHO made a declaration in 1978 that aimed to provide adequate healthcare services in India by the year 2000, known as “Health for All by 2000 AD” (Kalne et al., 2022). The healthcare system in India includes various components such as sub-centers, primary health centers, community health centers, doctors, beds, and health attendants. However, despite the WHO's call for improved healthcare services, the Ministry of Health and Family Welfare of the Government of India has not been able to provide the necessary healthcare services to the rural population in the district of Doda. This failure to implement the “Health for All by 2000 AD” goal has been detrimental to the region's economic base, as physically fit and mentally alert individuals are better able to work efficiently and produce more. Access to quality healthcare is also important for both residents and visitors to the region (Ahmed et al., 2023; Chowdhary et al., 2017; Kehr et al., 2023).

The primary aim of this study is to examine the inadequacies of healthcare infrastructure in the Doda district, specifically regarding availability and accessibility, and to explore the relationship between these issues and the challenges faced by rural healthcare in India. The Indian government implemented the National Rural Health Mission (NRHM) in 2005 to enhance rural healthcare infrastructure. Still, the progress has been inconsistent across the country, with significant disparities in healthcare availability and accessibility between states. There are several significant problems with rural healthcare, including inadequate infrastructure, a lack of skilled human resources, an ineffective healthcare infrastructure and accessibility, and an insufficient network between healthcare facilities at all levels. This study aims to highlight the current situation of these challenges in the Doda district and identify potential solutions that could enhance the state of rural healthcare in India.

Database and Methodology

To conduct this study, secondary sources were utilized to obtain information on healthcare facilities and demographic data. The secondary data on healthcare facilities was collected from District Statistical Handbooks Doda (2016-17), while demographic data was sourced from the Census of Indian, 2011, and District Census Handbook Doda 2019. This study employs a

Geographical Perspective

combination of quantitative and descriptive analysis to explore spatial inequities in the district's healthcare infrastructure, with a particular focus on Availability and Accessibility - two crucial components of healthcare.

Study Area

Doda, situated in the hilly terrain of the Jammu division in the Union Territory of Jammu and Kashmir. Its geographical coordinates are between $32^{\circ} 50' N$ to $33^{\circ} 23' N$ latitude and $75^{\circ} 20' E$ to $76^{\circ} 13' E$ longitude, covering an extensive land area of $8,912 \text{ km}^2$ (Figure1) The district's population, as per the 2011 census, is approximately 410,000, with a sex ratio of 919 females per 1000 males (District Census Handbook: Doda 2019).

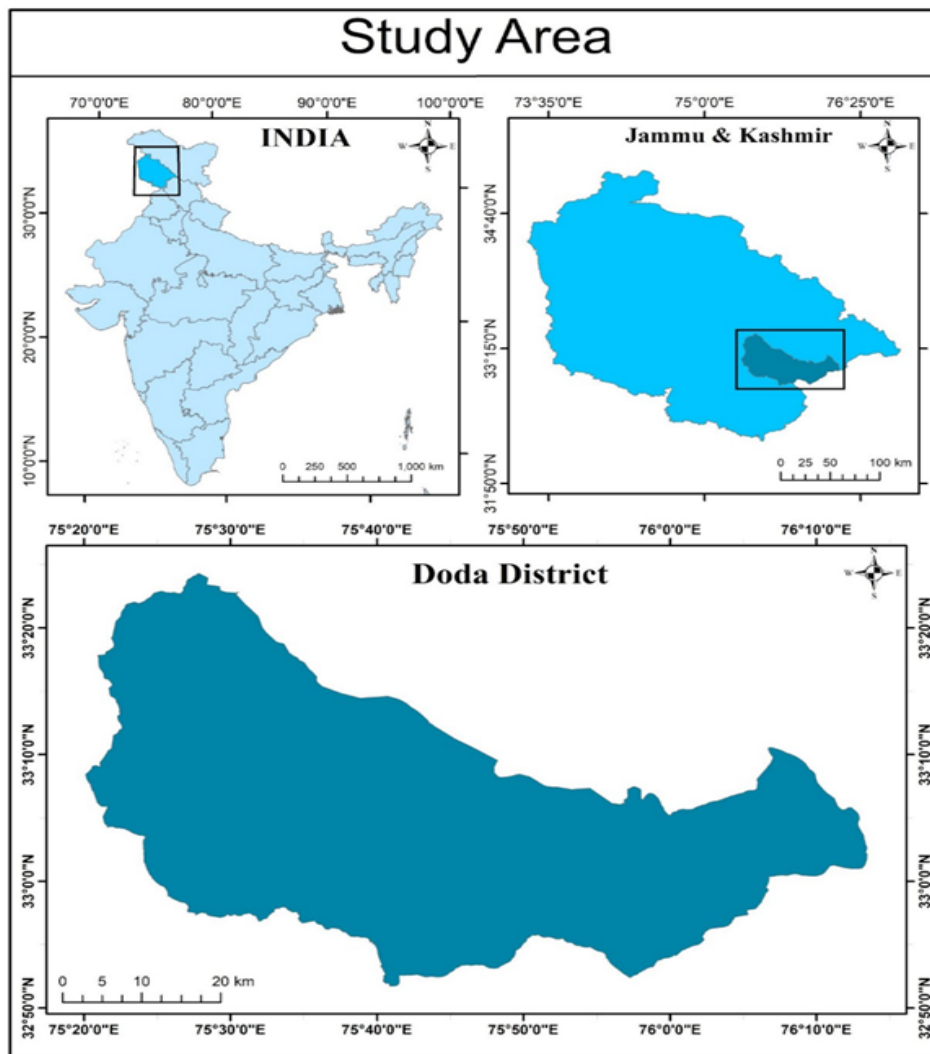


Figure 1 : Location of the study area

Result and Discussion

Analysis of Physical Healthcare Infrastructure Availability

Table 1 provides an overview of the healthcare facilities in the Doda district of Jammu and Kashmir, both at the district and block levels. The table reveals that there are a total of 151 health centres and one district hospital in Doda. These include 2 SDH/CHC, 13 PHC, and 133 SC. However, it is noteworthy that there is a significant variation in the availability of healthcare facilities across different block levels within the district.

At the block level, the study indicates that Bhaderwah has the highest number of health centres (20) out of the 17 blocks in the Doda district. Bhagwah, Doda, and Kahra follow with 13 health centres each, while Changa and Gundna have 11 health centres each. Marmat has 10 health centres, and Bhalla, Chirala, Gandoh, Kastigarh, and Thathri have 8 health centres each. On the other hand, Assar and Dali Udyanpur have 5 health centres each, Jakyas and Khellani have 4 health centres each, and Chilli Pingal has 2 health centres.

The analysis of health infrastructure available at the block level indicates that both Bhaderwah and Gandoh blocks have a limited number of CHCs/SDHs. Regarding PHCs, they are only present in four blocks, namely Chilli Pingal, Jakyas, Kastigarh, and Khellani. Bhaderwah block has the highest number of SCs (18), followed by Changa and Gundna with 10 each, and Bhagwah and Kahra with 12 each. In contrast, the remaining blocks have less than ten SCs available.

S.No.	Name of the Block	DH	SDH/CHC	PHC	SC	Others	Total	Total Population
1	Assar			1	4		5	18828
2	Bhaderwah		1	1	18		20	43105
3	Bhagwah			1	12		13	29407
4	Bhalla			1	7		8	28978
5	Chirala			1	7		8	16717
6	Changa			1	10		11	26484
7	Chilli Pingal				2		2	12212
8	Doda/Ghat	1		1	11		13	28289
9	Dali Udyanpur			1	4		5	14519
10	Gandoh		1	1	6		8	15247
11	Gundna			1	10		11	27311
12	Jakyas				4		4	13958
13	Kastigarh				8		8	18809
14	Khellani				3	1	4	10917
15	Kahra			1	12		13	23421
16	Marmat			1	9		10	17584
17	Thathri			1	6	1	8	18414
	Total	1	2	13	133	2	151	

Source: District Statistical Handbook Doda (2016-17)

Availability of Physical Health Infrastructure

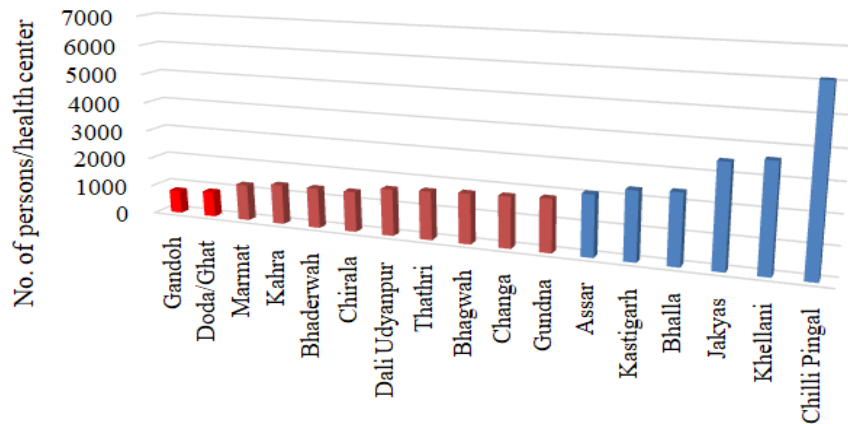
For an in-depth investigation of the availability and accessibility of physical infrastructure, only four facilities were included: SCs, PHCs, CHCs, and district hospitals. Other infrastructure categories listed in Table 3, such as medical aid clinics and dispensaries, were not considered as their presence is not as significant as physical health infrastructure. The weights assigned to physical infrastructure units are multiplied by their corresponding weights. Each unit of physical health infrastructure is weighed according to the number of associated human resources. As per the established norms of the MOFHW, SCs with 3 skilled workers are given a weightage of 1. PHCs, on the other hand, have 15 authorized skilled workers, which is five times the number of SCs, resulting in a weightage of 5. Similarly, CHCs, with 25 skilled worker roles, have almost 8 times the number of SCs, resulting in an assigned weightage of 8%.

Table 2 : Availability of Physical Health Infrastructure: District Doda (2016-17)

S.No.	Name of the Block	DH	SDH\ CHC	PHC	SC	Total	Total Population	Population served by each health center
1	Assar			5	4	9	18828	2092
2	Bhaderwah		8	5	18	31	43105	1390
3	Bhagwah			5	12	17	29407	1730
4	Bhalla			5	7	12	28978	2415
5	Chirala			5	7	12	16717	1393
6	Changa			5	10	15	26484	1766
7	Chilli Pingal			0	2	2	12212	6106
8	Doda/Ghat	16		5	11	32	28289	884
9	Dali Udyanpur			5	4	9	14519	1613
10	Gandoh		8	5	6	19	15247	802
11	Gundna			5	10	15	27311	1821
12	Jakyas			0	4	4	13958	3490
13	Kastigarh			0	8	8	18809	2351
14	Khellani			0	3	3	10917	3639
15	Kahra			5	12	17	23421	1378
16	Marmat			5	9	14	17584	1256
17	Thathri			5	6	11	18414	1674
	Total	16	16	65	133	230	364200	1583

Source: District Statistical Handbook Doda (2016-17)

Physical Health Infrastructure Population Ratio of Doda district (2016-17)



Index: **High:**<1252:14 **Medium:** 1252:14-2105:06 **Low:**>2105:06

Figure: 2

To determine the population serviced by the total weighted physical health infrastructure available, the population of each block is divided by the total number of weighted physical health infrastructure resources available. The resulting values are presented in Table 2. A lower proportion served would indicate a need for improvement in the availability of health infrastructure, whereas a higher proportion served would suggest a relatively better availability of health infrastructure.

Table 2, displays the weighted available physical health infrastructure, including SCs, PHCs, CHCs, and district hospitals, for each block. Based on the mean and standard deviation, the population health infrastructure ratio of all the blocks is classified into three categories: High (<1252:14), Medium (1252:14– 2105:06), and Low (>2105:06). As shown in Figure 2, the Doda district's average population health infrastructure ratio was 1583, placing it in the medium category of physical health infrastructure availability.

The population-to-health-infrastructure ratio at the block level shows that Chilli Pingal (6106), Khellani (3639), Jakyas (3490), Bhalla (2415), Kastigarh (2351), and Assar (2092) fall under the low category of infrastructure availability. Blocks such as Gundna (1821), Changa (1766), Bhagwah (1730), Thathri (1674), Dali Udyanpur (1613), Chirala (1393), Bhaderwah (1390), Kahra (1378), and Marmat (1256) are categorized under the medium category of health infrastructure. On the other hand, Doda (884) and Gandoh (802) blocks fall under the high population health infrastructure ratio category. Chilli Pingal falls at the bottom of the availability of health infrastructure in the poor category, whereas the Gandoh block tops the availability of health infrastructure in the good category.

Availability of Human Resources for Healthcare Provision in Doda District

Table 3, presents the current state of Human Resources availability in the Doda district, which comprises 400 hospital staff, including 176 doctors, 56 nurses/sisters, and 168 compounders. However, there is a significant disparity in the availability of Human Resources at the block level, as evidenced by Table 5. The Doda block has 56 doctors, while the Bhaderwah block has 47, and the Thathri block has 28. In contrast, the remaining blocks have less than five doctors each. Similarly, the district has 56 nurses/sisters and 168 compounders, but their distribution across blocks is uneven. The Doda and Bhaderwah blocks, which serve as district headquarters, have more medical personnel than other blocks.

Table 3: Human Resources Availability in the Doda District (2016-17)

S. No	Name of the Block	Population	Total no of doctors	ratio	Nurses/ Sisters	Nurse/ Population Ratio	Compounders
1	Assar	18828	4	4707		-	8
2	Bhaderwah	43105	47	917	16	2694	26
3	Bhagwah	29407	5	5881	01	29407	16
4	Bhalessa	19235					
5	Bhalla	28978	5	5795	01	28978	10
6	Changa	26484	5	5296	02	13242	05
7	Chilly Pingal	12212	3	4070		-	3
8	Chiralla	16717	4	4179	01	16717	09
9	Dali Udyanpur	14519	5	2903	01	14519	6
10	Doda	28289	56	505	21	1347	37
11	Gundna	27311	3	9103	01	27311	10
12	Jhakyas	13958	2	6979		-	04
13	Kahra	23421	4	3489	01	23421	05
14	Kastigarh	18809	4	4702		-	06
15	Khellani	10917	2	5458		-	05
16	Marmat	17584	4	4396	01	17584	05
17	Thathri	18414	28	657	09	2046	13
	Total	368188	176		56		168

Source: District Statistical Handbook Doda (2016-17)

Assessing the Availability of Human Resources in Healthcare Facilities

To conduct an in-depth analysis of the availability of human resources in the Doda district, certain weights are assigned to the absolute available human resources, including doctors, nurses, and compounders. These weights are based on their relative importance in the field of public health. Doctors are given a weightage of 4, nurses a weightage of 3, and compounders a weightage of 2. Next, the number of doctors, nurses, and compounders is multiplied by their assigned representative weights, and the results are added up row by row to get the proportionate weighted human resource availability for each block, as presented in Table 4. The population of these blocks is then divided by the total number of weighted physical health infrastructure resources available. The resulting figures represent the population served by the medical staff of the unit, as presented in Table 4. A lower proportion served would indicate better availability of health infrastructure, while a higher proportion served would indicate the opposite.

Table displays the ratio of population-to-weighted-available-human-resources, including doctors, nurses, and compounders, for each block. Based on their mean and SD, the population human resource ratio for all the blocks is categorized into three groups. As illustrated in Figure 1.2, these categories are High (<229:44), Medium (229:44-535), and Low (>535). The Doda district's average population human resource ratio is 1:261, which falls into the medium human resource category.

Table 4 : Availability of human resource of Doda district (2016-17)

S.No	Name of the Block	Doctors	Sisters/Nurses	Compounders	Total	Population served per medical staff
1	Assar	16	0	16	32	588
2	Bhaderwah	188	48	52	288	150
3	Bhagwah	20	3	32	55	535
4	Bhalla	20	3	20	43	674
5	Chirala	16	3	18	37	452
6	Changa	20	6	16	42	631
7	Chilli Pingal	12	0	6	18	678
8	Doda/Ghat	224	63	74	361	78
9	Dali Udyanpur	20	3	12	35	415
11	Gundna	12	3	20	35	780
12	Jakyas	8	0	8	16	872
13	Kastigarh	16	0	12	28	672
14	Khellani	8	0	10	18	607
15	Kahra	16	3	14	33	710
16	Marmat	16	3	10	29	606
17	Thathri	112	27	26	165	112
	Total	788	186	362	1336	261

Source: District Statistical Handbook Doda (2016-17)

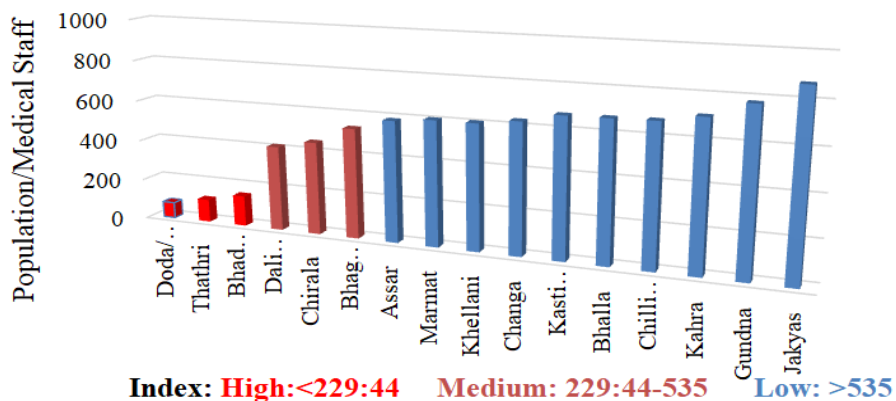


Figure 3 : Human Resource Population Ratio of Doda District (2016-17)

Source: District Statistical Handbook Doda (2016-17)

Geographical Perspective

The population-to-human-resources ratio varies across different blocks in this region. Jakyas block has the highest ratio at 1:872, followed by Gundna block at 1:780, Kahra block at 1:710, Chillil Pingal block at 1:678, Bhalla block at 1:674, Kastigarh block at 1:672, Changa block at 1:631, Khellani block at 1:607, Marmat block at 1:606, and Assar block at 1:588. These blocks are in the low category of human resource availability. Bhagwah, Chirala, and Dali Udyanpur blocks have a population-to-human-resources ratio of 535, 452, and 415, respectively, placing them in the middle category of human resource availability. On the other hand, Bhaderwah block has a ratio of 150, Thathri block has a ratio of 112, and Doda block has the lowest ratio at 78, indicating the high availability of human resources in these blocks. It's worth noting that Jakyas block has the lowest availability of human resources in the low category of block availability, while Doda block has the highest availability of human resources in the high category.

Subdivision-wise Variation in the Ratio of Hospitals, Health Centres, and Doctors to the Population

Table 5 : Subdivision-wise Variation in the Ratio of Hospitals, Health Centres, and Doctors to the Population

Name of the Block	Total No. of Population	Total no of hospital	Hospital population ratio	Total no health centres	Health population Ratio	Total no of doctors	Doctors' population ratio
Assar	18828	1	1:18828	4	1:4707	4	4707
Bhaderwah	43105	1	1: 43105	18	1:2394	47	917
Bhagwah	29407	1	1: 29407	12	1:2450	5	5881
Bhalessa	19235						
Bhalla	28978	1	1: 28978	7	1:4139	5	5795
Changa	26484	1	1: 26484	10	1:2648	5	5296
Chilly Pingal	12212	0	-	2	1:6106	3	4070
Chiralla	16717	1	1:16717	7	1:2388	4	4179
Dali Udyanpur	14519	1	1:14519	4	1:3629	5	2903
Doda	28289	1	1:28289	11	1:2571	56	505
Gundna	27311	1	1:27311	10	1:2731	3	9103
Jhakyas	13958	0	-	4	1:3489	2	6979
Kahra	23421	1	1:23421	12	1:1951	4	3489
Kastigarh	18809	0	-	8	1:2351	4	4702
Khellani	10917	0	-	3	1:3639	2	5458
Marmat	17584	1	1:17584	9	1:1953	4	4396
Thathri	18414	1	1:18414	6	1:3069	28	657
Total	368188						

Source: District Statistical Handbook Doda (2016-17)

According to the above table 5, Doda blocks had the highest ratio of population to various healthcare services. This can be attributed to inadequate transportation and communication systems in the area, as well as a substantial natural increase in population compared to other

blocks. To determine the carrying capacity of hospital and healthcare center zones, the workload factor is calculated based on the number of doctors in each block and the population. A lower factor value indicates a better capacity for the block to handle healthcare services.

Accessibility of Health Infrastructure: Assessing Availability and Reachability

Accessibility to health infrastructure refers to the ability of a population in a specific location to obtain healthcare services of satisfactory quality, cost, and convenience (Balaranjan et al., 2011). Access to efficient and optimal healthcare services is crucial for maintaining good health. In an ideal world, individuals from all backgrounds should be able to access healthcare services at any Health Center with ease and confidence. Access to healthcare services is essential for ensuring overall physical, social, and mental well-being, as well as disease prevention, detection, diagnosis, and treatment, and improving the overall quality of life, according to Healthy People 2020. To examine differences in healthcare service accessibility at the block and district levels in Doda, the average physical distance to healthcare facilities such as Primary Health Centers (PHCs), Community Health Centers (CHCs), and district hospitals has been used as a measure.

Accessibility of Health Infrastructure Based on Physical Distance and Geography

Geographic accessibility, also referred to as spatial or physical accessibility, is a crucial factor in determining access to healthcare facilities. It involves examining the relationship between the distribution of the population and the availability of healthcare services. According to research, physical accessibility is affected by various factors such as the distance and time it takes to travel to and from a healthcare facility, the terrain, and the availability of transportation infrastructure. Accessing healthcare services can be particularly challenging in developing countries where the physical proximity of health services has a significant impact on primary healthcare utilization. Delays in accessing proper care at health centers due to physical inaccessibility, including long distances, lack of transportation, or challenging terrain, can significantly contribute to the illness burden faced by a community population. Such situations are particularly common in challenging hilly terrains.

Findings from the study

The investigation has uncovered significant issues in healthcare infrastructure distribution within the district. Most people rely on cycle vans or walking to access health centers, and there is a shortage of female doctors and health attendants. The district falls short of national health infrastructure standards, resulting in a deficiency of healthcare services. Additionally, the majority of individuals in rural areas lack basic hygiene awareness, despite occasional education by local panchayats, NGOs, and health workers who visit villages to supply medicines and conduct inspections. To improve healthcare facilities in rural areas and increase awareness of health concerns among rural populations, the Government of India has launched various programs such as the National Rural Health Mission (NRHM), Integrated Child Development Services (ICGS), Mobile Health Mission (MHT), and Nirmal Bharat Abhijan. However, despite these efforts, the rural population remains uninformed about the importance

Geographical Perspective

of safe drinking water, increasing the likelihood of water-borne diseases in this district compared to others in Jammu and Kashmir.

Conclusion

The healthcare infrastructure in Doda district is not evenly dispersed, and there is a significant shortage of health services. According to national standards for health infrastructure, the area has a significant shortfall in healthcare services. The majority of individuals in rural areas are unaware of basic hygiene, which leads to the prevalence of various diseases in the area. Despite the efforts of the government and other organizations, the healthcare infrastructure in Doda district remains insufficient, and the population continues to face numerous challenges in accessing basic healthcare services. The provision of community health care is critical in any economy, but especially in emerging ones. Policymakers must ensure that the poor, particularly in rural areas, have fair access to the healthcare system by providing cost-effective health services and infrastructure. The study also reveals that the existing health facilities are not evenly distributed, and there is a significant disparity in healthcare access between different regions in Doda district. The accessibility of healthcare facilities is affected by geographical factors such as distance, transportation, and communication infrastructure. The study recommends the establishment of more health centres and the provision of better transportation and communication infrastructure to improve healthcare access in the district.

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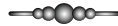
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ECOTOURISM IN MANAGEMENT OF PROTECTED AREAS : A LITERATURE REVIEW

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ABSTRACT

Ecotourism is one of the most suitable practices to conserve the protected areas in their natural manner by promoting sustainable tourism activities. Ecotourism deals with the environmentally sound methods of promoting tourism by the support of local communities. Ecotourism is more or less similar to sustainable tourism; it represents the best way to promote development in protected areas. The main objective of this study is to highlight the work that has been done in the past years on the role of ecotourism in the management of protected areas. To achieve this many research papers have been reviewed and analysed to understand the relation between ecotourism and protected areas. During this study literature is reviewed in four parts. The first part deals with the overview of ecotourism and its principles. Second part deals with the definition of protected areas and role of ecotourism in conservation of protected areas. In third part, literature related to prospects of ecotourism in biodiversity conservation and sustainable development has been reviewed. Fourth part of this paper deals with the positive impact of ecotourism on different aspects.

Key words: Ecotourism, Protected Areas, Sustainable Tourism, Nature-based Tourism, Prospects of Ecotourism.

Introduction

Exploitation of environment is the result of increase in human activities to satisfy human greed rather than human need. Destruction of protected areas is one of the aspects of environmental exploitation. This is highly impacted by the human activities like mass tourism. Several fragile protected areas in the world have already become popular tourist destinations. Tourism is responsible for environmental degradation and local cultural heritage loss by invasion of large number of visitors and their pathetic attitude towards the protected areas. To overcome this situation, *ecotourism* has become the most suitable practice. Ecotourism is important not only because it supports local communities, but also because it deals with environmental conservation.

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Objectives

This research work is done for the fulfillment of the following objectives:

- to provide an overview of the evolution and fundamental principles of ecotourism, emphasising its role in promoting environmentally sound and sustainable tourism practices;
- to investigate and elucidate the role of ecotourism in the conservation and management of protected areas, highlighting how it contributes to the preservation of natural environments and biodiversity;
- to explore the prospects of ecotourism in the context of biodiversity conservation and sustainable development, considering its socio-economic and environmental implications; and
- to evaluate the positive impact of ecotourism on different aspects, including economic development, community involvement, and environmental preservation and to provide a comprehensive understanding of its benefits.

Methodology

In this research work, a comprehensive review of existing research papers, articles, books, and reports related to ecotourism, protected areas and their interrelation have been conducted. After this the relevant data have been synthesised which involves categorising and organising the information into the four parts: (a) ecotourism principles, (b) role of ecotourism in protected area conservation, (c) prospects in biodiversity conservation and sustainable development, and (d) positive impacts of ecotourism. The findings from the literature review and analysis have been integrated to form a comprehensive picture of the relationship between ecotourism and the management of protected areas.

Overview of Ecotourism and its Principles

Ecotourism is most misunderstood term in travel industry. A walk through a national park is not ecotourism unless it provides some benefits to that environment and people who lives there. Ecotourism is dedicated for preserving and sustaining the world's natural and cultural diversities. That is why many environmentalist call it “sustainable tourism”.

Ecotourism entertains visitors in such a way that is minimally destructive to the environment and supports the local cultures and their livelihood. Ecotourism was first coined by Hector Ceballos- Lascuràinin (1983) described ecotourism a nature-based visit to comparatively undisturbed areas with a stress on education and its preservation by community involvement. He is also known as the father of the concept of Ecotourism. The idea of promoting ecotourism is to provide economic gains while preserving natural resources (Lee, 1997). Ecotourism is a win-win situation in which tourists get to expertise exciting, typically exotic locales and see creatures in their natural habitats. The cash raised through these visits goes to native communities and for protecting ecosystems (Walpole and Thouless, 2005). There are also

some other important work on ecotourism. Notable contributions are made by Jack Ranoll, (2021), Liz Sonneborn, Satish Chandra Nigam and Neeraj Nachiketa. Fundamentals of Environmental studies by Dr. Sarita Kumar has also an exclusive chapter on the concept and prospects of ecotourism. These all contributions are made during the last 20 years.

Elements of Ecotourism

There are number of salient elements of ecotourism such as.

- Environmental conservation
- Maintenance of biodiversity
- Satisfying experience for the visitors
- Study and appreciation of nature and
- Sustainable community development

Ecotourism is the active participation of local populations in preservation of environment. It is an alternate strategy to improve the health of degraded ecosystem due to various anthropogenic activities. At the World Ecotourism Summit (2002), ecotourism was defined as a form of sustainable tourism “that actively contributes to the protection of the natural and cultural heritage, which includes local and indigenous communities in its planning, development and its exploitation at a sustainable scale and contributes to their well-being”. Ecotourism is thus a development for both local populations and the protected areas concerned.

Ecotourism is one among the top priority of UNEP for conservation, sustainability, and biological diversity. It proves as a development tool which has three basic goals of the CBD (Convention on Biological Diversity).

- Conserve biological diversity, by strengthening protected area management system,
- Promote the sustainable use of biodiversity, by generating income, jobs and business opportunities in ecotourism and related business networks, and
- Share the benefits of ecotourism developments equitably with local communities and indigenous people (United Nations, 2001)

According to Wearing and Neil (2009), there are four core elements that define ecotourism:

1. Respect for protected natural areas;
2. Respect for the flora, fauna, geology and ecosystems of areas surrounding communities, and also for the cultural and social features of those communities related to the landscape;
3. The importance of conservation; and
4. The educative role which ecotourism should assume; many professionals and scholars insist on having this dimension fully considered as a guarantee for further engagement of future generation.

The International Ecotourism Society (TIES), a non-profit organisation which was created in 1990 and was a promoter of ecotourism by providing guidelines, standards and educational resources. Their aim was to make tourism a vehicle for promoting conservation and protection of bio-diversity and sustainable community development. It has been instrumental for promoting the well-being of local people. According to the *Ecotourism Association of Australia* (1992), ecotourism is ecologically sustainable tourism that fosters environmental and cultural understanding, appreciation and conservation.

Its definition still causes problems and misunderstandings. Sometimes it is even mistaken with agrotourism or eco-agrotourism. Tourism events organised in nature are also often called soft tourism, green tourism, ecologically or environmentally friendly and sustainable tourism. The last term is connected with the concept of sustainable development, which means such a kind of management that secures a possibility of using the environment again in the future. (Aleksandra Machnik, 2006)

Principles of Ecotourism

There are several principles on which ecotourism operate. The principles of ecotourism adopted from Cobbinah (2015) were:

- environmental conservation
- cultural preservation
- community participation
- economic benefits
- empowerment of vulnerable groups

Environment conservation (31.55%) was the area in which most of the studies were conducted, and it is followed by studies on community participation (25.67%) and economic benefits (24.60%). However, some observe that a paucity of studies exists in the areas of empowerment of vulnerable groups (6.95%) and cultural preservation (11.23%). However this particular studies or oriented towards environment degradation and community participation.

Definition of Protected Areas

According to the International Union for Conservation of Nature [IUCN] (1994), 'protected area is an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means'.

First comes biodiversity: 'Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems' (UN, 1992). Biodiversity is the result of an evolutionary process over thousands and millions of years. Without biodiversity earth will become uniform and,

ultimately, without natural resources. The loss of biodiversity is irreversible. This is why the concept of Protected Area (PA) was introduced. Obviously, the designation of a PA is not a guarantee of biodiversity protection. Effective management is needed, focusing on species, habitats and ecosystems. (Dologlou, 2016)

Role of Ecotourism in Conservation of Protected Areas:

From all the above discussion, some common trends have emerged in relation with role of ecotourism in protected areas. In this perspective the essential principles for carrying out an ecotourism project are:

1. Generate tourism activities that have a low impact on protected areas and natural resources;
2. Integrate the different actors (individuals, communities, Eco tourists, tourism operators and government institutions) in the planning, development, implementation and monitoring phases;
3. Respect local cultures and traditions;
4. Generate sustainable and equitable revenues for local communities and for most actors involved, including private tourism operators;
5. Produce income that will be used for the preservation of protected areas; and
6. Educate all involved actors on their role in the preservation and management of the course;

Douglas Williamson (2006) in his paper (Ecotourism and protected areas: making the most of the opportunities) provides a concise overview of the role of ecotourism in management of protected areas. He highlights the role of several actors involved in planning of ecotourism i.e., protected area staff, local communities, tourist operators, NGOs, funding agencies such as banks, private investors and international donors, and of course the tourists themselves. He also emphasised on the importance of zoning of protected areas which further enhance the conservation and management of protected areas. Ryan and Fennell (2008) focus on prospects of adaptive co-management as an alternative approach to protected area management for sustainable management for sustainable tourism. They studied three national parks of three different countries and various stakeholders. Azamaiparashvili (2017) stressed on the goal of ecotourism to conserve the environment and awareness among the people. He studied various indicators that shows role of ecotourism in preserving and conserving protected areas. According to Eagles et al., (2002), there are three potential benefits of ecotourism in protected areas:

- economic opportunity is enhanced,
- natural and cultural heritage is protected,
- quality of life is enhanced through the promotion of aesthetic, ethical, and spiritual values, environment education etc.

Geographical Perspective

Ceballos-Lascuráin (1996) proposed to qualify ecotourism as an activity that must possess eight attributes. These are presented below in a slightly modified form.

- It promotes positive environmental ethics and fosters “appropriate” behaviour among its participants.
- It does not degrade the focal resource.
- It concentrates on intrinsic rather than extrinsic values.
- It focuses on the environment in question and not on man.
- It benefits biodiversity and the environment.
- It actively involves local communities in the tourism process.
- Its level of gratification is measured in terms of education and/or appreciation.
- It involves considerable preparation and demands in-depth knowledge on the part of both leaders and participants.

Prospects of Ecotourism in Biodiversity Conservation and Sustainable Development

Ecotourism is as a sub-component of sustainable tourism. Ecotourism is considered as an effective tool for sustainable development. That's why developing countries are now including it in their economic development policies and conservation strategies. Ecotourism is a sustainable tool of development which meets the needs and demand of tourists and local residents while protecting the environment. Ecotourism offers benefits for local residents, conservation, development and educational experiences. Ecotourism is a sustainable form of natural resource-based tourism. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitat, as well as cultural artefacts from the locality (Dowling, 1997; Fennell, 1999).

Ecotourism entails a combination of conservation and tourism (the economics related with it) to benefit local communities, especially focusing on sustainability (Myburgh and Saayman, 2002). Ecotourism is largely perceived to safeguard natural areas and thereby to contribute to the conservation of biodiversity. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artefacts from the locality. In ecotourism planning the first issue that emerges is the environment and its conservation (Munn, 1992; Ceballos-Lascurain, 1996; Gössling, 1999; Tisdell and Wilson, 2002; Lindsey et al., 2005; Lopez-Espinosa de los Monteros, 2002; Fung and Wong, 2007).

Ecotourism destinations are always environmentally sensitive as these directly involve various environmental phenomena including bird watching, trekking, mountaineering, horse riding and elephant riding within the forest wilderness trail, staying in natural caves, studying about flora and fauna, simple bush walking, fishing, study of animal behaviour and other ecological studies (Rahman, 2010). Ecotourism may include cultural activities too.

Ecotourism is rooted in the concept of sustainable development, as defined by the World Commission on Environment and Development's Brundtland report (1987) (King and

Stewart, 1992; McMinn, 1997; Stem et al., 2003). Ecotourism is considered as a very effective tool for promoting sustainable development in developing countries. Ecotourism provides alternative source of income to local communities that helps in community development and make them more sustainable and empowered. There are many views about ecotourism that it act as a viable way to protect the natural environment on one hand and create social and economic benefits for local population on the other hand. Ecotourism provides a wide range of nature-based activities that instigate visitor appreciation and make them understanding the natural and cultural heritage. Ecotourism has attracted increasing attention in recent years, not only as an alternative to mass tourism, but also as a means to promote a country's economic development and environmental conservation. Its aim is to conserve resources, especially biological diversity, and maintain sustainable use of resources, which can bring ecological experience to travelers, conserve the ecological environment and gain (Bansal and Kumar, 2011; Godratollah et. al., 2011; Tewodros, 2010).

Positive Impact of Ecotourism

Ecotourism have both direct (tourism, visitors fees, monetary contribution for environment conservation, voluntary donations) and indirect benefits (various types of taxes on tourism like travel and lodging tax). Ecotourism is defined from both the supply and demand perspectives (McDonald and Ponting, 2005). Ecotourism effects protected areas in relation to their environment and education awareness for its conservation and enhance its environmental value. The Halle Park in Mombasa, Kimana Sanctuary in the Amboseli, the Kakamega National Reserve, and the Tree-Top lodge in the Aberdares National Park, Britain are some of the examples that have been protected and conserved due to ecotourism development (Belsoy et. al., 2012).

Ecotourism particularly supports alternative energy resources and solid waste management (Anup et. al., 2021), which includes the ability to systematically brand mark the conservation sites' environment (Das and Chatterjee, 2015). Ecotourism promotes community development by reducing the constraints caused by social dissatisfaction and resource exploitation (Cabral and Dhar, 2019; Ashok, Tewari, Behera, and Majumdar, 2017; Masud, Aldakhil, Nassani, and Azam, 2017; Nyaupane and Poudel, 2011; Mbaiwa and Stronza, 2010; Nyaupane and Poudel 2011). It also promotes human rights, socio-economic empowerment, and the preservation of traditional culture in the community via decision-making and participation in different activities (Kline, 2011).

Ecotourism is one of the helpful tool in achieving Sustainable Development Goal (SDG). Fifth SDG, aims to achieve gender equality and the women empowerment in all spheres of life by 2030. Ecotourism is a management tool that promotes women's empowerment and participation (Moswete and Lacey, 2015). Women are employed in community-based ecotourism by commercialising their native crafts, while the younger generation is employed as tourist guides (Adom, 2019). They also learn about other activities such as becoming tourist hosts and managing their home stays with an emphasis on good sanitation, cleanliness and serving prepared meals to the guests (Deori and Das, 2013; Walter, Regmi, and Khanal, 2018).

Conclusion

Ecotourism is a nature based tourism that promotes protection of nature on one hand and enhances the socio-economic status of local community on the other hand. Ecotourism is a sub-component of sustainable tourism that promotes the holistic development by preserving the resources for future generation. Ecotourism plays a key role in preservation of protected areas and enhancing its quality which can promote further tourism activities which provides livelihood to the local community. In the recent time, people have begun to choose tourism activities which are more related to natural and cultural areas within which they can learn something about cultural and natural values within the nature. Ecotourism activities have become that sector which has a huge potential to create a great changes in socio-cultural and economic aspects. Ecotourism is not only restricted to the socio-economic development it also ensures protection of natural and cultural landscape and creates awareness of conservation of nature. Ecotourism protects against the ongoing threat of climate change. Ecotourism has been seen a group of activities that aims to promote environment conservation on one hand and socio economic development on the other hand.

Nevertheless, in this era of mass tourism ecotourism possess great scope for protection of protected areas. Ecotourism has huge potential of better nature protection and maintains a natural balance in ecosystem. However, the complications connected with its problems and policy implementation cannot be ignored. There is need to provide an impetus to ecotourism industry to further boost the growth and maintain sustainability to protected areas, to which proper policy formulation and its implementation is required.

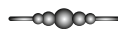
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SPATIAL CHANGES IN FEMALE LITERACY IN BIHAR (2001-2011)

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ABSTRACT

Female literacy is the key point of development. Females account for about 50 percent population in any geographical region. In some regions particularly in Europe at many places, they outnumber males. There cannot be integrated and sustainable development without educational empowerment of females. Bihar is a state where female literacy was found lowest among the states of India. Looking into this kind of scenario, the scholar outlined objectives for this research paper. District is taken as a unit to analyze spatial pattern and temporal changes in female literacy in the state of Bihar. There are results to see that urbanized districts have higher female literacy and Muslim dominated backward districts have higher rate of changes in female literacy in between 2001-2011.

Keywords: Literacy, Empowerment, Spatial pattern, Temporal changes.

Introduction

Education is one of the basic needs of the people. Less educated persons are more deprived of economical, social and political stakeholders. Illiteracy is thus a major obstacle to the development of a country. No wonder then that the people of the developed countries are literate and educated. Investment in education of children and youth is, therefore, an investment in their and their country's future.

The most basic measurement of educational status of a people is literacy (Ghosh, 1985). High level of physical and mental status of population of a country is a pre-requisite for its economic, social and political advancement. That is why literacy rate is considered to be a good indicator of development in any given society (Madhu Babu et al., 2004). Directive Principles of Constitution of India asks the state to provide free and compulsory education for all the children until they complete fourteen years of age. The National Policy on Education, 1968 had also stressed the need for strenuous efforts for early fulfilment of the goal laid down in the Constitution in this respect. The Constitutional Amendment Act of 1976 put education in the concurrent list i.e. the official list of subjects for which the Centre and the State government assume joint responsibility. The National Policy on Education, 1986 focussed on: universal enrolment in elementary schools; universal retention of children up to fourteen years of age; and a substantial improvement in the quality of education to enable all children to achieve a high level of knowledge and innovative temperament.

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Geographical Perspective

It is important to note that female literacy has been very low in Bihar. It has been the second lowest female literacy state after Rajasthan, and major attributes for the situation are traditional social and deep rooted belief. Social values have defined female's responsibilities within the walls of the house. Again early marriage and early mother hood have also been major obstacles in female literacy mission. Among the landless labourers it hardly matters whether the child is a male or female. He or she has to work from the child-hood yet the literacy mission and adult education programmes have been able to make some inroads in the literacy drive. This has brought some gainful consequences in spatio-temporal context which is the theme of this paper. The paper analyses only the changes of female literacy during the previous decade (2001-2011). It is important to mention that the female literacy of Bihar was only 16.51% and 23.10% in the census year of 1981 and 1991 respectively which has increased to 47.00%.

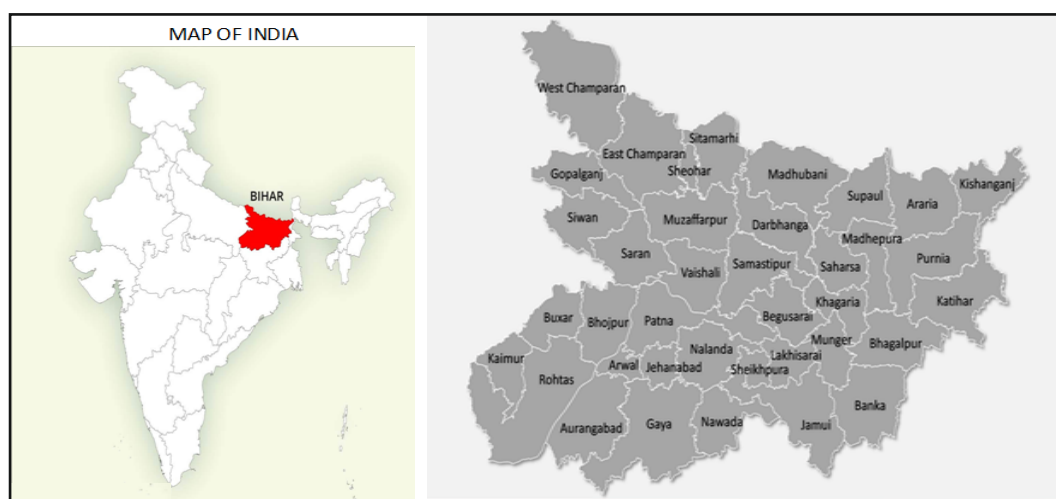


Figure 1 : Bihar and its districts

Objectives

The main objectives of this research paper is:

1. To analysis the spatial distribution pattern of female literacy.
2. To differentiate literacy between male and female of Bihar.
3. To analyse changes in the spatial pattern of female literacy during 2001-2011 period.

In the year 2001 the state of Bihar had a population of, 8,29,98,509. It has recorded 28.62 percent increase during the decade 1991-2001. The female population of the state increased from 3,97,57,714 to 4,96,19,290 making an increase of 24.81 percent.

The general literacy level of Bihar was 47.00 percent in 2001 which increased to 63.82 percent in 2011. Male and female literacy levels increased to 59.68 and 33.12 percent respectively in 2001 and further increased to 73.39 and 53.33 percent in 2011

Methodology

Every research work needs an approach of analysis. The key approach is based on the nature of data and tools of explanation. Methodology addresses approaches, data collection and methods used in processing of data.

The present research paper is based on secondary data. The scholar has principally collected data from census reports of 2001 and 2011. Such reports are statistically processed and thereafter, tables are prepared to explain the facts and to meet the research questions arising from the objectives of this research.

Study Area

The state of Bihar is the area covered in this study. The state is located in the eastern region of the country. Administratively, the state is divided into 38 district. District is taken as a unit of the study of spatial pattern of female literacy in Bihar. The total population of the state is about 13 cr. on 2nd Oct, 2023 as per caste census report, 2023. However, it was only 10.4 cr. in 2011. There were 5.43 cr. males and 49.83 cr. female persons in the same census report.

The average literacy of the state was 46.94% in 2001 which increased to 61.35 percent in 2011 in the total population of the state. At the same time, the study area had 73.39 percent male literacy and 53.33 percent female literacy in 2011. They have also changing trend when we compare with the year of 2001. Munger district has the highest female literacy ratio (65.53%) while Rohtas district has highest male literacy ratio (85.29%) in 2011. Low level of urbanisation and large area falling under feudalistic rural system and grads social status to male in comparison to female are factors behind the percent status of female literacy and education level in Bihar.

Results and Discussion

Comparative Study of Trends of Literacy Rate Between India and Bihar from 1951-2011

Undoubtedly, the general population of Bihar has lagged behind in educational indicators such as general literacy rate, female literacy rate and enrolment and retention rates. On the other hand, the facts reveal that India is far behind acceptable standards regarding the first step towards education i.e. literacy. However, even that level is not uniformly attained throughout India. Wide regional disparity in educational attainment is a vexing problem in India. Here, an attempt has been made to discuss the trends of literacy rate between India and Bihar from 1951 onwards.

Table 1: Trends of literacy rate (%) in India and Bihar (1951-2011)

Years	India			Bihar		
	Total	Male	Female	Total	Male	Female
1951	18.33	27.16	8.86	13.49	22.68	4.22
1961	28.3	40.4	15.35	21.95	35.85	8.11
1971	34.45	45.96	21.97	23.17	35.86	9.86
1981	43.57	56.38	29.76	32.32	47.11	16.61
1991	52.21	64.13	39.29	37.49	51.37	21.99
2001	64.84	75.26	53.67	47.53	60.32	33.57
2011	74.04	82.14	65.46	61.80	71.20	51.50

Source: Census of India, 1951, 1961, 1971, 1981, 1991, 2001 and 2011

Geographical Perspective

In 1951, the literacy rate for India was 18.33 and it was 13.49 for Bihar (for male it was 27.16 per cent for India and 13.49 per cent for Bihar whereas for female it was 8.86 per cent for India and 4.22 per cent for Bihar). The difference of literacy rate between India and Bihar during 1951 was 4.84 per cent of the total population (it was 4.84 per cent for male and 4.46 for female).

Reasons of low female literacy in Bihar is supported by a set of factors comprise of poverty, socio-economic constraints and background of the family-as a house keeper and attaining motherhood.

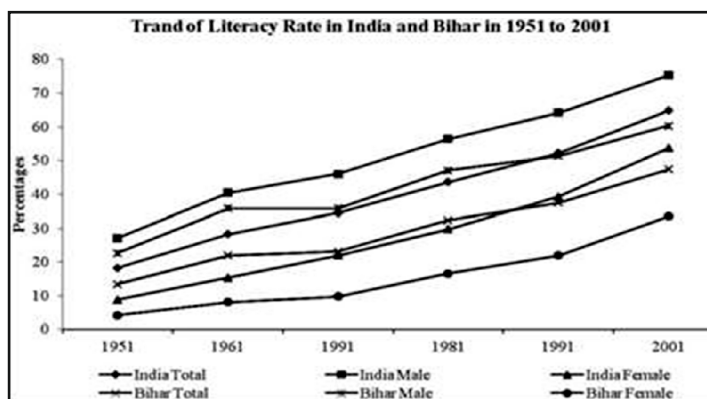


Figure 2 : Trends of Literacy Rate in Bihar

Spatial Pattern of Female Literacy in 2001

The census report of 2001 reveals that the general literacy level of Bihar was 47.00 percent while the literacy level of males and females was 59.68 and 33.12 percent respectively. Maximum female literacy was found in Patna district (50.83 percent). It was followed in descending order by Munger (47.40 percent), Rohtas (45.69 percent), Aurangabad (41.90 percent) and Bhojpur (41.80 percent) districts. So far as minimum female literacy is concerned it was in Kishanganj district (18.63 percent) followed by Supaul (20.81 percent), Madhepura (22.11 percent) and Araria (22.37 percent) in the ascending order. Table 1 gives a general impression of the spatial pattern of female literacy in Bihar.

Table 2 : Spatial Pattern of Female Literacy, 2001

Literacy in percent	No. of Districts	Names of Districts
Above 50	1	Patna
40-50	4	Munger, Rohtas, Aurangabad, Bhojpur
30-40	18	Buxer, Jehanabad, Kaimur, Arwal, Nalanda, Bhagalpur, Siwan, Gauya, Vaishali, Saran, Nawada, Gopalganj, Samstipur, Darbhanga Muzaffarpur, Begusarai, Lakhisarai, Sheikhpura,
20-30	14	Khagria, Banka, Jamui, Madhubani, Sitamarthi, Saharsa, Pashmi, Champaran, PurbiChamparan, Sheohar, Katihar, Purnia, Araria, Madhepura, Supaul
10-20	1	Kishanganj

Bihar as a whole has poor female literacy because of more females of various socially depressed communities, backwards and poor people. Virtually traditional social system is a hurdle in the improvement of literacy. Only five districts have more than 40 percent female literacy because these districts have considerable urban population. It can therefore be inferred that the higher percentage is due to urban female's exposure to literacy programmes. Kishanganj, Supaul, Madhepura and Araria districts have the female literacy below 23 percent. Poor female literacy in these districts is due to poor economic condition, dominance of landless house-holds, mass poverty and fendalistic rural system.

Spatial Pattern of Female Literacy in 2011

Spatial pattern of female literacy has recorded a trend of increase in the census report of 2011. The Bihar as a whole has increased its literacy level from 47.00 to 63.82 percent (2001- 2011). The census of 2011 has recorded 73.39 and 53.33 percent as literacy level for males and females respectively. Maximum female literacy is found in Munger district (65.53 percent) being followed by Rohtas (64.95 percent), Patna (63.72 percent), Aurangabad (62.05 percent) and Siwan (60.35 percent). Munger has replaced Patna in the first female literacy ranking of Bihar. This achievement of Munger is due to factors like greater involvement of voluntary organization and special drive under tribal development programmes. Lowest female literacy is recorded in the district of Saharsa (42.73 percent). It is followed by Madhepura (42.75 percent), Purnia (43.19 percent) and Araria (45.18 percent) in ascending order. The census of 2001 had Kishanganj having lowest literacy level but presently Kishanganj has 47.98 percent literacy due to maximum growth rate of literacy among the districts of Bihar. Table 2 gives an impression of the spatial pattern of literacy in the districts of Bihar in 2011.

Table 3 : Spatial Pattern of Female Literacy, 2011

Literacy in percent	No. of Districts	Names of Districts
Above 60	06	Munger, Rohtas, Patna, Aurangabad, Siwan, Bhojpur
55-60	11	Buxer, Kaimur, Vaishali, Begusarai, Saran, Arwal, Muzaffarpur, Bhagalpur, Jehanabad, Gopalganj, Gaya
50-55	06	Sheikhpura, Lakhisarai, Nalanda, Samastipur, Khagaria, Nawada
45-50	11	Jamui, Banka, Madhubani, Kishanganj, PurbiChampan, Sheohar, Darbhanga, Paschim Champan, Supaul, Katihar, Araria
40-45	04	Sitamarhi, Purnia, Madhepura, Saharsa.

Higher literacy percentage is seen in the districts of Munger, Rohtas, Patna, Aurangabad and Siwan: Urban and economic development programmes have mainly been responsible for higher percentage of literacy in these districts. On the other hand Saharsa, Madhepura, Purnia, Sitamarhi and Araria, have very low literacy level due to their location in north Bihar which has

Geographical Perspective

several problems like social and economic backwardness. High flood frequency, mass poverty, very hard economic life and deep rooted social traditional systems have caused low level of literacy. These districts are lacking in urban, industrial, transport and communication development.

A significant phenomenon of female literacy pattern is that nearly 8 districts had less than 25 percent literacy in 2001 but the census of 2011 has recorded not even a single district having less than 40 percent female literacy. It must be taken as an achievement in the direction of women development and empowerment programmes in the state of Bihar.

Literacy Changes (2001-2011)

Change in the level of literacy is a general characteristic feature of a developing society. Literacy improvement has become a noble mission of development in India. It is reflected not only through the programmes and allocation but also through census reports which provide factual information with regards to literacy improvement. Table 3 reveals the spatial pattern of changes in the literacy of Bihar during the decade 2001-11. It is found that the state as a whole has recorded change of 61.02 percent. The highest change is recorded in Kishanganj district (157.54 percent) being followed by Supaul 124.07 percent), Araria (101.96 percent); Sheohar (98.03 percent), Katihar (96.63 percent) and Purbi Champaran (95.13 percent). The lowest increase in literacy has been noted in the district of Patna (25.35 percent). It is followed by Munger (38.24 percent), Jehanabad (40.48 percent), Rohtas (41.84 percent) and Nawada (41.93 percent) in the ascending order.

Table 4 : Literacy Change (2001-2011)

Literacy (in percent)	No. of Districts	Names of Districts
Above 125	1	Kishanganj
100-125	2	Supaul, Araria
75-100	9	Sheohar, Katihar, PurviChamparan, Madhepura, Madhubani, Jamui, PaschmiChamparan, Khagaria
50-75	17	Gopalganj, Banka, Saharsa, Samastipur, Muzaffarpur, Saran, Nawada, Kaimur, Sitamarhi, Siwan, Sheikhpura, Vaishali, Lakhisarai, Begusarai, Gaya, Darbhanga, Buxer
25-50	9	Bhagalpur, Aurangabad, Arwal, Bhojpur, Nalanda, Rohtas, Jehanabad, Munger, Patna

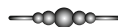
This pattern of literacy change has some geographical, social, economic and political reasoning. Kisananj district has more than 157.54 percent increase in literacy due to greater emphasis over the implementation of adult education and other literacy programmes. Some social welfare programmes have also attributed in the literacy development programmes in Supaul and Araria districts.

Conclusion

The above investigations and analysis may be taken in the context of the objectives of the work. It is fully justified that higher female literacy is mainly in better economically developed and considerably urbanized districts of Bihar, i.e., Patna, Munger, Rohtas, Aurangabad, Siwan and Bhojpur, having more than 60 percent females as literates. These are the districts where percentage of urban population is relatively high. It may be viewed that the voluntary organizations might have contributed towards higher female literacy in the districts of Bihar but that may not be as major factor as urbanisation. There has also been significant changes of female literacy in positive direction in districts like Kishanganj, Supaul and Araria. They have significant size of Muslim population. However, the census report of 2011 shows that and other socially backward areas even in Muslim dominated backward areas and feudalistic social system there is a tendency of female literacy uprise.

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कृषि आधारित उद्योग में महिलाओं की भूमिका भागलपुर जिला के संदर्भ में

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सार

बिहार खनिज की दृष्टिकोण से अभावग्रस्त राज्य है। अतः यहाँ कृषि की प्रधानता के कारण कृषि आधारित उद्योग को आजीविका के मुख्य साधन के रूप में प्रश्रय दिया गया है। विश्व स्तर पर इस बात के प्रमाण हैं कि खाद्य सुरक्षा सुनिश्चित करने से लेकर स्थानीय कृषि जैव विविधता को संरक्षित करने में महिलाओं की निर्णायक भूमिका है। कृषि आधारित उद्योग में महिलाओं को केन्द्र में रखकर देखा जाए तो सामाजिक-आर्थिक स्थिति में महिलाएँ सशक्त तथा नए परिवेश में सक्रिय रही हैं। महिलाएँ कृषि तथा कृषि से जुड़ी गतिविधियों में अपना योगदान तो बढ़-चढ़ कर देती हैं, लेकिन आर्थिक दृष्टिकोण से उनके योगदान का संकलन नहीं किया जाता है। प्रस्तुत शोध प्रपत्र कृषि आधारित उद्योग में महिलाओं की भूमिका तथा आर्थिक विकास में उनके योगदान को दर्शाने का प्रयास किया गया है।

अध्ययन के दृष्टिकोण से भागलपुर जिला की कुल कृषक जनसंख्या— 92,720 है, जिसमें पुरुष— 82,585 तथा 10,155 मात्र महिला कृषक की श्रेणी में है। जबकि 32,954 महिलाएँ कृषि से जुड़ी गतिविधियों में संलग्न हैं। लेकिन इसमें आधे से भी कम महिलाओं को कृषक की संज्ञा दी गयी है, जिसमें अनुमान लगाया जा सकता है कि लघु उद्यमी महिलाओं को कृषि आधारित उद्योगों में प्रश्रय नहीं दिया गया है।

किसी समाज के जनसंख्या में आधा अनुपात को दर्शाने वाली महिलाओं को दरकिनार कर संतुलित विकास करना असंभव है। आर्थिक-सामाजिक स्थिति को सुदृढ़ करने के लिए महिलाओं के योगदान को प्रश्रय देना होगा, महिलाएं क्रियाशील जनसंख्या की सक्रिय भागीदारी को उजागर कर, कृषि आधारित उद्योग में लैंगिक असमानता की खाई को भरने का कारगर प्रयास करती हैं। महिलाएँ फसल रोपनी, कटाई, बीजों का विभाजन, रेशे तैयार करना, दुध प्रसंस्करण, घी तैयार आदि गतिविधियों में संलग्न होने के बावजूद आर्थिक परिपेक्ष में इनका महत्व नगण्य माना जाता है, जो किसी भी विकासशील समाज के लिए अशोभनीय है। समावेशी कृषि नीति के माध्यम से महिलाओं को उनका उचित देयता प्राप्त होनी चाहिए।

प्रस्तुत शोध प्रपत्र में प्रयुक्त आँकड़े द्वितीयक हैं, जो सरकारी दस्तावेज, अन्य शोध प्रपत्र के माध्यम से एकत्रित किए गए हैं।

मुख्य शब्दावली: कार्यशील जनसंख्या, लैंगिक असमानता, समावेशी विकास, आर्थिक परिपेक्ष, संतुलित विकास इत्यादि

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परिचय

भारत मूलतः एक कृषि प्रधान राष्ट्र है। यह भारतीय अर्थव्यवस्था की रीढ़ हैं, वर्तमान में कृषि के साथ-साथ कृषि आधारित उद्योग भी अर्थव्यवस्था में महत्वपूर्ण योगदान दे रहा है। भारतीय राज्यों में कृषि के दृष्टि से बिहार अतिमहत्वपूर्ण है। यहाँ की लगभग 67% भूमि पर कृषि कार्य होता है। बिहार की भूमि कृषि के लिए सर्वश्रेष्ठ है इसलिए अर्थव्यवस्था को सुदृढ़ बनाने के लिए कृषि आधारित उद्योग पर बल देना एक सफल प्रयास माना जाता है।

कृषि आधारित उद्योग कृषि, औद्योगिक एकीकरण को कृषि और उद्योगों के बीच एक जैविक कड़ी के रूप में परिभाषित किया जा सकता है, जो एक तरफ कच्चे माल का उपयोग करता है, तो दूसरी ओर कृषि निविष्टियों और कृषि का निर्माण करता है, जो उनके उपयोग पर निर्भर करता है। कृषि आधारित उद्योगों की स्थापना के लाभों को प्राप्त करने की प्रक्रिया में रोजगार और आजीविका के अवसरों का तेजी से सृजन करने के लिए विभिन्न खाद्य प्रसंस्करण गतिविधियों के विकास के लिए एक व्यापक दीर्घकालिक दृष्टिकोण अपनाना आवश्यक होगा।

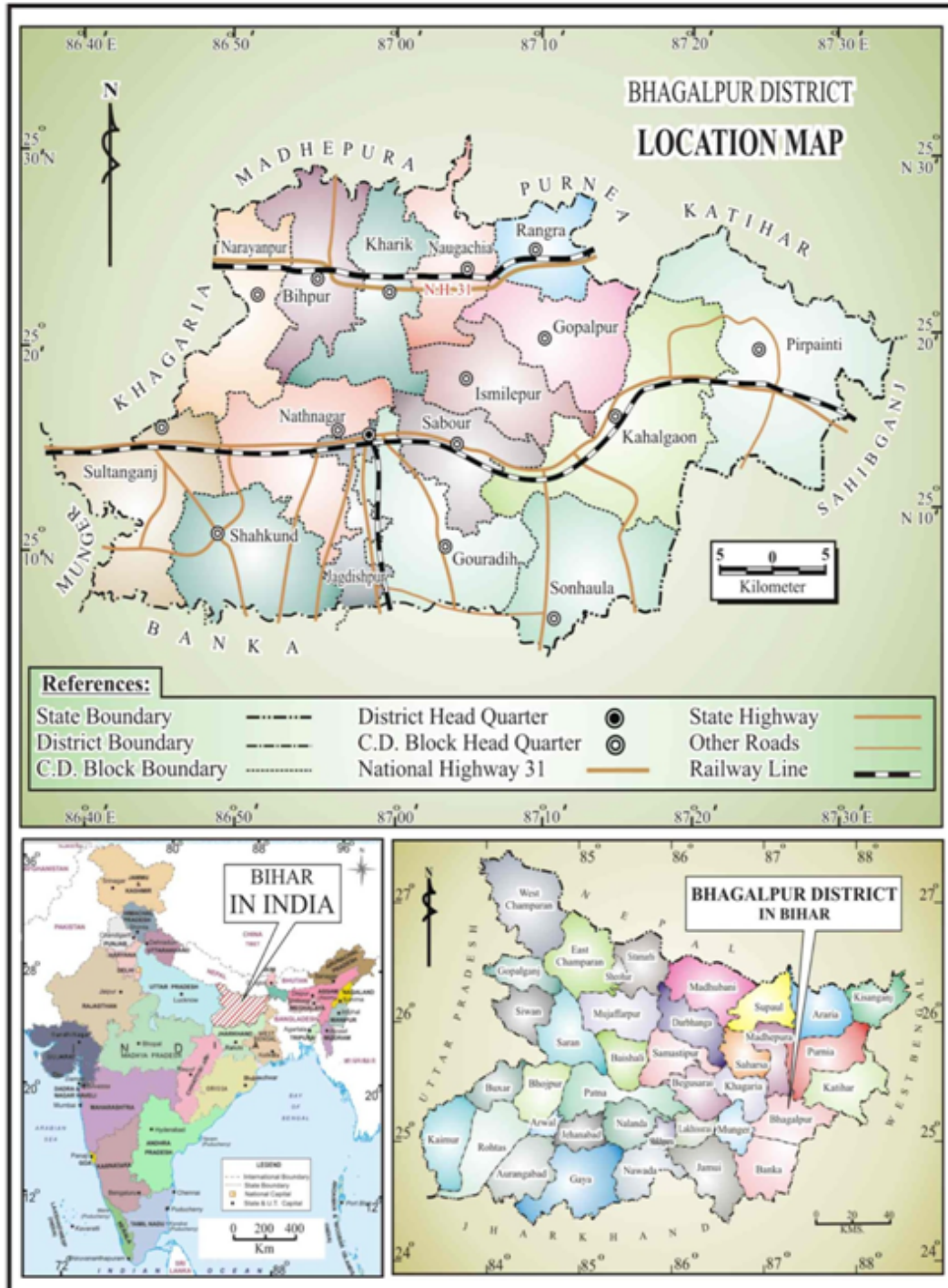
हम जानते हैं कि किसी भी समाज की प्रगति तभी संभव है, जब महिलाओं की आर्थिक, सामाजिक स्थिति सुदृढ़ हो सिमोन द बोउवार का कथन है – “स्त्री पैदा नहीं होती, बनाई जाती है कहा जा सकता है कि महिला के सर्वांगिन विकास के लिए उन्हें आर्थिक रूप से संबल होना होगा। महिलाओं का प्रदर्शन कृषि आधारित क्रियाकलाप में आरंभ से ही रहा है, महिलाएँ कृषि क्रियाकलाप में संलग्न रहती हैं, तथा कृषि से जुड़े उद्योग रेशम उद्योग, हस्तशिल्प उद्योग, दुध प्रसंस्करण उद्योग, फल संबंधित उद्योग आदि में महती भूमिका निभाती है बात यह है कि समाज में लगातार बदलावों के लिए संघर्ष चलता रहा है, महिलाएं घर तथा खेत, खलिहान तक ही सीमित रह जाती हैं, उनके अथक प्रयासों के बावजूद भी उन्हें उद्यमी की दर्जा से वंचित रखा जाता है।

महिलाओं को आर्थिक प्रगति में सक्षम नहीं माना जाता है तथा इनकी योगदान नगन्य प्रदर्शित होते हैं। हमारे शोध क्षेत्र – भागलपुर जिले में महिलाओं की स्थिति कृषि से जुड़े उद्योगों में दिखाने का प्रयास किया गया है, ताकि महिलाएँ आर्थिक रूप से आत्मनिर्भर बन सकें।

अध्ययन क्षेत्र

भागलपुर बिहार राज्य का एक प्राचीन ऐतिहासिक जिला है मध्य गंगा मैदान में अवस्थित यह जिला पूर्वांचल में एक महत्वपूर्ण भौगोलिक क्षेत्र है। लगभग 24°30' से 30°20" उत्तरी अक्षांश तथा 86°28'40" से 87°30' पूर्वी देशान्तर तक इसका विस्तार है इसका कुल क्षेत्रफल 2570 वर्ग किलोमीटर तथा 2011 की जनगणना के अनुसार जनसंख्या 3032266 है। इस जिले में तीन अनुमंडल भागलपुर सदर, कहलगाँव और नवगछिया जिसके अन्तर्गत 16 प्रखण्ड हैं। इस जिले में गाँव की संख्या 1532 है।

Geographical Perspective



चित्र सं० : 1

उद्देश्य :

- जिला में कृषि आधारित उद्योग में महिलाओं का स्थिति का आंकलन
- अध्ययन क्षेत्र में कृषि आधारित उद्योग के विकास में बाधक तत्वों को उजागर करना।
- आत्मनिर्भर भारत में नारी सशक्तिकरण के प्रश्रय को दर्शाना।

अनुसंधान क्रिया विधि और आँकड़े स्रोत :

1. भागलपुर जिले के कृषि आधारित उद्योग में महिलाओं की भूमिका दर्शाने के लिए द्वितीयक स्रोत के आंकड़े लिए गए हैं। जिसमें कृषि-आर्थिक अनुसंधान केन्द्र (AERC) भागलपुर और विकास आयुक्त सुक्ष्म-लघु और मध्यम उद्यम मंत्रालय (DCMSME) डिस्ट्रीक सेनसस हैंडबुक भागलपुर सरकारी कार्यालय द्वारा जारी आंकड़ों के आधार पर सूचनाओं को दर्शाया गया है, इन आंकड़ों के अनुसार शोध क्षेत्र उत्पादित फसल और फसल आधारित उद्योग को प्रस्तुत किया गया है।

तालिका सं० : 1**भागलपुर जिला : फसल प्रतिरूप (%)**

फसल	(2016-17)	(2017-18)	(2018-19)	(2019-20)	(2020-21)
चावल	0.9	1.4	0.5	0.7	0.9
गेहूँ	2.7	2.6	2.5	2.4	1.8
मक्का	3.6	5.8	5.3	5	4.2
छाल	2.2	2.1	2	2.8	3
गन्ना	1.5	0.74	0.16	0.19	0.3

स्रोत : बिहार आर्थिक सर्वे 2016-17 से 20-21

कृषि आधारित उद्योगों के लिए भागलपुर जिले में असिम संभावनाएं हैं। यहाँ चीनी उद्योग, मक्के आधारित, कार्न फ्लेक्स, मुर्गीदाना, मछलीदाना, पशुआहार, बिस्कुट उद्योग तथा पॉपकार्न उद्योग तथा गेहूँ आधारित बकरी उद्योग, दाल से जुड़े पापड़ उद्योग, दालमोट कारखाना आदि लगाए जा सकते हैं, जिससे किसान कच्चे माल को प्रोसेसिंग कर उचित लाभ प्राप्त कर सकते हैं। प्रस्तुत आंकड़ों से प्रदर्शित होता है कि खाद्य फसल चावल-गेहूँ में मामूली घट-बढ़ हुआ है जबकि गन्ना का वृद्धि उत्पादन विगत वर्षों में बहुत घट गया है। जिससे चीनी उद्योग पर बहुत बुरा प्रभाव पड़ा है। पीरपैती स्थित चीनी मीलें बंद होने के कगार पर हैं। मक्का के उत्पादन में वृद्धि देखी गई है जिससे मक्का आधारित उद्योग को प्रश्रय मिल रहा है।

तालिका सं० : 2
भागलपुर जिला : बागवानी फसल प्रतिरूप
(उत्पादन - टन में)

वर्ष	(2016-17)	(2017-18)	(2018-19)	(2019-20)	(2020-21)
आम	73.3	73.09	74.1	74.12	74.13
अमरूद	5.8	5.58	5.58	5.59	5.6
आलू	168.4	262.88	263.26	245.11	263.23

स्रोत : बिहार आर्थिक सर्वे 2016-17 से 2020-21

प्रस्तुत आंकड़े से इस निष्कर्ष पर पहुँचा जा सकता है कि अध्ययन क्षेत्र में फल आधारित उद्योग— जुस, अचार, जेम्स, जैली, चिप्स आदि की प्रखर संभावनाएँ हैं यहाँ उत्पादन पर्याप्त मात्रा में हो रहा है जिसे उद्योग में प्रोसेसिंग कर देश के कोने-कोने में व्यापार किया जा सकता है।

तालिका सं० : 3
भागलपुर जिला : मुख्य उद्योगिक हब

उद्योग	जिले में स्थिति	उद्योग की सं०	औसत पूँजी	कुल व्यावसायी
चावल	जगदीशपुर ब्लॉक	69	10 लाख	414
लहठी उद्योग	सनहौला ब्लॉक	25	25 लाख	100
हैंडलुम उद्योग	नाथनगर ब्लॉक	100	50.5 लाख	500

Source : Brief Industrial Profile of Bhagalpur District (DSME) 2011

उपयुक्त आंकड़े से यह निर्देशित होता है कि भागलपुर जिले में कुछ मुख्य Industrial Hub हैं, जिसमें सिल्क से उत्पादित वस्त्र उद्योग नाथनगर, अरबा कतरनी चावल (GI Tag) जगदीशपुर, लहठी उद्योग आदि उद्योग हैं, जिसमें महिला कारगर मुख्य रूप से कार्यरत हैं। जिले में कुल कृषि आधारित उद्योग की सं० 490 हैं जिसमें 565.5 लाख की पूँजी का कारोबार होता है और 2494 कार्यरत उद्यमी हैं, जो भागलपुर जिले में महिलाओं के आजीविका का एक प्रमुख स्रोत हैं।

तालिका सं० : 4
भागलपुर जिला : महिला उद्यमी की संख्या

क्र० सं०	उद्योग का नाम	पंजीकृत महिला उद्यमी
1	जैम और जैली	11
2	आलु चिप्स, पापड़	9
3	मधुमक्खी पालन	5
4	अचार मुरब्बा	12

Sources : Block Level Record in Bhaglapur

कृषि आधारित उद्योग में छोटे पैमाने के उद्योग में महिलाओं की भागीदारी सुखद है, लेकिन बड़े औद्योगिक हब में महिला उद्यमी की संख्या कमतर देखा गया है नाबार्ड रिपोर्ट 2006-07 के अनुसार पुरुष कार्यरत प्रतिशत 47.68 प्रतिशत है जबकि महिला कार्यरत 21.34 प्रतिशत है, जो महिलाओं की भेद-भाव वाले स्थिति को उजागर करती है।

तालिका सं० : 5
पुरुष एवं महिला कार्यकारी जनसंख्या का कार्यािक विवरण

क्र सं०	प्रखण्ड का नाम	पुरुष/महिला	खेतिहर मजदूर (%)	गृह उद्योग मजदूर (%)
1.	खरीक	पुरुष	67.50	4.43
		महिला	69.87	9.42
2.	नवगछिया	पुरुष	43.96	3.59
		महिला	51.12	7.97
3.	रंगरा चौक	पुरुष	54.58	2.09
		महिला	65.42	2.83
4.	गोपालपुर	पुरुष	57.41	3.13
		महिला	69.73	5.00
5.	पीरपैती	पुरुष	39.37	3.64
		महिला	68.52	5.90
6.	कहलगाँव	पुरुष	51.86	1.70
		महिला	68.62	3.41
7.	इस्माइलपुर	पुरुष	56.44	2.93
		महिला	65.52	2.78
8.	सबौर	पुरुष	33.58	2.43
		महिला	40.28	3.81

9.	नाथनगर	M	40.80	4.82
		F	51.48	9.19
10.	सुलतानगंज	M	46.33	5.45
		F	55.24	10.33
11.	शाहकुण्ड	M	59.25	4.92
		F	61.89	11.11
12.	गोराडीह	M	62.88	2.44
		F	70.14	5.76
13.	जगदीशपुर	M	12.21	11.32
		F	13.08	27.25
14.	सन्हौला	M	65.97	3.84
		F	67.09	8.57
15.	नारायणपुर	M	49.95	2.72
		F	68.60	4.92
16.	बिहपुर	M	49.10	2.60
		F	55.14	5.72

स्रोत : जिला जनगणना हैंडबुक, भागलपुर, 2011

उपर्युक्त आंकड़े के अनुसार हम इस निष्कर्ष पर पहुंचते हैं कि भागलपुर जिले के सभी प्रखण्डों में कृषि क्रियाकलाप में जुड़ी महिलाओं का प्रतिशत पुरुषों की अपेक्षा अधिक है, हाउसहोल्ड इन्डस्ट्री में भी पुरुषों की तुलना में महिलाएँ कार्यकर्ता अधिक हैं, पुरुष गाँवों से शहरों की ओर पलायन होने से कृषि श्रम बल में महिलाओं की हिस्सेदारी में वृद्धि हो रही है।

इससे महिलाएँ कृषि क्षेत्र में भी सशक्त हो रही हैं। यह सुखद प्रतिफल है। इसलिए इन क्षेत्रों में कृषि आधारित उद्योग में महिला उद्यमी संभावना अधिक है अगर महिलाओं के आर्थिक-सामाजिक स्थिति को मद्देनजर रख कर कृषि आधारित उद्योग में महिलाओं को प्रश्रय दिया जाय तो महिलाएं आर्थिक रूप से आत्मनिर्भर बनेगी।

महिलाओं के अधिकारों को लेकर कई आन्दोलन भी शुरू हुए हैं। तब से महिलाओं ने एक लम्बा सफर तय किया है। पुरुषों के वर्चस्व वाले क्षेत्रों सहित सभी क्षेत्रों में स्वयं को सिद्ध किया है। समाज में नेतृत्व और उद्यमशीलता की भूमिका चुनने के लिए महिलाओं को सक्षम बनाने में समाज सरकार एवं स्वयं महिलाओं एक प्रमुख भूमिका है।

हम जानते हैं कि महिलाएं किसी भी समाज की लगभग आधी जनसंख्या का नेतृत्व करती हैं लेकिन महिलाओं का स्थान उद्यमी क्षेत्र में नगण्य मालूम होता है। यू तो सरकार स्त्री शक्ति पैकेज, उद्योगिनी योजना, महिला उद्यम योजना, महिला ई हार्ट, महिला उद्यमिता मंच जैसे अनेक योजनाओं से महिलाओं के आर्थिक सशक्तिकरण की दिशा में मजबूत कदम उठा रहे हैं लेकिन जानकारी के अभाव में तथा उचित प्रबंधन के अभाव में महिलाएं समुचित विकास से वंचित रह जाती हैं।

कृषि आधारित उद्योग में बाधक तत्व

सामाजिक रुढ़िवादिता – महिलाओं को प्रायः पुरुषों के मुकाबले शारीरिक, तार्किक और मानसिक रूप से कम आँका जाता है। महिलाओं का कार्य घर तक सीमित कर जंजीर में जकड़ दिया जाता है, महिलाओं में पर्याप्त पूँजी खर्च करने को परिवार शीघ्रता से राजी नहीं होते हैं। बेटियाँ पुरुष उन्मुख क्षेत्र में स्वयं को किस प्रकार बनाये रखेगी यह पूर्वाग्रह भी उन्हें प्रगति से रोकती हैं।

पूँजी की समस्या

महिला उद्यमियों को फंड और स्पॉन्सरशिप तक पहुँच तथा बुनियादी समर्थक से वंचित होना पड़ता है। वित्त के क्षेत्र में महिलाओं के क्षमताओं के बारे में आपत्ति है, क्योंकि यह परंपरागत रूप से एक पुरुष प्रधान क्षेत्र है, महिलाओं को तार्किक रूप से कम पूँजी दिए जाते हैं। बैंक सेक्टर के लिए आवश्यक है कि वे महिलाओं को सॉफ्ट ऋण उपलब्ध करायें।

कौशल तथा शिक्षण की कमी

महिला प्रशिक्षक शायद ही कहीं मिलती है, अतः महिलाएं आर्थिक क्षेत्र में कदम रखने से हिचकिचाती हैं, उन्हें उचित प्रशिक्षण नहीं दिया जाता है। महिलाएँ प्रशिक्षण की कमी के कारण बाजार में प्रतिस्पर्धा नहीं कर पाती है। जिला में महिला पॉलिटेकनिक एवं आई.टी.आई की स्थापना एवं कृषि क्षेत्र में कौशल विकास को प्राथमिकता देने की आवश्यकता है।

बाजार तक पहुँच में कमी :

कच्चे फसल जल्द बर्बाद हो जाते हैं, महिलाएँ उन्हें टोकरी वाले खरीददार को देने के लिए विवश हो जाती है। जिससे उन्हें उचित मूल्य नहीं प्राप्त होता है, अगर तय समय पर फसल का प्रोसेसिंग हो जाए तो ज्यादा से ज्यादा लाभ कमाया जा सकता है। जानकारी के अभाव में भी महिलाएँ सरकारी योजनाओं का लाभ नहीं उठा पाती है।

निष्कर्ष

अतः निष्कर्षतः कहा जा सकता है कि भागलपुर जिले में कृषि आधारित उद्योग की व्यापक संभावनाएँ हैं, और उपर्युक्त प्रस्तुत आकड़ों से प्रदर्शित हो रहा है कि यहाँ उद्योग फलीभूत हो रहे हैं। महिलाएँ इसमें अपना अहम योगदान दे रही हैं तथा बढ़-चढ़ कर भागीदारी ले रही हैं। सोचनीय तथ्य यह है कि कृषि तथा कृषि संलग्न क्रियाकलाप में महिला श्रमिक की अधिक भागीदारी है, लेकिन उन्हें उनका उचित मानदेय प्राप्त नहीं हो पाता है। इसलिए उन्हें पर्याप्त लाभ कमाने के लिए कृषि आधारित उद्योग की ओर अग्रसर होना होगा। जिसमें वो घर से भी खाद्य पदार्थ का प्रोसेसिंग कर बाजार तक पहुँचा कर उचित मूल्य प्राप्त कर सकती है। अगर उचित प्रशिक्षण, पर्याप्त पूँजी की व्यवस्था कर दिया जाय तो वे उद्यमिता के क्षेत्र में एक नया मुकाम हासिल कर सकती है।

कृषि क्षेत्र में महिलाएँ जिन गतिविधियों में लगी हैं उनके लिए विशेष हुनर की जरूरत नहीं होती है। मगर परिश्रम अधिक करने की आवश्यकता होती है। महिलाएँ कठिन परिश्रम के साथ-साथ अनियमित और

कम भूगतान पर कार्य करने के लिए तैयार हो जाती है। महिला श्रमिक घासों की कटाई रोपनी, कपास बीज से रेशे तैयार करना रेशम धागा तैयार करना, दूध से प्रसंस्कृत कर दही, मक्खन, घी उत्पाद तैयार करती है। महिलाएँ कम प्रशिक्षण में भी पुरुष की तुलना में अधिक संजीदगी पूर्ण कार्य कर सकती है।

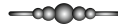
सरकार द्वारा चलायी जा रही कल्याणकारी योजनाओं के केन्द्र में भी पुरुष ही रहते हैं। इसका मुख्य कारण जमीन का मालिकाना हक पुरुषों का ही होता है। महिलाएँ अधिक कार्यशील होते हुए भी मालिकाना हक से वंचित रहती हैं। महिलाएँ स्वयं के नाम से जमीन के कागजात न होने के कारण ऋण आदि सुविधा प्राप्त करने में असमर्थ होती हैं। बदतर स्थिति तो तब होती है जब महिलाओं को एक कार्य के लिए पुरुषों की अपेक्षा कम परिश्रमिक दिया जाता है। महिलाओं के आर्थिक एवं सामाजिक सशक्तिकरण के लिए कृषि आधारित उद्योग क्षेत्र में उनकी भूमिका एवं क्षमता को और अधिक निखारने की जरूरत है लेकिन यह तभी संभव हो पाएगा जब ऋण, तकनीक, आवश्यक प्रशिक्षण तथा आसानी से उद्यमी के रूप में पंजीकरण तक उनकी पहुँच आसान होगी।

राज्य सरकार मुख्यमंत्री महिला उद्यमी योजना के तहत एक मुश्त दस लाख रुपये की ऋण दे रही है, तथा अन्य प्रोत्साहन योजना भी है जिसका लक्ष्य बिहार की महिलाओं को आर्थिक रूप से आत्मनिर्भर बनाना है। चीनी उद्योग, गुड़ उद्योग, रेशम वस्त्र उद्योग, बागवानी कृषि से तैयार फसल आम लीची आदि से अचार, जूस, जैम्स, जैली मिलावट रहित खाद्य उत्पाद का व्यापार बड़े पैमाने पर कर सकती है। उद्यमिता के क्षेत्र में महिलाओं को उनका सम्मानजनक स्थिति प्राप्त करने के लिए कृषि आधारित उद्योग एक सफल प्रयास होगा।

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निचली कोसी बेसिन में नदी मार्ग परिवर्तन से उत्पन्न प्रवास : एक भौगोलिक समीक्षा

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सार

प्रवास, जन्म दर और मृत्यु दर के साथ किसी देश अथवा किसी प्रदेश की जनसंख्या संरचना निर्धारित करने का एक महत्वपूर्ण तत्व है। सामान्यतः प्रवास किसी व्यक्ति अथवा व्यक्तियों के समूह का अस्थायी अथवा अर्द्ध स्थायी रूप में आवास से किसी निश्चित दूरी में परिवर्तन को प्रवासन कहा जाता है। कोसी बेसिन में प्रवास एक मुख्य समस्या मानी जाती है, क्योंकि कोसी नदी अपने मार्ग परिवर्तन के लिए जानी जाती है। यह नदी मार्ग परिवर्तन के कारण अपने समस्त क्षेत्र में कृषि एवं अधिवासिय भूमि के कटाव, बाढ़ लाती है जिससे इस क्षेत्र में निवासरत लोगों का स्थाई और अस्थायी रूप से पलायन होता रहता है।

पिछले 250 वर्षों में लगभग कोसी नदी 120 किलोमीटर पश्चिम की ओर स्थानांतरित हुई है। 11,263 वर्ग किलोमीटर भूमि पर रह रहे लोगों का अपने जीविकोपार्जन एवं अस्तित्व बचा ने के संघर्ष में इनका पलायन हुआ है। बाढ़, कृषि भूमि का कटाव, भूमि की उर्वरता में ह्रास आधारभूत संरचना का पिछड़ापन भौगोलिक दुर्गमता की समस्या बनी हुई है। नदी मार्ग परिवर्तन के कारण इस क्षेत्र में निवासित लोगों का विस्थापन, बाढ़ कृषि भूमि का कटाव, भूमि की उर्वरता में ह्रास, आधारभूत संरचना का पिछड़ापन, भौगोलिक दुर्गमता जैसी समस्या उत्पन्न होती हैं, जिसके परिणामस्वरूप लोग जान-माल की सुरक्षा और जीविकोपार्जन के लिए दूसरे सम्पन्न गांवों, शहरों और विभिन्न राज्यों की ओर पलायन करते हैं।

प्रस्तुत शोध पत्र कोसी बेसिन में सम्मिलित 10 जिलों के नदी मार्ग परिवर्तन से उत्पन्न प्रवास इसके कारण लोगों में हो रहे पलायन की पड़ताल करता है साथ ही प्रवास को रोकने के लिए इस क्षेत्र में अर्द्ध जलीय जीवन प्रणाली, बेहतर आपदा प्रबन्धन, छोटे चेकडैम का निर्माण, नदी तल का अवसाद का हटाना, बेहतर बुनियादी संरचना उपलब्ध कराने से इस क्षेत्र में नदी मार्ग परिवर्तन के परिणामस्वरूप विस्थापन और पलायन को कम किया जा सकता है।

मुख्य शब्दावली : नदी मार्ग परिवर्तन, प्रवास, बाढ़, विस्थापन, आधारभूत संरचना, अर्द्ध जलीय जीवन

भूमिका

प्रवासन एक मौलिक और सदियों पुरानी घटना है जिसने दुनिया भर में कई समाजों की सांस्कृतिक और अर्थव्यवस्थाओं की संरचनाओं को आकार दिया है। इसमें व्यक्तियों या लोगों के समूह या व्यक्तिगत इंसान का एक स्थान से दूसरे स्थान पर गमन करना शामिल है, जो अक्सर प्राकृतिक सामाजिक, आर्थिक और राजनैतिक जटिल प्रक्रिया से प्रेरित होती। उत्तर भारत में स्थित बिहार राज्य का एक समृद्ध

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इतिहास रहा है और यह राज्य भी प्रवास की जटिल गतिशिलता से अछूता नहीं रहा। इस राज्य के कोसी नदी के निचले बेसिन क्षेत्र में नदी मार्ग परिवर्तन के फलस्वरूप प्रवासन यहाँ मुख्य समस्या बनी हुई है। इस भौगोलिक क्षेत्र में प्रवास मुख्य रूप प्राकृतिक कारकों से प्रेरित है। बेसिन में सम्मिलित संपूर्ण क्षेत्र प्रवास की समस्या से ग्रसित हैं इस प्रदेश में प्रवासन का मुख्य कारण कोसी नदी के पिछले 250 वर्षों में नदी मार्ग परिवर्तन के परिणामस्वरूप उत्पन्न अनेक समस्याओं जैसे बाढ़, विस्थापन, कृषि भूमि का कटाव, कृषि भूमि की उर्वरता में ह्रास, भौगोलिक दुर्गमता, आधारभूत संरचना का पिछड़ापन के कारण सम्पूर्ण प्रदेश आर्थिक और सामाजिक पिछड़ेपन और असमानता से ग्रस्त है। जिसके कारण इस क्षेत्र के लोग अपने अस्तित्व को बचाने और जीविकोपार्जन के लिए एक स्थान से दूसरे स्थान अस्थायी रूप तथा अस्थायी रूप में पलायन करते हैं।

पूर्णिमा जिला के प्रसिद्ध उपन्यासकार सुरेंद्र कुमार स्निग्ध अपनी उपन्यास "छाड़न" में लिखते हैं "बिहार प्रदेश के उत्तरी सीमांचल को छूते ही कोसी अपनी प्रवाह बेनी बिखेर देती है और काली घटाओ जैसी अनेक धाराओं से सहरसा और पूर्णिया के संपूर्ण भूभाग में पसर जाती है दरभंगा के पूर्वांचल से पूर्णिया तक की 75 मील भूखंड की एक इंच भी ऐसी भूमि नहीं है जहाँ कोसी ने कभी किलोल न किया हो।"

उद्देश्य

कोसी नदी अत्यधिक मार्ग परिवर्तन के लिए जानी जाती है संपूर्ण निचला कोसी बेसिन नदी के मार्ग परिवर्तन एवं बाढ़ का प्रांगन है। नदी मार्ग परिवर्तन से कृषि एवं आदिवासी भूमि के कटाव ने इस क्षेत्र में विस्थापन को जन्म दिया, इस शोध पत्र का मुख्य उद्देश्य निम्नलिखित है :-

- इस भौगोलिक क्षेत्र में परिवर्तन के लिए उत्तरदायी कारकों का पता लगाना।
- नदी मार्ग परिवर्तन से प्रवासन पर प्रभाव का पता लगाना।
- प्रवास को रोकने के लिए कारगर उपाय सुझाना।
- प्रवासन से होने वाली समस्याओं एवं नुकसान के बारे में जन जागरूकता एवं जनप्रतिनिधि व स्थानीय प्रशासन को अवगत कराना।

विधि तंत्र

इस शोध पत्र के अध्ययन पद्धति में दो तरह के आंकड़ों को शामिल किया गया है। ये प्राथमिक और द्वितीयक आंकड़े हैं। द्वितीयक आंकड़े जहाँ पुस्तकों, पत्र-पत्रिकाओं का सहारा लिया गया है, वहीं समस्या के गहन अध्ययन के लिए प्राथमिक आंकड़ों में क्षेत्र सर्वेक्षण के लिए अनुसूची तैयार कर साक्षात्कार के माध्यम से आंकड़े एकत्रित किए गए हैं। मानचित्र एवं रेखाचित्र उपयुक्त कार्टोग्राफिक विधियों एवं उपग्रह मानचित्र की सहायता से तैयार किए गए हैं, जो अध्ययन के अंतर्गत आने वाले समस्याओं के विश्लेषण का आधार बनते हैं। इसके साथ ही रिमोट सेन्सिंग और जी आई एस का भी इस्तेमाल किया गया है। प्राथमिक आंकड़ों के संग्रह हेतु प्रतिचयन विधि का उपयोग किया गया है।

उद्देश्यपूर्ण स्तरीकृत यादृच्छिक $\frac{1}{2}$ Purposive Stratified Random Sampling $\frac{1}{2}$

आंकड़ों के चयन का आधार : कोसी नदी से दूरी—

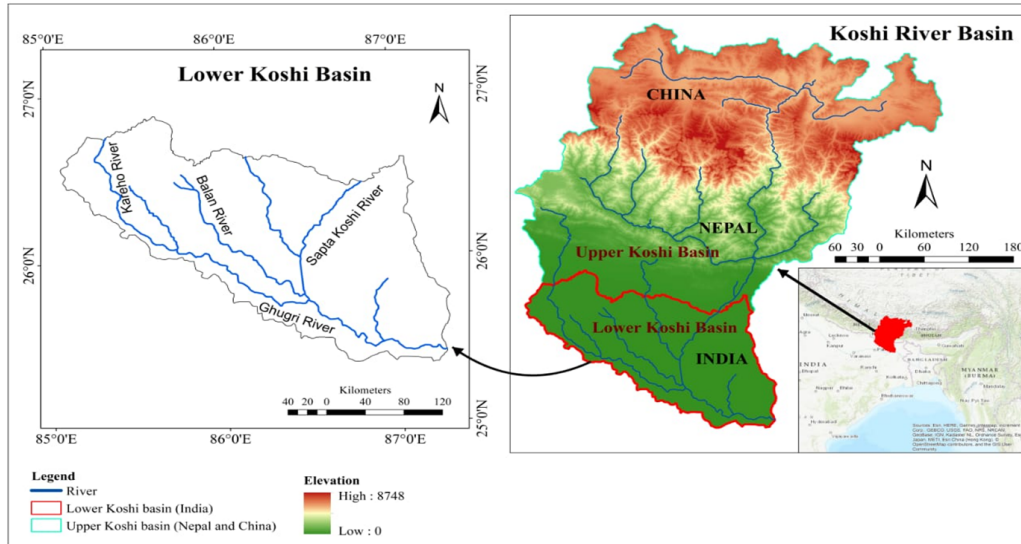
- ✓ 0 किलोमीटरसे 05 किलोमीटर
- ✓ 05 किलोमीटर से 10 किलोमीटर

आंकड़ों का संग्रह

10 जिलों (सुपौल, सहरसा, खगड़िया, मधेपुरा, उत्तरी भागलपुर कटिहार, पूर्णियां, अररिया, मधुबनी, दरभंगा) के 08 सामुदायिक विकास प्रखण्डों से 30 गांवों का चयन कर कुल 900 सैंपल लिए गए हैं। एकत्रित आंकड़ों का विश्लेषण उपयुक्त सांख्यिकीय विधियों से किया गया है।

अध्ययन क्षेत्र

कोसी नदी विश्व की एक प्रमुख नदी है। सम्पूर्ण कोसी जलग्रहण क्षेत्र बिहार में 93,355 वर्ग किलोमीटर (History of kosi Project, WRD, Govt- of Bihar) है। लेकिन कमला बालन को छोड़ दिया जाय तो अध्ययन क्षेत्र निचले कोसी बेसिन के अंतर्गत 11,265 वर्ग किलोमीटर क्षेत्रफल समाहित है। (चित्र 1) इस समस्त क्षेत्र में कुल 10 जिले आते हैं। विस्तृत विवरण नीचे दिए गए तालिका 01 से पता चलता है।



चित्र 1 : स्थिति मानचित्र, बिहार में निचली कोसी बेसीन

इस सपूर्ण क्षेत्र में लगभग 2 करोड़ 50 लाख जनसंख्या निवास करती हैं। कोसी नदी बिहार के साथ भारत की भी प्रमुख नदी है। यह गंगा की बड़ी सहायक नदियों में से एक है। कोसी का उदगम स्थल नेपाल हिमालय में 7000 मी. की ऊंचाई (26°54'47" उत्तरी अक्षांश से 25°24'43" उत्तरी अक्षांश) से होता है। नेपाल के हनुमान नगर (6°11' उत्तरी अक्षांश और 86°54' पूर्वी देशांतर) के पास भारत की सीमा में प्रविष्ट होकर सुपौल, सहरसा, खगड़िया मधेपुरा होते हुए कटिहार के कुर्सेला (25°24'43" उत्तरी अक्षांश और 8°70'15" पूर्वी देशांतर) गंगा नदी में मिल जाती है।

तालिका 01 : कोसी बेसिन का देश/जिलावार क्षेत्रफल

क्रम सं.	देश / जिला	जलग्रहण क्षेत्र (वर्ग किलोमीटर)
01	तिब्बत (चीन)	32671
02	नेपाल	39678
03	भारत	
i	दरभंगा	66
ii	मधुबनी	1715
iii	सुपौल	2366
iv	खगरिया	691
v	सहरसा	1646
vi	अररिया	835
vii	पूर्णिया	1172
vii	मधेपुरा	1796
ix	कटिहार	446
x	भागलपुर	512
	कुल (भारत)	11265
	कोसी कुल जलग्रहण क्षेत्र	74,500 (कमला बलान के सम्मलित क्षेत्र)

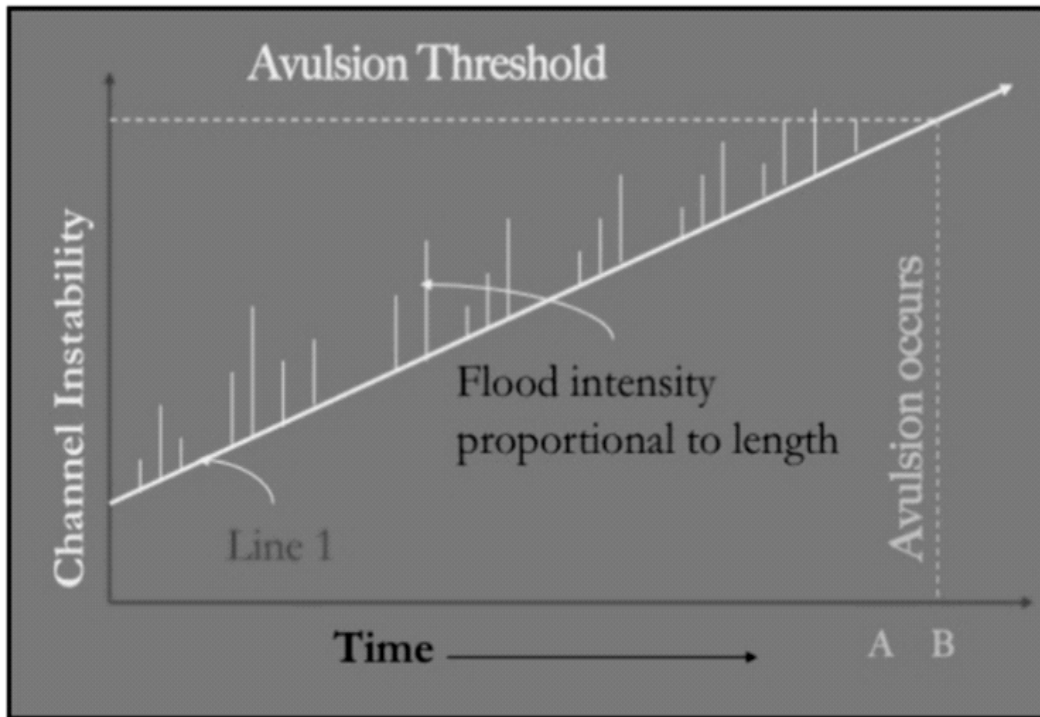
स्रोत : केंद्रीय जल आयोग, भारत सरकार, 1993

Geographical Perspective

कोसी नदी मार्ग परिवर्तन और बाढ़ के लिए कुख्यात है। अपनी इस प्रवृत्ति के कारण अपने बेसिन क्षेत्र में प्रवास को मुख्य समस्या बनाती है और निवासरत लोगों को पलायन करने के लिए बाध्य करती है। हमें ज्ञात है कि कोसी नदी पिछले 2 शताब्दियों में पश्चिम की ओर लगभग 150 कि.मी. तक स्थानांतरण किया है। कई पुरानी धाराएँ सैटेलाइट तस्वीरों में स्पष्ट दृष्टिगोचर होती हैं एवं उनमें से कुछ धाराओं में मानसून काल में जल प्रवाह भी होता है। कुछ रिपोर्टों के अनुसार कोसी नदी क्षेत्र में 4 मिलियन से अधिक लोग पलायन को बाध्य हुए हैं।

कोसी नदी की गतिशीलता

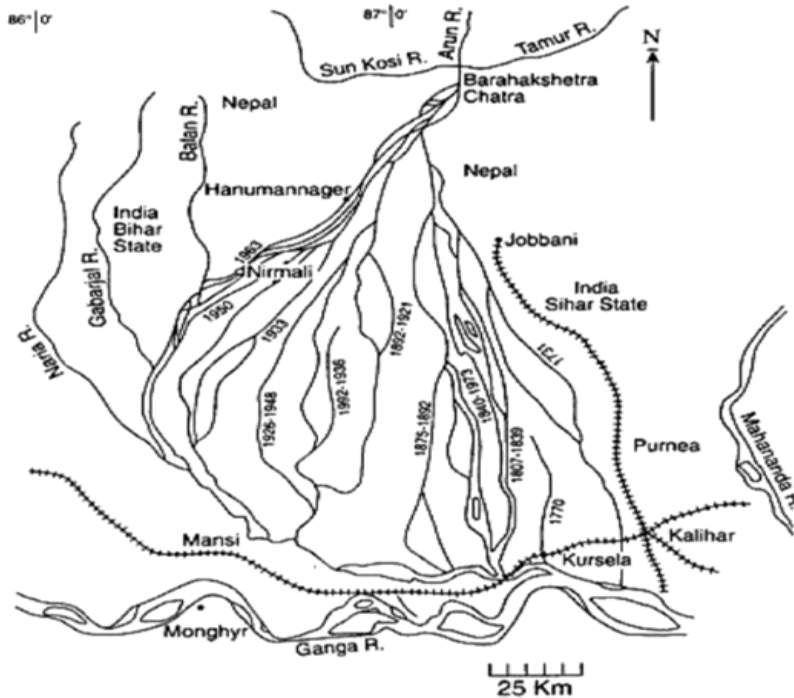
कोसी नदी विश्व में अत्यधिक मार्ग परिवर्तन तथा बाढ़ के लिए विख्यात है। अपने मार्ग परिवर्तन के प्रवृत्ति के कारण यह नदी बिहार की शोक कहलाती है। कोसी नदी के मार्ग परिवर्तन को एवल्शन परिवर्तन (Avulsion shift) के रूप में वर्णित किया जाता है। इस नदी की गतिशीलता का पता इसके एवल्शन से स्पष्ट हो जाता है। एवल्शन की प्रक्रिया में एक नोडल बिंदु के आस पास अचानक नदी के किनारे प्रयाप्त परिणाम (आमतौर पर बाढ़) की घटना होती है। जो एवल्शन थ्रेशहोल्ड या उसके आसपास होती है।



चित्र 1 : एवल्शन थ्रेशोल्ड की संकल्पना
(जॉन्स एवं श्यूमम 1999, पर आधारित)

इस चित्र में दर्शाया गया है कि समय के साथ नदी के विभिन्न चैनल के मार्ग में अस्थिरता आई है। जिसका पता ढलान, वक्रता 'नदी के आकार विभिन्नता से ज्ञात होता है। इस आकृति में खड़ी रेखाएं विभिन्न परिणाम के बाढ़ का प्रतिनिधित्व करती है। इस चित्र में यह भी स्पष्ट होता है कि किसी नदी गंभीर स्थिति की बाढ़ भी हमेशा परिवर्तन नहीं लाती और कभी-कभी कम गंभीर बाढ़ भी नदी एवल्शन परिवर्तन को बढ़ा सकती है।

कोसी नदी की गतिशीलता की जानकारी सर्वप्रथम शिलिंग फिल्ड (1893) द्वारा बताया गया। उनके बाद कई भूगोलवेत्ताओं ने उत्तर बिहार के मैदानी इलाकों में कोसी नदी के पश्चिम की ओर स्थानांतरण पर ध्यान केंद्रित किया। शिलिंग फिल्ड (1893) ने बताया कि कोसी नदी पश्चिम की ओर मार्ग परिवर्तन के साथ ही पूर्व की ओर भी प्रवाहित होती है। लियोपोल्ड एव मॉडोक (1954) ने कोसी नदी की पार्श्विक बदलाव को जालीनुमा तंत्र (Braided system) की प्रवृत्ति बताया, जो अवसादीकरण की दर पर भी निर्भर करता है। मुखकज (1961) में सर्वप्रथम अतित में अलग-अलग समय में कोसी नदी की विभिन्न धाराओं का मानचित्रण किया। इन मानचित्रों का प्रकाशन Holmes की प्रसिद्ध पुस्तक (Holmes 1978) में हुआ। गोले एवं चिटाले (1966) ने बताया कि कोसी नदी पिछले 200 वर्षों में 150 कि.मी. ५० की ओर परिवर्तित कर गयी है। वही चक्रवर्ती एवं अन्य (2010)ने बताया कि कोसी नदी पश्चिम कि ओर 117 कि.मी. स्थानांतरित हुई है (चित्र 03)।

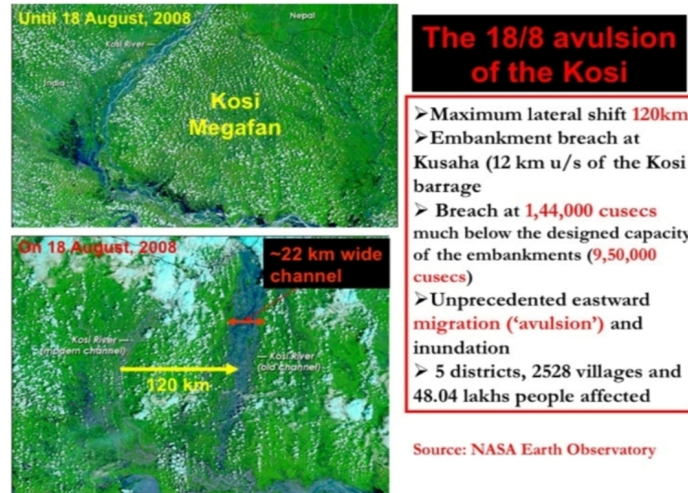


चित्र 3 : कोसी जलोढ़ पंख तथा कोसी नदी के मार्ग स्थानांतरण का इतिहास
(स्रोत : चक्रवर्ती एट. ऑल, 2010)

जलोढपंख (Alluvial fan) की स्थलाकृति का भी निर्माण करती है। नदी के मार्ग परिवर्तन का यह आकलन कोसी नदी के जलोढपंख पर विभिन्न समोच्च रेखाओं के आकलन द्वारा किया गया था। चक्रवर्ती एवं अन्य ने बताया कि अन्य हिमालय से निकलने वाली नदिया इतनी मार्ग परिवर्तन नहीं करती जितनी कोसी करती है क्योंकि, अन्य नदियाँ अनुदैर्घ्य घाटियाँ बनाती है जबकि कोसी नदी एक शंक्वाकार डेल्टा का निर्माण करती है। साथ ही यह भी भविष्यवाणी की गई की जब संपूर्ण कोण यानी जलोढ पंख के निर्माण के बाद कोसी नदी पूर्व की ओर पूनः मार्ग परिवर्तन करने लगेगी। कुछ भूगोलवेत्ताओं के अनुसार कोसी नदी की जलीय गतिशीलता पर विवर्तनीक प्रभाव को भी मानते है। उनका मानना है कि कोसी नदी प० की ओर स्थानांतरण प० की ओर उत्तर-दक्षिण दिशा में एक भ्रंश से संबंधित है। एरोगवामी (1971) अग्रवाल एवं भोज (1962) ने बताया कि कोसी नदी का पश्चिमी किनारा का परिवर्तन हो रहा है क्योंकि नदी में अवसादन की दर अधिक है। जिससे ढाल का झुकाव पूर्व से पश्चिम की ओर है जिससे पश्चिम किनारा का अवतलन हो रहा है। और यह भी तर्क दिया गया कि अवसाद की अधिकता के साथ भ्रंश के पश्चिम की ओर धसने से असमान भार पूर्व दिशा की ओर झुकाव पैदा करेगा जिससे एक समय में नदी वापस पूर्व की ओर मुड़ जाएगी। हॉलकि वेल्स और डोर (1987)का मानना है कि कोसी नदी में किसी बड़े बदलाव के लिए क्षेत्र में आए भुकंप का कोई संबंध नहीं है। साथ ही यह भी बताया कि नदी में आये भयंकर बाढ़ भी कोसी नदी के बदलाव के साथ संबंधित नहीं हैं। वेल्स एवं डोर (1987) ने निष्कर्ष निकाला कि विवर्तनिक घटनाएँ और भीषण बाढ़ निश्चित रूप से कोसी नदी प्रणाली को प्रभावित करती है, लेकिन उनका प्रभाव न तो प्रत्यक्ष होता है न ही तत्काल। कोसी नदी का पाश्विक बदलाव काफी हद तक ऑटोसाइक्लिक और स्टेकेसिक है।

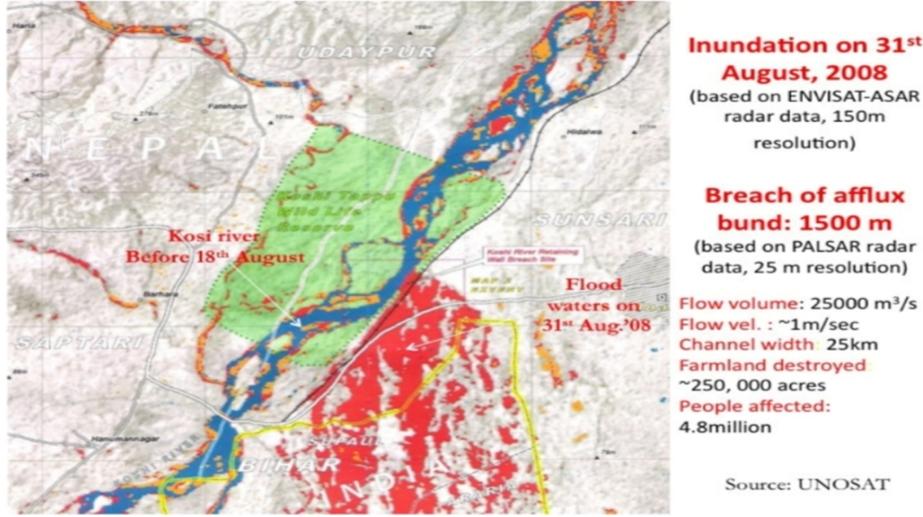
कोसी तटबंध में टूट और प्रवसन पर उसका प्रभाव :

कोसी नदी के नवीनतम तटबंध में दरार कोसी बैराज से 12 किलोमीटर ऊपर कुसहा नामक स्थान पर 18 अगस्त 2008 में हुई थी जो (चित्र 04) से पता चलता है



चित्र 4 : अगस्त 18 (2008), कोसी नदी का एवुल्शन

दरार के चौरा होने के कारण नदी अपने मूल स्थान से पूर्व की ओर एक नए मार्ग से बहने लगी। दरार के समय नए मार्ग में पानी का बहाव 1,44,000 क्यूसेक था जबकि सामान्य पुराने मार्ग में केवल 25,744 क्यूसेक था। इस नए मार्ग से नदी की चौड़ाई 15 से 20 किलो मीटर तथा लंबाई 150 किलोमीटर थी (चित्र 05)। कुसहा बांध के टूटने से पहले सात बार कोसी बांध में कोसी बैराज के नीचे टूट हुई (Mishra, 2008)। पहला टूट 1963 में दलवा, नेपाल में हुई, जहाँ संपत्ति का तो नुकसान हुआ लेकिन कोई बहुत बड़ी दुर्घटना नहीं हुई।



चित्र 5 : कुसता के पास दरार, जहाँ से कोसी नदी का 85% जलप्रवाह नये मार्ग से हुआ।

दूसरी टूट 1968 में दरभंगा जिले के जमालपुर के पास हुई और तीसरी घटना 1971 में हुई जब भटनिया बांध भीमनगर के नीचे की ओर ढह गया। चौथी दरार 1980 में सहरसा जिला के बहुरवा के पास हुई जिससे पूर्वी तटबंध नष्ट हो गया, जिससे काफी हानी हुई। कई हजार लोगों को विस्थापन का सामना करना पड़ा। बाद में दरार के बाद पानी तेजी से घट गया। वर्ष 1984 में सहरसा जिला के हेमपुर गाँव के पास पूर्वी तटबंध में पाँचवी बार टूट आई जिससे सहरसा और सुपौल जिले के 50,00,000 लोग प्रभावित हुए। ऐसी ही एक घटना 1987 में पश्चिमी तटबंध पर हुई थी जब छठा तटबंध सहरसा जिले के महिषी ब्लॉक के समानी और घोघेपुर गाँव में टूटा था। सातवीं बार 1991 में जोगनिया में नदी ने तटबंध के लगभग दो किलोमीटर तट को नष्ट कर दिया जिससे जोगनिया के आसपास के कई इलाकों में लोगों को प्रवासन का सामना करना पड़ा। 2008 में कुसहा में दरार आठवीं बार हुई टूट अचानक होने के कारण जान माल की काफी हानि और प्रभावित क्षेत्रों में लंबे समय जल भराव के मामले सामने आए। यह घटना सबसे विनाशकारी रही जिससे कई गाँव का विस्थापन हुआ। नई मार्ग ने लगभग 3000 वर्ग किलोमीटर क्षेत्र को प्रभावित किया। नीचे दिए गए तालिका 02, में 2008 में आये बाढ़ में हुए विस्थापन और नुकसान का जिलावार विवरण दिया गया है।

तालिका 2 : 2008 में कोसी बाढ़ से बिहार के पूर्णतः प्रभावित जिलों में विस्थापन का विस्तृत विवरण

विशिष्ट क्षेत्र	मधेपुरा	सुपौल	सहरसा	अररिया	पूर्णिया
प्रभावित प्रखंडों कि संख्या	11	5	6	4	9
पंचायतों कि संख्या	140	65	59	71	77
प्रभावित गाँवों कि संख्या	170	173	169	141	140
प्रभावित परिवारों कि संख्या	374798	186661	130000	140895	41645
प्रभावित पशुधन	303640	132500	161000	80000	35000
प्रभावित क्षेत्र (लाख हेक्टेयर)	1.59	0.51	0.38	0.45	0.47
क्षतिग्रस्त मकानों कि संख्या	168410	130207	8439	8439	7562
विस्थापितों कि संख्या	335110	370000	107937	107937	35000
मृतकों कि संख्या	187	15	2	2	1
मृत पशुधनों कि संख्या	1115	95	0	0	0
क्षति कि गहनता और प्रभाव के अनुसार रैंकिंग	1	2	4	4	1

श्रोत : आपदा प्रबंधन विभाग, बिहार सरकार, पटना, 2009

नदी के तीव्र प्रवाह के कारण कई घर, स्कूल, सड़कें और अस्पताल क्षतिग्रस्त हुए। बिजली, पानी, यातायात, संचार, खाद्य आपूर्ति, कई दिनों तक प्रभावित रहा। कई गांव कट गए पांच जिलों के 35 ब्लकों के 412 पंचायत के 993 गांवों के कुल 35,45,545 लोग और 7,12,140 जानवर प्रभावित हुए, जिनमें से 239 व्यक्ति और 1232 जानवरों की जान-माल की क्षति हुई। मधेपुरा, सहरसा के कई बड़े इलाकों में 2010 तक पानी भरे रहे, तथा कृषि प्रधान वाले खेतों में नाव चलती रही। जहाँ पानी घट गया वह एक मीटर से ज्यादा रेत की मोटी परत बैठ गई जसे खेती लायक बनाने में कई साल लग गए। कुसहा बाँध टूट से जो लोग प्रवासित हुए थे कुछ वापस आए और कुछ वापस नहीं आए। वर्तमान समय में भी इन प्रवासित लोगों का जीवन बहुत कष्टकर है, ये तटबंध के ऊपर जीवन बसर करने को मजबूर हैं ये लोग अपनी मूलभूत जरूरतों की भी पूर्ति नहीं कर पाते है ।

निचली कोसी बेसिन में नदी मार्ग परिवर्तन से उत्पन्न समस्या जो प्रवासन के लिए बाध्य करती है:—

- ❖ **कृषि भूमि का नष्ट होना** : निचले कोसी बेसिन क्षेत्र में अधिकांश आबादी कृषि पर निर्भर करती है। परंतु कोसी नदी के स्थानांतरण के कारण कृषि भूमि के निम्नीकरण ने कृषि में उत्पादन एवं उत्पादकता को निम्न किया है। जिससे निचला कोसी बेसिन क्षेत्र में कृषि कार्य सही से नहीं हो पाता परिणामस्वरूप एक विशाल आबादी अपनी खाद्य आवश्यकताओं के लिए पलायन करते हैं ये पलायन आबादी तटबंध के ऊपर और सुरक्षित गांव में साथ ही साथ बड़े नगरे या राज्यों की ओर पलायन करते हैं।
- ❖ **कोसी नदी की बाढ़** : नदी के मार्ग स्थानांतरण के फलस्वरूप नदी कभी पूर्व तो कभी पश्चिम की ओर बहती है। पूर्वी ओर पश्चिमी तटबंध के बीच में बसे लगभग 350 गांवों में निवासित लोग नदी के कभी पूर्व कभी पश्चिम की ओर धारारों के विचरण करने से उत्पन्न बाढ़ ने लोगों के जीवन को दुष्कर कर दिया है। साथ ही क्षेत्र के अन्य जीलें भी बाढ़ से त्रस्त है। 31 जुलाई 2020 तक उत्तरी बिहार के 12 जिले कोसी नदी में आई बाढ़ से प्रत्यक्ष—अप्रत्यक्ष रूप से प्रभावित रहा। इस बाढ़ से 4.7 मिलियन लोग बाढ़ से ग्रसित थे। तथा राज्य आपदा प्रबंधन बुलेटिन के अनुसार यह संख्या दिन पर दिन बढ़ती जा रही है। जो क्षेत्र में निवासित लोगों को प्रवासन के लिए मजबूर करते है। यह स्थायी और अस्थायी दोनों रूपों में होता है।
- ❖ **कमजोर बुनियादी ढांचा** : अध्ययन क्षेत्र में सड़क, बिजली, रेल मार्ग, अस्पताल, शिक्षण संस्थान जैसे आधारभूत संरचनाओं की कमी है कमजोर आधारभूत संरचना किसी क्षेत्र के पिछड़ेपन का मुख्य कारण है तथा औद्योगीकरण के मार्ग का मुख्य बाधक भी है कमजोर आधारभूत संरचना के कारण ही कोसी क्षेत्र का द्वितीयक क्षेत्र जिसमें रोजगार की व्यापक संभावना है पिछड़ेपन का शिकार है। साथ ही इसका जीडीपी में योगदान भी दिन प्रतिदिन कम होता जा रहा है। निचले कोसी क्षेत्र में बाढ़ तथा नदी मार्ग परिवर्तन इस तरह की परियोजना की लागत को और बढ़ा देता है यही कारण है कि निवेशक इस क्षेत्र में निवेश करने से कतराते हैं न्यून निवेश औद्योगिक पिछड़ापन इस क्षेत्र से निवासित लोगों को प्रवास के लिए प्रेरित करती है।
- ❖ **भौगोलिक दुर्गमता** : संपूर्ण निचला कोसी बेसिन क्षेत्र कोसी नदी की कई धाराओं द्वारा विभक्त होकर विभिन्न प्रदेश के रूप में दृष्टिगोचर होती है। मिर्चा, फरवाने, तिलावेह, तिलजुगा धरधी, सुरसढ़, धमारा आदि जैसी कई कोसी की अनेक शाखाएँ इस क्षेत्र की मैदानी एकरूपता को भंग करती है। इस क्षेत्र को एक दूसरे से विलग करती है। चूंकि ये शाखाएं परिवहन तथा गमना—गमन को बाधित करती है, साथ ही इस क्षेत्र में परिवहन परियोजनाओं की लागत भी अधिक है। इन कारणों से यह क्षेत्र संपर्कता की दुर्गम समस्या से ग्रसित है। कई गांव ऐसे हैं जहाँ से बाजार, स्वास्थ्य केंद्र, कॉलेज तथा विश्वविद्यालय की दूरी बहुत अधिक है, जो इस क्षेत्र के पिछड़ेपन का प्रमुख कारण है। इसी के साथ यहाँ पर यातायात के साधनों का भी अभाव है तथा सड़क सम्पर्कता भी बेहतर स्थिति में नहीं है। उपरोक्त कारणों से ही निचले बेसिन क्षेत्र में रोजगार सृजन की क्षमता कम है तथा अधिकांश आबादी प्रवासित होने के लिए अभिशप्त होती है।

परिचर्चा

इस क्षेत्र के चयनित गाँव के आंकड़ों के विस्तृत अध्ययन से ज्ञात हुआ है कि निचली कोसी बेसिन के 95% गाँवों में नदी मार्ग परिवर्तन कभी ना कभी हुआ है। इस मार्ग परिवर्तन से बेसिन क्षेत्र में सबसे ज्यादा प्रवास क्रमशः सहरसा, सुपौल, खगड़िया, मधेपुरा में हुआ है। तालिका 03 में प्रखण्ड, ग्राम स्तर पर प्रभाव को दिखया गया है।

तालिका 03 : नदी मार्ग परिवर्तन से प्रवास पर प्रभाव

क्रम सं	प्रभाव	जिला	प्रखण्ड	गाँव
01.	अत्यधिक प्रभावित	सुपौल	मरौना	पछगछिया, सिसौनी, बरहारा पिपरपान्ती, सखुवा
			भपटियाही	कल्याणपुर, बहुरवा, लोकहा, कोदली
		सहरसा	महिषी	प्राणपुर, बघवा, बलुआहा, मुरली
			नौहट्टा	मझौल, पहाडपुर, हेमपुर, केदली असैय
02.	मध्यम प्रभावित	खगड़िया	गोगरी	बिरबास, बलतारा
			बेलदौर	डुमरी, तेलिहाड
		मधेपुरा	आलमनगर	मुरौत, कपसिया
			चौसा	खोपडिया, लौवालगान
03.	निम्न प्रभावित	मधुबनी	फुलपरास	मुरली
		दरभंगा	पू.कुशेश्वर स्थान	कोला
		अररिया	नरपतगंज	अचरा भवानीपुर
		कटिहार	कुरसेला	बलथी महेशपुर
		उ.भागलपुर	नौगछिया	कदवा
		पूर्णिया	रूपौली	बेला परसादी

स्रोत : फील्ड सर्वेक्षण 2020

जो कहीं जीरो से पांच किलोमीटर के बीच तो कहीं पांच से दस किलोमीटर के बीच हुआ है। नदी मार्ग परिवर्तन के कारण इन गावों में परिवहन ,संचार ,बाजार, स्वास्थ्य ,खाद्य आपूर्ति, की क्षति हुई है। इस क्षेत्र के 90% लोगों का मानना है कि नदी स्थान्तरण के कारण भूमि का अपरदन हुआ है, जिससे कृषि

भूमि की उर्वरता निम्न हुई है। 10% का मानना है कि अपरदन तो हुआ है लेकिन कृषि भूमि पर कोई खास प्रभाव नहीं पड़ा है। सबसे अधिक नदी मार्ग परिवर्तन के कारण प्रवासन की समस्या सुपौल, सहरसा, मधेपुरा और खगड़िया में हुआ है। कम प्रभावित क्षेत्रों में मधुबनी, दरभंगा, अररिया, कटिहार, पूर्णियां और उत्तरी भागलपुर वाले क्षेत्र आते हैं जो सीधे सीधे कोसी नदी से प्रभावित तो नहीं हैं बल्कि कोसी नदी की सहायक शाखाओं से प्रभावित होती है। अररिया जिला के नरपतगंज ब्लॉक के अँचरा भवानीपुर में सुरसढ़ नदी में आए बाढ़ से प्रवासन को गति मिली है वहीं मधुबनी जिला के फुलपरास ब्लॉक में कमला बलान नदी से मार्ग परिवर्तन हुआ है जिसकी वजह से गाँवों का विस्थापन हुआ है। उत्तरी भागलपुर के नौगछिया ब्लॉक के कदवा में कोसी नदी से ही विस्थापन हुआ है। इन क्षेत्रों में प्रत्येक वर्ष बाढ़ से प्रवर्तन की गति को और बढ़ा दिया है। अध्ययन क्षेत्र में बसे गाँवों में रह रहे लोगों का विस्थापन कई बार हुआ है, यह विस्थापन पांच से सात किलोमीटर तक औसतन हुआ है इस प्रवासन में प्रत्येक गाँव के लगभग 70% लोग विस्थापित हुए हैं यह विस्थापन मुख्य रूप से विभिन्न विभिन्न वर्षों 1922, 1960, 1972, 1980, 1984, 1986, 1993, 1994, 1997, 2000, 2005, 2008, 2012, 2017, 2020, 2022 (क्षेत्र सर्वेक्षण, शोधार्थी द्वारा) में हुआ है जो, वर्तमान में भी जारी है। नदी मार्ग परिवर्तन से कृषि भूमि का कटाव भी हुआ है निरंतर मार्ग परिवर्तन से कृषि प्रारूप में भी बदलाव हुए हैं जिससे कई आर्थिक समस्या उत्पन्न हुई जिसके फलस्वरूप इस प्रदेश में रह रहे लोगों को पलायन के लिए मजबूर होना पड़ा। समस्त क्षेत्र में कृषि भूमि तथा अधिवासित भूमि दोनों जल-जमाव से ग्रसित हैं कई लोग अपरदन से परेशान हैं तो कहीं बाढ़ से कहीं दोनों जिससे प्राथमिक क्रिया सुचारु रूप से नहीं होती है। बेरोजगारी, गरीबी, सड़क सम्पर्कता, आधारभूत संरचना का पिछड़ापन, ऋण, महंगाई, शिक्षा, पूंजी का अभाव ने संपूर्ण प्रदेश में प्रवास को जन्म दिया है।

निचली कोसी बेसिन क्षेत्र में प्रवर्तन एवं उनके दुष्प्रभाव को न्यूनतम करने के उपाय

- ❖ कोसी नदी के मार्ग परिवर्तन की प्रवृत्ति पर पूर्णतया नियंत्रण तो नहीं किया जा सकता है परंतु इसकी गति को कम किया जा सकता है नदी के शाखाओं को चैनलाइज कर बड़े बांधों को छोटे छोटे चेकडैम में प्रतिस्थापित कर नदी तल के अवसाद को हटाकर नदी मार्ग परिवर्तन की प्रवृत्ति को कम किया जा सकता है जिससे क्षेत्र में विस्थापन में कमी आएगी।
- ❖ तटबंध पुल पुलियों की उचित निगरानी तथा रख-रखाव में ध्यान दिया जाए ताकि गंभीर बाढ़ के समय भी कम नुकसान का सामना करना पड़े।
- ❖ बेहतर आधुनिक तकनीकों पर आधारित आपदा प्रबंधन नीती को अपनाए जाने की आवश्यकता है इस संदर्भ में बिहार सरकार भारत का प्रथम राज्य है जिसमें 15 वर्षीय आपदा जोखिम न्यूनीकरण रोडमैप सेंडाइ फ्रेमवर्क को अपनाया है तथा इस फ्रेमवर्क को कोसी के संपूर्ण क्षेत्र में लागू करने की आवश्यकता है।
- ❖ कोसी नदी के बाढ़ के दुष्प्रभाव को कम करने के लिए स्थानीय निवासियों को नदी के साथ सामंजस्य स्थापित करने की आवश्यकता है इस संदर्भ में बांग्लादेश के अर्द्ध जलीय जीवन प्रणाली मॉडल से प्रेरणा ली जा सकती है।

Geographical Perspective

- ❖ भीम नगर से लेकर कुर्सेला तक नदी के दोनों किनारों पर वनारोपण किया जाए, पेड़ की प्रजाति इस प्रकार की हो जिसकी जड़ें गहरी हो तथा जो अधिक जल को अवशोषित करने की क्षमता रखती हो।
- ❖ कृषि के नवीनतम कृषिगत सुधार हो जिसमें निवेश कृषिगत आधारभूत संरचनाओं का विकास नवीन तकनीक का उपयोग कर किसानों की आय में वृद्धि की जा सकती है। जल कृषि, मछली पालन, कुकुर पालन, डेयरी फार्मिंग आदि अपनाने की जरूरत है जिससे लोगों को खेती के अलावा भी आमदनी हो सके। खेती को लाभ का सौदा बना कर क्षेत्र में होने वाले पलायन को कम किया जा सकता।
- ❖ पूर्वी पश्चिमी तटबंध के बीच निर्वासित लोगों के लिए विशेष पुनर्वास की उचित व्यवस्था की जाए।
- ❖ मूल आधारभूत उच्चस्तरीय संरचनाओं का निर्माण करना ताकि नदी मार्ग परिवर्तन तथा बाढ़ से कम नुकसान हो।
- ❖ संपूर्ण निचला कोसी बेसिन क्षेत्र लंबे समय से पिछड़ेपन का शिकार रहा है। इस क्षेत्र के सर्वांगीण विकास की मांग लगातार विभिन्न मंचों पर उठती रही है, अतः इस क्षेत्र के बहुमुखी विकास के लिए केंद्रीय तथा राजकीय स्तर में समन्वय द्वारा क्षेत्र विशेष के लिए दीर्घकालिन उपयोगी नीति एवं योजनाओं को लागू करने की जरूरत है।

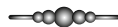
निष्कर्ष

संपूर्ण अध्ययन क्षेत्र पिछले कई वर्षों से विपदाओं (खासकर बाढ़ एवं नदी मार्ग परिवर्तन) से उत्पन्न कई समस्याओं (कृषि भूमि का कटाव, अवसादिकरण, उत्पादन एवं उत्पादकता में कमी, जल जमाव, कमजोर आधारभूत ढांचा, भौगोलिक दुर्गमता, प्रवास, विस्थापन आदि) से लगातार जूझ रहा है। यहाँ के लोगों की जीवठता, पुनः उठ खड़े होने की अभिलाषा, व्यापक जल संसाधन, विशाल मानव संसाधन, वृहत बाजार कृषि खाद्य पर संस्करण आदि क्षेत्रों में असीम सम्भावनाएं भी हैं जो, इस क्षेत्र के विकास दर को गति प्रदान कर सकती हैं। उन्नयन कौशल, विकास, पूंजी निवेश, मानव संसाधन में निवेश कर इस क्षेत्र का सतत, समावेशी विकास को चिरस्थायी बनाया जा सकता है।

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GENERAL SECRETARY REPORT

**On the Auspicious Occasion of the XXIV Annual Conference and National Seminar
of**

The Association of Geographers, Bihar and Jharkhand

November 4-5, 2023

University Department of Geography, Ranchi University, Ranchi, Jharkhand, (India)

Hon'ble President, Chief Guest and Guest of Honour of today's inaugural Session of 24th Annual Conference cum National Seminar, dignitaries on the dias, Fellow delegates, Life and Annual Members of the Association, Invited Guests, Students, Media Persons, Ladies and Gentlemen.

I am standing before you to present my Second General Secretary report of the overall activities of the association. It is a matter of great privilege and honour for me to present this report on the occasion of the 24th Annual Conference cum National Seminar under the auspices of the Association of Geographers, Bihar and Jharkhand, which is being attended by a large number of distinguished scholars and researchers, not only from different parts of the states of Bihar and Jharkhand but also from other Indian States and again not only from Geography but also from other branches of knowledge.

Friends! Our association has now become twenty four years old. During these periods, the Association itself has been strengthened in respect of life members, financial position and infrastructure facilities. These have been possible due to the participation by the Post-graduate Departments and Departments of Geography of Colleges of different Universities to give an active support in the functioning of the association. These activities helped in increasing the number of life members to 1325. There has been an increase of about 100 life members in the last year. There has also been an increase in the number of institutional and annual members.

Dear Fellow Members! I am happy to inform you that our financial position is also considerably sound. This year also the balance sheet of the account of the Association has been certified by the Chartered Accountant and the Treasurer will present the balance sheet in the General Body Meeting. Our fixed deposit is Rs. 13,74,019/- till 31st March, 2023. The infrastructural facilities of the Association has also improved much during the last few years. Website has been launched and email address of the Association created. We are communicating well with such a large number of members through the website as well as through email of the Association. All relevant informations are now available on the website. Besides that, you may interact with office bearers and member of the Executive Committee through the email and Whatsapp social media. The PAN Card of the Association has been made in 2019 to facilitate fixed deposit account in the Bank.

It is our pleasure to inform you that Prof D.P. Singh, our former President has launched an academic programme under the name of Founders and Makers of Modern Geography in India. The 44th Episode of this online lecture series is just completed. This programme has received warm response across the country. Now series of Edited Volumes (Books) are in process of publication, covering lectures delivered on the theme. Prof D.P. Singh, Director, Researches of

IERAD has led a group of scholars and social activists to bring awareness in the society in Saran, Champaran and Vaishali regions through organizing meetings, padyatra and exhibitions in schools, colleges and libraries.

I am again happy to inform you that the UGC CARE list approval committee has accepted our proposal for granting the status of UGC CARE list Journal. It is not only send for acceptance but we have now released E-journal issues of Volume 22 and 23 in OCR format, and Volume 24 is in process. Process has also begun for E-journal registration. It is the sincere efforts of editorial board members due to which our journal has started to receive research papers from all over the country. All life members present here will receive the volumes of printed journals at the registration counter. Even non- life members may also get entire volume of E-journal through AGBJ website.

Various Departments of Geography of the Universities of Bihar and Jharkhand are promoting the subjects by organizing Seminars, extra-mural lectures, workshop and other academic activities throughout the year. A modern GIS-Remote sensing Computer Lab has been established in the Department of Geography, Patna College which was inaugurated by Hon'ble Vice-Chancellor of Patna University Prof. Girish Kumar Choudhary on November 22, 2022. The Department of Geography, Patna University organized many special lectures during last one year. A special lecture was delivered by Prof. Ravi Kiran Sharma, Retired Professor of Geography, Patna University on 'Quantitative Methods in Geography' on March 3, 2023; A special lecture was delivered by Dr. Shyamal Kishore, Head of the Department of Philosophy, T.P.S. College, Patna on 'Professional Ethics in the contemporary perspective' on March 18, 2023; An another invited lecture on 'Data Collection and Representation for Geographical Studies : Some Methodological Issues' was delivered by Prof. A.K.M. Anwaruzzawan, Department of Geography, Aliah University, Kolkata on April 4, 2023. Another invited special lecture on 'Montreal Protocol : Fixing the Ozone layer and reducing climate change' was delivered by Prof. Rash Bihari Prasad Singh, former Vice-Chancellor of Patna University and Nalanda Open University, Patna and patron of the Association on September 16, 2023.

Another special invited lecture on 'Application of statistical techniques in Geographical Study' was delivered by Prof. F.A. Siddiqui, Former Chairperson of Department of Geography, A.M.U., Aligarh (U.P.) on September 21, 2023.

A special invited lecture on the topic "Geographical Toponyms of Patna" was delivered by Prof. L.N. Ram, Former Vice-Chancellor of Patna University and Chief Patron of our association on 6th October, 2023 in the P.G. Department of Geography, A.N. College, Patna, Patliputra University.

PG Department of Geography, Magadh University organized special lectures on different occasions which were addressed by Prof RBP Singh on "G-20 countries and changing global power order"(July 2023); Prof P.R. Vyas, MLS University delivered a lecture on Climate Change on 21st September 2023; Dr. V. K. Srivastava, DDU Gorakhpur University delivered lecture on Urbanization related issues on September 15, 2023 and Dr. Praveen Saptarshi of S. B. P. University, Pune on Relevance of Mahatma Gandhi in Modern Age (October 09, 2023).

The Magadh University has also resolved to host 1st South Asian Geographers conference in February, 2024.

Geographical Perspective

VKS University Ara had a grand success of our 23rd Annual Conference at S.B. College Ara premises. Recently, Shershah College Sasaram had hold one day National Seminar on " Changing Geomorphological Landscape", which was attended by many prominent geographers of Bihar and Jharkhand. Dr. Rana Pratap, Former NAGI President was the Chief Guest on this occasion. Dr. Anoop Kumar (Patliputra University), Dr. Narender Kumar (VKSU) and Dr. Sanjay Kumar (VKSU) also delivered thought provoking lectures.

In addition to above facts, Geography departments of different universities also organised several academic activities both off-line as well as on-line. Several guest faculties and regular teachers have also joined respective Geography departments of Bihar and Jharkhand. We seize this occasion to congratulate them and also request them to associate themselves with the Association to carry it forward and to make it an association of new generation geographers. I am sorry to state that due to shortage of time, achievements of several geographers of Bihar and Jharkhand in the fields of book writing, receiving awards, attending national and international seminars, getting promotion, etc. are not being presented here. I on behalf of the association congratulate them and wish to have a bright future. Most of them are mentioned in the Departmental news.

I, as a General Secretary of the Association request all those life members who have not furnished their email to kindly submit the same to the office of the Association. You are also requested to be a regular follower of our website for any kind of information. All newly recruited teachers in Geography are specially requested to come forward to become actively associated with the Association. Your association will give a new generational move to the Association.

At the end I once again express my sincere thanks to all of you for your kind co-operation and support in running the Association. I am sure that our bond to work together will promote the cause of Geography and we shall succeed in establishing Geography as an indispensable subject in coming years. We need to work academically on challenging issues in a systematic and scientific way so that stake holders in the field of planning and development may not be able to ignore the importance of Geography.

I hope that your two-day stay at Ranchi will be academically very fruitful. At the end, I owe my deep sense of gratitude to the organizers of this conference who have provided all kinds of facilities satisfactorily.

Thanking you all once again.

Jai Bihar, Jai Jharkhand, Jai Bhoogol.



(Dr. Manoj Kumar Sinha)

General Secretary, AGBJ

email: agbj2003@gmail.com

THE ASSOCIATION OF GEOGRAPHERS BIHAR & JHARKHAND

DEPARTMENTAL NEWS

PATNA UNIVERSITY, PATNA

Teaching Learning/Curricular/ Extracurricular Activities

1. GIS- Computer Lab Inaugural Function (22.11.2022)

Inauguration of GIS- computer lab was done by the Hon'ble Vice Chancellor of Patna University Prof. Girish Kumar Choudhary in the Department of Geography, Patna College. Former PU Vice-chancellor Prof. R.B.P. Singh, former MU Vice- chancellor K.N. Paswan, former department head Prof. V.N.P. Sinha and PU Geography head Prof. Anuradha Sahay graced the occasion. At the outset, Patna College Principal Dr. Ashok Kumar welcomed the guest. Patna College Geography department Head Dr. Md. Nazim elaborated the function of the lab and Dr. Manoj Kumar Sinha proposed the vote of thanks.

2. Swachcha Bharat Abhiyan

Swachcha Bharat Abhiyan was held in the Department of Geography on 05.12.2022. All the teachers, staff and students took part and contributed in cleaning the department premise.

3. Publication of Faculty

- Prof. Md. Nazim and Manish Kumar published a research paper in a Peer Reviewed Journal “Geographical Perspective”, Vol 23, October 2022 entitled “A Geographical Analysis of Crop Diversification in Saharsa District of Bihar”.
- Prof. Md. Nazim and Saba Naz published an article in Swadeshi Research Foundation – A Monthly Journal of Multidisciplinary Research, Vol. 9, No. 7, May, 2022 entitled “Grameen evam Nagriya Chhetron ki Vyavsayik Sanrachna ka Tulnatmak Adhyan(1991-2011)”.
- Dr. Debjani Sarkar Ghose, Md. Ashraf and Swati published an article in Geographical Perspective, Vol III, October 2022 entitled “Assessment of Wasteland in Jamui District using ISROs LISS III Satellite data(2008-2016)”.
- Dr. Debjani Sarkar Ghose, Padmaja, Akanksha and Ayushi published an article in Explore, Vol. XIV, No.1, 2022, entitled “Employment Status of Youth in Patna District, Bihar”.

Geographical Perspective

- Dr. Debjani Sarkar Ghose and M. Mishra published an article in Madhya Bharti, Vol 83, No. 14, 2023 entitled “Spatial Monitoring of Urban Expansion using Remote Sensing and GIS: A case study of Patna Municipal Corporation”.
- Dr. Debjani Sarkar Ghose, Aadya Rai, Aayushi Kumari, Kumari Sanjana Gautam published an article in Quest Journal, Vol 1, No. 1, 2023 entitled “Problems and Prospects of Retail Sectors in Patna Municipal Corporation Area”.
- Dr. Uday Kumar published an article in Geographical Perspective, A Peer Reviewed Journal, October 2022, Vol. 23 entitled “Spatio-Temporal Analysis of Sex Ratio in Begusarai District of Bihar”.
- Dr. Uday Kumar published an article in Research Discourse, July- Sept. 2022, Vol. XII entitled “Urbanisation and its impact on the Literacy Growth in the Begusarai Municipal Area (1981-2011)”.
- Dr. Uday Kumar published an article in Research Discourse, Jan.- March 2023, Vol. XIII entitled “Urban Poverty in India: Incidence and Measurement”.

4. Superannuation of Prof. Anuradha Sahay

Prof. Anuradha Sahay, Head, Department of Geography, Patna University has superannuated on 31.12.2022.

5. Joining of Prof. Md. Nazim as PG Head

Prof. Md. Nazim joined as Head of the PG Department of Geography, Patna University, Patna on 01.01.2023.

6. Freshers cum Farewell Function

A Fresher's cum Farewell Function by the students of M.A. Semester III was organized on 27.02.2023 in the Seminar Hall of the Department. The students of MA Semester II and M.A. IV (passed out) participated in the function. All teachers and research scholars were also present in the function. Various cultural activities were performed by the students.

7. Special Invited Lecture on “Quantitative Methods in Geography”

A special lecture was delivered by Prof. (Retd.) Ravi Kiran Sharma, of Patna University on “*Quantitative Methods in Geography*” on 01.03.2023 in the Seminar Hall of the department in which the students of M.A. Semester-III have participated and they were extremely benefitted.

8. Special Invited Lecture on “Professional Ethics in the Contemporary Perspective”:

The special invited lecture on “*Professional Ethics in the Contemporary Perspective*”

was held in the Department of Geography on 18.03.2023. Prof. (Dr.) Shyamal Kishore, Head, P.G. Department of Philosophy, T.P.S. College, Patliputra University, Patna was the chief speaker. Teachers, Guest faculties and students attended the lecture in large number.

9. Special Invited Lecture on “Data Collection and Representation for Geographical Studies: Some Methodological Issues”:

The special invited lecture on “*Data Collection and Representation for Geographical Studies: Some Methodological Issues*” was organized in the Department of Geography on 06.04.2023. Prof. (Dr.) A.K.M. Anwaruzzaman, Department of Geography, Aliah University, Kolkata was the chief speaker. His lecture was very useful for the teachers, researchers and the students.

10. World Environment Day Celebration

World Environment Day was celebrated on 5th June 2023 in the Department of Geography in which the teachers, research scholars and students took part. Poster presentation on the theme of the year “Beat Plastic Pollution” was organized along with a plantation drive in the department on this occasion.

11. Participation in Course structure Design

Professor Md. Nazim, Head, Dept. of Geography, Patna University and Dr. Uday Kumar, Asst. Professor (Guest Faculty) participated in course structure design of 4 year B.A. (CBCS) Programme at Governor’s Secretariat, Bihar, Raj Bhavan, Patna from 12-14 June, 2023.

12. Transfer and Joining as Associate Professor

Dr. Debjani Sarkar Ghose, Associate Professor was transferred from Patna Women's College to PG Department of Geography, Patna University. She joined the department on 01.07.2023.

13. Renewal of Guest Faculty

Dr. Uday Kumar, Dr. Vivek Kumar, Dr. Monika Kumari renewed as Assistant Professor (Guest Faculty) in the PG Department of Geography.

14. Transfer and joining of Guest Faculty

Dr. Prerna Bharti, Dr. Akhtar Abid Ali were transferred from B.N. College to PG Department of Geography, Patna University.

15. Condolence Meeting

A condolence meeting of teachers, research scholars and staff members of the

Department of Geography, Patna University was held in the memory of the sad demise of Prof. Snehlata Prasad on 31st July, 2023 in the seminar hall of the department to pay homage to the departed soul. Prof. Snehlata Prasad, Retd. Professor of Geography, Patna University and Former Principal, Patna College left this world forever on 28.07.2023.

16. Essay Writing Competition

An Essay Writing Competition was held on 14.08.2023 in the Seminar Hall of the department of Geography. The students of M.A. in Geography, Semester III took part in the competition.

17. Induction Meet (M.A. Semester I)

An Induction Meet of M.A. Semester I, Session 2023-2025 was held on 11.09.2023 in the Seminar Hall of the Department of Geography to make students aware of the curriculum and CBCS patterns of the syllabus for classes examinations, CIA test and for maintaining discipline in the department.

18. Quiz Competition on World Ozone Day

On the occasion of **World Ozone Day**, a written **Quiz Competition** was held on 13.09.2023 in the Seminar Hall of the department. The students of MA in Geography, Semester I and II took part in the competition in large number.

19. Special Invited Lecture on “Montreal Protocol: Fixing the Ozone Layer and Reducing Climate Change”

Special lecture on “*Montreal Protocol: Fixing the Ozone Layer and Reducing Climate Change*” was held in the Department of Geography on 16.09.2023. Prof. (Dr.) Rash Bihari Prasad, Former Vice Chancellor, Patna University was the chief speaker. Teachers, Guest faculties and students attended the lecture.

20. Special Invited Lecture on “Application of Statistical Techniques in Geographical Study”

Special lecture on “*Application of Statistical Techniques in Geographical Study*” was held in the Department of Geography on 21.09.2023. Prof. (Dr.) F. A. Siddiqui, Former Chairperson, Department of Geography, Aligarh Muslim University, Aligarh was the chief speaker. Prof. (Dr.) Md. Nazim, Head Department of Geography, Patna University welcomed the guest and speaker. The lecture was attended by all teachers, Guest faculties and student.

PATLIPUTRA UNIVERSITY, PATNA

1. World Population Day was celebrated on 11th July 2023-with a special lecture by Dr Smriti Sparsh on the topic-“Uplifting the Voices of Women and Girls to Unlock our World's Infinite Possibilities” by Department of Geography at College of commerce Arts and Science (COCAS), Patna
2. World Earth Day on 22nd April 2023, World Nature Conservation day on 28th July World Environment Health Day on 26th September and Mega Plantation Drive in collaboration with LIC, Head Office, Patna was celebrated by Department of Geography at COCAS, Patna
3. A special invited lecture on the topic “Geographical Toponyms of Patna”, was delivered by Prof. L.N Ram, Former Vice Chancellor on 6th Oct. 2023 in the Department of Geography at A.N. College, Patna.
4. A Nukad Natak was enacted to mark Ozone Day celebration on 16th Sept. 2023 in the Department of Geography at A.N. College, Patna.
5. Dr Manoj Kumar joined as Head, University Department of Geography. Patliputra University Patna on 1st September 2023.
6. Dr Gaurav Sikka and Smt. Jagriti Prabhat joined as Assistant Professor in the Department of Geography, A.N College Patna.
7. The following guest faculty teachers joined in different colleges of Patliputra University Patna:-Dr Ranjit Kumar Dr. Lakshmi Kant, Dr Mukul Kumar, Dr Manoj Kumar, Dr Kalindi Prabha, Dr Iffat Nasreen, Dr Anita Singh, Dr Anil Kumar Akela, Dr Vijay Mistry, Dr Monika Kumari, Dr Amar Kumar, Dr Shweta.
8. Dr Naveen Kumar Sinha and Dr Ram Lagan Prasad superannuated on 31st Dec. 2022 and 30th June 2023 respectively.
9. Dr Vidya Yadav got Short Term Empirical Research Project entitled “Deendayal Antyodaya Yojna (DAY) Utilization by Urban Homeless: A Study in Selected areas of Bihar, Sponsored by ICSSR.
10. Dr Anoop Kumar Singh and Dr Vidya Yadav were short listed as subject expert for preparing the syllabus of four-year undergraduate course of Bachelor of Arts under CBCS system at Raj Bhavan Bihar from 18 to 21st September, 2023.

P.G. Department of Geography, A.N. College, Patna

Seminar/ Symposium/ Workshop/ Special lecture held at Department:

- a. A 5-day training program on Introduction to an Integrated Platform for GIS Image Processing, and Photogrammetry, in the department on April 24-29, 2023.

Geographical Perspective

- b. A lecture on "Geographical Toponyms of Patna" was delivered by Prof. Laxmi Niwas Ram, former V.C. Patna University on 6th Oct'2023.

Faculty Profile (old/Transferred/Guest faculty):

1. Dr Vinita Prasad, resumed charge of Head of the Department, Geography on 01.10.2022.

Transfer and Joining of Teachers

Sl. No.	Name of faculty	Date of Joining	Nature of Transfer	Name of University
1.	Dr Gaurav Sikka	02.02.2023	Inter University	L.N. Mithila University, Darbhanga
2.	Jagriti Prabhat	13.07.2023	Inter University	T N B College, TMBU, Bhagalpur

Guest Faculty:

1. Dr Iffat Nasreen: Joined in October 2022 and transferred to College of Commerce in July 2023.
2. Dr Shweta Kumari: Joined in November 2022.

Teachers/ Saff who retired:

1. Prof. Nupur Bose retired on 30.09.2022.
2. Prof. Poornima Shekhar retired (Posthumous) on 31.03.2023.
3. Dr Subhas Kumar Singh (Demonstrator) retired on 31.07.2022.

Demise of Teachers

1. Professor Poornima Shekhar Singh (on lien) was Director, Centre for Geographical Studies, Aryabhata Knowledge University, who left for heavenly abode on 18 January, 2023.
2. Razi Hassan, also departed for heavenly abode.

Publications by teachers/ scholars:

Sl. No.	Name of faculty	Publication details
1.	Dr Vinita Prasad	<p>1. "Role of Traditional and Indigenous Knowledge in Disaster Management", published in Indigenous Knowledge and Disaster Risk Reduction, Disaster Risk Reduction, G. K. Panda et al. (eds.), Springer Nature Switzerland</p> <p>2. "Urban Sustainability: The Way Forward", published in Uday Chatterjee et al. (Eds): Urban Environment and Smart Cities in Asian Countries, Springer Nature Switzerland AG 2023.</p> <p>3. "Sustainable Urban Waste Management: Patna, A Case Study" published in UGC Care listed Bi-annual Journal, "South India Journal of Social Sciences", Vol. XX, No. 05, July-December' 2022.</p>

		<p>4. "Covid-19 and Livelihood Issues" published in peer reviewed research Journal "Vishleshan" (Rani Durgavati University, Jabalpur, M.P., India) Vol. 19 (2022).</p> <p>5. "Strategies for Sustainable Industrial Development: A Case Study of Arwal District", published in Geographical Perspective of Geographers, Bihar and Jharkhand, an annual bilingual Peer reviewed Journal, Vol, 23, October 2022.</p>
2.	Dr Bhawana Nigam	<p>1. Urban sprawl and its impact on the human environment: A case study of Patna urban agglomeration, Bihar, SOUTH INDIA JOURNAL OF SOCIAL SCIENCES, p.p. 26-35, Vol. XX., No.7, July -December 2022.</p> <p>2. An Analysis of Climate Change and Sustainable Development Programs in Bihar, International Center for Scientific Research and Development p.p..01-14, Volume 01, Issue 01 (2023).</p> <p>3. Challenges of Rural Handicrafts Industry in Bihar: A Case Study of Brass Industry of Parev (Bihita, District Patna), Geographical Perspective Annual Bilingual, p.p..88-93, volume-23, October-2022, by the Association of Geographers, Bihar and Jharkhand.</p>
3.	Dr Gaurav Sikka	<p>1. Putting 'Gender' First in Resettlement Planning: Lessons From Sardar Sarovar Project Resettlement and Rehabilitation, Geographical Perspective, Association of Geographers Bihar and Jharkhand, Vol. 23, pp. 54-65, October 2022.</p>
4.	Jagriti Prabhat	<p>1. "Geographical study of Smart Management" of Muzaffarpur City: A case study in 'Matadarsh', Year 15, Vol 1: Jan – March, 2023 [ISSN- 0974 - 9800]</p> <p>2. "Functional Classification of Muzaffarpur Town: A geographical study", In 'Beyond Disciplines', Vol 7, Number 1-2 (2022) [ISSN- 2250-3420]</p>

Other:

1. Presentation of research paper titled "Equitable access to "safe" water: A geographical critique of rural water schemes in the flood plains of Bihar, India" at the Royal Geographical Society (with IBG) Annual International Conference, Imperial College, London by **Prof. Nupur Bose**.
2. Academic Excellence Award 2023, by Institutes of Scholars and Academicians, Kolkata India, was conferred to **Dr Vinita Prasad**, P G Department of Geography, A. N. College, Patna.
3. Paper titled 'Adaption to climate change and sustainability: a case study of women in Agriculture in Bihar' was presented in Annual International Conference of the Royal Geographical Society (with the Institute of British Geographers). 29 August- 1 September 2023, London, U.K., by **Dr Bhawana Nigam**.
4. Delivered an invited lecture as a resource person on "Collecting, Analyzing, and Sharing Qualitative Research Data" at National Seminar organized by S.U. College, Hilsa, Patliputra University on 14th September 2023, By **Gaurav Sikka**.

Research Projects:

1. August, 2023:- Completion and submission of final report on the 6-nation project on

Geographical Perspective

"Nature-based Solutions for Water Management in the Peri-Urban: Linking Ecological, Social and Economic Dimensions" (Project NATWIP), funded by EU's Water JPI initiative, 2018 Joint Call. This was a 3-year Social Sciences Project by Prof. Nupur Bose (Retired), Principal investigator, India and team.

2. National Institute of Health Research, UK-funded 5-year bilateral project with University of Birmingham, States of Kerala and Bihar, and A.N.College and Mahavir Cancer Sansthan & Research Institute, Patna has just been initially approved by UK. Prof Nupur Bose is Collaborator to work on 2 work packages from Bihar.

C. Extra-curricular activities

1. Best out of Waste model competition was held on the occasion of the World Conservation Day, on 5th December'2022.
2. A poster competition for B A semester I students was organized on the topic of Importance of Bio-fuels, 10th August'2023 to celebrate Bio-fuel day in the Department of Geography, AN College, Patna.
3. A poster competition for B A II geography (Hons.) was organized on 21th August'2023 to celebrate Akshay Urja Divas in the Department of Geography, AN College, Patna.
4. A Nukad Natak was enacted to mark Ozone Day Celebration on 16.09.2023 by M A Semester III and BA Semester I students in the Department of Geography, A N College, Patna.

RANCHI UNIVERSITY, RANCHI

1. Preparation of New Syllabus for UG/PG Geography under NEP 2020. The new syllabus was prepared by the teachers of the Department of Geography, R.U. In this regard a meeting of Heads of Departments of Geography of Different Universities along with teachers of Ranchi University was held. The syllabus under NEP framed was approved and implemented by Ranchi University.
2. Assistant Professor in the different Colleges was appointed by the Jharkhand Public Service Commission for Geography. 14 Assistant Professors under backlog and 38 in regular mode was appointed in the different Universities of Jharkhand.
3. Dr. Jagdish Kumar Mahto transferred from P.G. Dept. of Geography to J.N. College Dhurwa and Miss. Mary Shalini Pushpa Kerketta appointed as Head in the University Dept. of Geography transferring from the RWC Ranchi in the month of July 2023.
4. Prof. (Dr.) Jitendra Shukla appointed as University Professor by JPSC and became HOD, Geography NPU and Dean Faculty Social Science, Dean Faculty Education and Humanities. He however, did not continue and returned back to University Department of Geography, Ranchi University.
5. Participation of Teachers and Research Scholars in Seminar: -
 - Prof. (Dr.) Jitendra Shukla participated in the Annual Conference and National Seminar of Association of Geographers of Bihar and Jharkhand (AGBJ) held in S.B. College Ara. Some Contract teachers and Research Scholars also participated in the Seminar.
 - IGU international Conference (Mahendragarh, Haryana): Prof.(Dr.) Jitendra Shukla and one UGC (SRF) participated and Presented research paper in the Seminar of international Geographical Union at Mahendragarh, Haryana.
 - Prof.(Dr.) Jitendra Shukla, Two Contractual teacher Ravi Kumar and Srikant Kumar 10 research Scholar participated in the International Seminar of INCA held in the month of November 2023 at Dehradun organised by NHO. Dr. Shukla presented paper and also chaired technical session.
6. 24th Foundation Day Lecture of AGBJ was organised by the University Dept. of Geography on 26th April 2023. All the executive body members were present. Prof. (Dr.) RBP Singh delivered Special Lecture on this occasion.
7. XXIV Annual Conference and National Seminar is going to be held on 4th and 5th November 2023 in the University Dept. of Geography R.U.
8. 35 Candidates enrolled in Geography for Ph. D research work under Teachers of different College of Ranchi University, Ranchi.

L. N. MITHILA UNIVERSITY, DARBHANGA

1. 12th Annual conference of MAG on “Impact of climatic change on socio-economic milieu of Mithila Region” at M L S M College, Darbhanga under the convenorship of Dr. V. N. Jha.
2. Dr. V.N. Jha, Sri Sonu Kumar Das & Ms Kumari Kshipra attended the AGBJ conference on 9-10 Nov. 2022 at Arah.
3. Dr. V.N. Jha took the charge of Headship on 1st Feb, 2023 from Dr. Santosh Kumar.
4. Dr. Santosh Kumar retired from the Dept. on 28th Feb 2023.
5. Dr. Sunil Kumar Singh joined the Dept. on March 2023 on deputation, from G. D. College, Begusarai.
6. Mr. Sonu Kumar Das, Research Scholar has been selected for SRF (Senior Research Fellowship) on May 2023.
7. Dr. Anuranjan delivered the lecture on “Environmental Pollution” as resource person at Mahatma Gandhi College, Darbhanga in National Seminar on 4th April 2023.
8. Dr. V. N. Jha delivered the lecture on “Environmental Pollution” as resource person at Mahatma Gandhi College, Darbhanga in National Seminar on 4th April 2023.
9. Dr. V. N. Jha and Dr. Anuranjan gave the invited lecture "Agriculture & Food Security in India" at V.S.J. College, Rajnagar, Madhubani on 25th April 2023.
10. An educational trip of M.A. IVth sem students (2020-22) led by Dr. Anurajan & Dr. R. Shikha visited Nalanda & Rajgir on 9-10 Dec 2022.
11. An educational trip of M.A. IVth sem students (2021-23) led by Dr. M.R. Sharma & Dr. R. Shikha visited Nalanda & Rajgir on 4-5 oct 2023.
12. Nine Research scholars were admitted in the Dept. for Research Methodology coursework in PAT 2021-22 result.

VINOBA BHAVE UNIVERSITY, HAZARIBAG

Seminar (24 May 2023):

On the occasion of the World Environment Day the Department had organised a seminar on the theme “Our Environment vs Our Lifestyle” under Mission LiFE Campaign. In which the main speaker was Dr. Tanveer Alam, Chemist, State Geological Laboratory, Jharkhand. This seminar was also enlightened by the views of Hon'ble Vice-Chancellor, Dr. Mukul Narayan Deo, VBU, Hazaribag and Dr. Saroj Kumar Singh, HOD, Dept. of Geography, VBU, Hazaribag. In this seminar students presented their views through PPT on newly installed Digital Smart Board in the Department.

Teacher-Parent Meet

As a healthy academic activity Department had organised a Teacher-Parent Meeting on 06 May 2023 in the department where parents shared their suggestion for improvement of academic activities.

Study Tour

Educational Tour is an important part of Geographical study. Department had organised a one day tour to Birsa Biological Park, Ranchi and Patratu Dam & Damodar Valley, Ramgarh on 19 January 2023.

Research Papers Published by the Teachers and Research Scholar:

- Verma, T., & Singh, S. (2022), *Impact of Urbanisation on the Sustainability of Land Resource Utilisation in Koderma District of Jharkhand* – AMOGHVARTA, ISSN: 2583-0775(P), 2583-3189 (E), December 2022 to February 2023, Vol- 02.
- Kumar, P., & Singh, S. (2022), *Agriculture as a Source of Livelihood and its Challenges of Sustainability among Bangladeshi Hindu Refugee Communities in West Champaran District of Bihar* – AMOGHVARTA, ISSN: 2583-0775(P), 2583-3189 (E), December 2022 to February 2023, Vol- 02.
- Oraon, B., & Singh, S. (2022), *चुरचू ब्लॉक में जनजातियों के शैक्षिक विकास पर सामाजिक आर्थिक प्रभाव* – AMOGHVARTA, ISSN: 2583-0775(P), 2583-3189 (E), September 2022 to November 2022.
- Verma, T., & Singh, S. (2023), *Trend and Pattern of Out-migration in Koderma District of Jharkhand During 2001-2011* - SHODH SAMAGAM, ISSN 2582-1792 (P), 2581-6918 (E), January 2023 to March 2023, Vol- 04.
- Rana, J., & Singh, S. (2023), *पारिस्थितिक पर्यटन केन्द्रों के विकास से प्रवाजन पर प्रभाव की संभावना: एक भौगोलिक विश्लेषण (हजारीबाग जिले के बड़कागाँव प्रखण्ड के विशेष संदर्भ में)* & SHODH SAMAGAM, ISSN 2582-1792 (P), 2581-6918 (E), January 2023 to March 2023, Vol- 04.
- Kumar, S., & Singh, S. (2023), *Rural-Urban Migration and its Consequences: A Case Study of Chatra District, Jharkhand* – SHODH SAMAGAM, ISSN 2582-1792 (P), 2581-6918 (E), January 2023 to March 2023, Vol- 04.

B.R.A. BIHAR UNIVERSITY, MUZAFFARPUR

List of Guest Faculties

- Three Guest Faculties are engaged in the University Department of Geography:

S.N.	Name of the Guest Faculties
1.	Dr. Alpna Jyoti
2.	Dr. Neelambari Gupta
3.	Dr. Rajeshwar Rai

➤ **Achievements of the Head of the Department:**

Prof. (Dr.) Ram Pravesh Yadav, Head of the University P.G. Department of Geography, B.R.A. Bihar University, Muzaffarpur was awarded Dr. Sarwapalli Radha Krishnan National Teachers Award on Oct., 2022.

➤ **Member of Syndicate, Senate and Academic Council :**

Prof. (Dr.) Ram Pravesh Yadav, Head, completed his tenure as a member of Syndicate, Senate and Academic Council, BRA Bihar University, Muzaffarpur in the month of September and December, 2022.

- Dr. Alpna Jyoti published her book on Geomorphology entitled “Quantitative Geomorphology” in Nov., 2022.
- Dr. Rajeshwar Roy published his book on population Geography entitled “Jansankhya Bhugol : Madhubani zila ke sandarbh mein Jan., 2023.

Academic Achievement of the Department :

'Certificate of Appreciation'.

- **Lecture in Integrated Social Science Refresher Course organized by HRDC:**
Dr. Ram Pravesh Yadav delivered his lecture on the topic “Holistic Model of Development: An Emerging Concept' in the integrated Refresher Course of Social Science in April, 2023.
- He also delivered his second lecture in the Orientation Course organised by HRDC, Muzaffarpur.

Ph. D. Degree Awarded

(From October, 2022 to September, 2023)

Patna University, Patna

Sl. No.	Name of Scholar	Topic of Thesis	Name of Supervisor
1.	Shruti Goswami	“Changing Pattern of Female Literacy in Saran District of Bihar (1981-2011)”	Dr. Sister Maria Rashmi A.C.
2.	Sarita	“जनसंख्या के प्रारूप में परिवर्तन (1971-2011): पटना जिले का एक भौगोलिक अध्ययन”	Dr. Manoj Kumar Sinha
3.	Mrinalani Priya	“Flood and its Socio – Economic Impact- A Geographical Study Of Kosi Flood Plain”	Prof. K. N. Paswan
4.	Amit Ranjan Biraji	“Population Growth and Food Security in Araria District of Bihar (1991 -2011): A Geographical Study”	Prof. Md. Nazim
5.	Rahul Morya	"बिहार के पश्चिम चम्पारण जिला में बदलते भूमि-उपयोग का कृषि प्रारूप पर प्रभाव : एक भौगोलिक अध्ययन (1991-2011)"	Prof. Md. Nazim
6.	Rakesh Kumar	“पटना जिला के मलिन बस्तियों का भौगोलिक अध्ययन”	Dr. Manoj Kumar Sinha
7.	Vidya Lala	"Challenges in the Development of Smart City in Bihar: A Case Study of Bihar Sharif”	Prof. Anuradha Sahay
8.	Saba Naz	“मुस्लिम महिलाओं के शैक्षणिक स्तर एवं व्यवसायिक प्रारूप में परिवर्तन- फुलवारी शरीफ़ प्रखंड का एक भौगोलिक अध्ययन”.	Prof. Md. Nazim
9.	Prity Rani	“Socio-Economic Conditions of Female Workers in Agriculture: A Case Study of Bihar Sharif Sub -Division, Nalanda (Bihar)”	Prof. Anuradha Sahay
10.	Shipra Soni	“Impact of Flood on the Landscape Of North Bihar: A Study in Applied Geomorphology”	Prof. R. B. P. Singh

Ranchi University

Sl.No.	Name of Scholars	Topic of Thesis	Name of Supervisor
1	Moushmi	Environmental impact of Coal mining in North karanpura Coalfield Project (NKP) Area: Jharkhand	Dr. J. Shukla
2	Pratibha Singh	कैमूर जिले में कृषि भूमि उपयोग कि समस्याएँ एवं समाधान	Jayshree Sahdeo
3	MadhumitaKumari	Function of Urban Fringe of Ranchi City.	Dr. Shiv Kumar
4	TabassumAra	राँची जिला में जनसंख्या : एक भौगोलिक अध्ययन	Dr. Anita Sinha
5	Indrabhushan Pandey	राँची नगरीय क्षेत्र कि वर्तमान जनसंख्या एवं अधिवासिय समस्याएँ	Dr. G. K. Singh
6	Rajshree Das	Urbanization and its Temporal Pressure on Land Resource (A Case Study of Ranchi City).	Dr. R.R. Srivastava
7	JyotsanaRoseline Ekka	Forest Degradation and Reclamation of the Forest and Forest Land - A Case Study of South Chotanagpur Division.	Dr. D. Roy
8	LochnaKoirala	Levels of Regional Development and Planning in south Chotanagpur Division.	Dr. R.R. Srivastava
9	Sanjay Dutta	Human Activities and Their Impact on Wetlands: A Case Study on ChatraBeel, English Bazar Block, Malda District, West Bangal India.	Dr. D. Roy
10	Sarita Kumari	महली जनजाति की सामाजिक आर्थिक समस्याएँ एवं विकास : दक्षिण छोटानागपुर प्रमंडल के सन्दर्भ में एक भौगोलिक अध्ययन	Dr. N. K. Mahto
11	Poonam Mehta	धनबाद जिला में कोयला उत्खनन का पर्यावरणीय प्रभाव : एक भौगोलिक विश्लेषण	Dr. Shashikanta Toppo

J.P. University, Chapra.

Sl. No.	Name of Scholar	Topic of Thesis	Name of Supervisor
1	YOGENDRA ROY	“सिवान जिला में जनसंख्या पर्यावरण एवं सतत् विकास : एक भौगोलिक अध्ययन”	Prof. BIRENDRA KUMAR, P.G. DEPARTMENT OF GEOGRAPHY, J.P.U., CHAPRA.
2	AJIT KUMAR	“PATTERN OF RURAL DEVELOPMENT IN PANCHAYATI RAJ SYSTEM : A GEOGRAPHICAL STUDY OF SIWAN DISTRICT”	DR. KALIM GAFFAR MIAN, ASSOCIATE PROF. ZAIC SIWAN, J.P.U., CHAPRA.
3	ANAND KUMAR	“गोपालगंज जिले के सामाजिक आर्थिक स्थिति पर गंडक नदी का प्रभाव : एक भौगोलिक अध्ययन”	Prof. BIRENDRA KUMAR, P.G. DEPARTMENT OF GEOGRAPHY, J.P.U., CHAPRA.
4	VINAY KUMAR SINGH	“सारण जिला के ग्रामीण अधिवासों का भौगोलिक अध्ययन”	Prof. BIRENDRA KUMAR, P.G. DEPARTMENT OF GEOGRAPHY, J.P.U., CHAPRA.
5	SHAILENDRA MALAKAR	“छपरा नगर का सतत् विकास : एक भौगोलिक अध्ययन”	Prof. SANJAY KUMAR, HEAD, DEPT. OF GEOGRAPHY, RAJENDRA COLLEGE, CHAPRA.
6	REKHA KUMARI	“सारण जिला में आधुनिक तकनीक से सब्जियों के उत्पादन की संभावनाएँ एवं समस्याएँ : एक भौगोलिक अवलोकन”	DR. BASUDEV PRASAD ASSOCIATE. PROF., J.J. COLLEGE, GAYA, MAGADH UNIVERSITY BODH GAYA.
7	SARBJEET KUMAR	“ENVIRONMENTAL AWARENESS AMONG RURAL -URBAN PEOPLE : A GEOGRAPHICAL ANALYSIS OF SARAN DISTRICT”	DR. KALIM GAFFAR MIAN, ASSOCIATE P rof. ZAIC SIWAN, J.P.U., CHAPRA.
8	RUBI KUMARI	“पिछड़े क्षेत्र में सतत् विकास की योजनाएँ : गोपालगंज जिला का एक भौगोलिक अध्ययन”	Prof. SANJAY KUMAR HEAD, DEPT. OF GEOGRAPHY, RAJENDRA COLLEGE, CHAPRA.
9	VIKASH KUMAR PANDEY	“गोपालगंज जिले के विकास में सेवा केन्द्रों की बदलती भूमिका का एक भौगोलिक अध्ययन”	Prof. USHA SINGH , HEAD, P.G. DEPARTMENT OF GEOGRAPHY, J.P.U., CHAPRA.
10	PRABHAT KUMAR	“PLANING AND PROCESS FOR POVERTY ERADICATION : A GEOGRAPHICAL ANALYSIS OF ROHTAS DISTRICT”	DR. KALIM GAFFAR MIAN, ASSOCIATE P rof. ZAIC SIWAN, J.P.U., CHAPRA.

Tilkamanjhi Bhagalpur University, Bhagalpur

Sl. No.	Name of Scholar	Topic of Thesis	Name of Supervisor
1	Binod Kr. Singh	Changes in Agricultural Landuse of Diara Lands Bhagalpur District, Bihar	Dr. Manoj Kumar Jha (Rtd.)
2	Manisha Kumari	कटिहार जिला, बिहार में कृषि के परिवर्तनशील स्वरूप का भौगोलिक अध्ययन	Dr. Aniruddh Kumar
3	Gaurav Kumar	सामाजिक, आर्थिक प्रगति में ग्रामीण विकास कार्यक्रमों एवं योगनाओं की भूमिका: बांका जिला (बिहार) के संदर्भ में भौगोलिक विश्लेषण	Prof. Sharat Chandra Mandal (Rtd)
4	Puja Kumari	गोड्डा जिला (झारखंड) के अनुसूचित जनजाति एवं अनुसूचित जाति के महिलाओं के शैक्षिक एवं व्यवसायिक संरचना का स्थानिक एवं कालिक विश्लेषण	Prof. Ram Nivas Pandey (Rtd)
5	Mihir Kr. Singh	Poverty alleviation programme and its impact on socio-economic milieu in Murshidabad District (West Bengal)	Prof. (Dr.) Sanjay Kumar Jha (Dean S.Sc)
6	Manujendra Kumar	पर्यटन विकास एवं नियोजन : भागलपुर तथा मुर्गैर प्रमंडल के संदर्भ में भौगोलिक अध्ययन	Prof. (Dr.) Sanjay Kumar Jha (Dean S.Sc)
7	Rampravesh Choudhary	बांका जिला, बिहार में जनाकिकीय विशेषताओं का भौगोलिक अध्ययन	Prof. (Dr.) Sanjay Kumar Jha (Dean S.Sc)
8	Amarnath Jha	Impact of Literacy on Socio-Economic development in Katihhaar District (Bihar) A Geographical Analysis	Prof. (Dr.) Sanjay Kumar Jha (Dean S.Sc)
9	Subrata Roy	A Geographical study of Potentials, Problems and Planning of Rural Tourism for Sustainable future in the Doars Region, West Bengal (India)	Prof. Sharat Chandra Mandal (Rtd)
10	Bipin Kumar Gupta	सक्षरता का स्थानिक-कालिक प्रतिरूप : कटिहार जिला (बिहार) के संदर्भ में भौगोलिक अध्ययन	Prof. Sharat Chandra Mandal (Rtd)
11	Md Imran Ali	Sustainable Agricultural development in Dakshin Denajpur District (W.B.) : A Geographical Analysis	Dr. Uma Shankar Pandit (Rtd)
12	Tapan Mandal	Modernisation of Agriculture in Murshidabad District, (W.B.) : A Geogrphical Analysis	Dr. Uma Shankar Pandit (Rtd)

University Department of Geography, VBU, Hazaribag

SL.No.	NAME OF THE Ph.D. SCHOLAR	DATE OF AWARD OF Ph.D.	NAME OF THE TOPIC	NAME OF THE SUPERVISOR
1	Dr. Pant Prakash Mehta , Assistant Professor, St. Collumba's College, Hazaribag.	20/01/2023	Spatio-Temporal Variation in Socio- Economic of Scheduled Castes in Hazaribag district during 1951-2011- A Geographical Analysis	Dr. O. P. Mahto
2	Dr. Aparna Ghosh, Former Guest Teacher, University Department of Geography, VBU, Hazaribag.	04/09/2023	Spatio- Temporal Study of Patterns of Literacy Differentials in Hazaribag District of Jharkhand during 1981-2011	Dr. Saroj Kumar Singh

Bhupendra Narayan Mandal University, Madhepura

Sl.No.	Name of Scholars	Topic of Thesis	Name of Supervisor
1	Dr. Kumar Gauraw	Changing Land Use Pattern in Kosi Division and its Impact on Rural Economy	Dr. Bhagwat Prasad Yadav
2	Dr. Bal Krishna Prasad	कोसी का मार्ग परिवर्तन का उच्चावचन, प्रवाहलंत्र एवं अर्थव्यवस्था का प्रभाव का भौगोलिक अध्ययन	Dr. Bhagwat Prasad Yadav
3	Dr. Suman Chandra Das	Spatial Variation of Urban Amenities in the Development of Katihar District	Dr. Bhagwat Prasad Yadav
4	Dr. Subodh Kumar Mishra	उत्तर बिहार के मानव संसाधन में साक्षरता एवं लिंगानुपात के बदलते स्वरूप में भौगोलिक अध्ययन	Dr. Deo Kant Chaudhary
5	Dr. Nishant Ketu	Spatial and Temporal Analysis of changing Agricultural Land Use and Probability of Agro-Based Industries in Kosi Plain	Dr. Ganesh Prasad

B.R.A. Bihar University, Muzaffarpur

Awarded Ph.D. Degree in Geography to the following Research Scholars under the supervision of different Supervisors.

S.N.	Name of Research Scholar	Title of the Research	Name of Supervisor
1.	Shambhu Saran Srivastava	५० चम्पारण जिला में मतस्य उद्योग के विकास की सम्भावनाओं का भौगोलिक का अध्ययन।	Prof. (Dr.) Ram Pravesh Yadav. Head, Univ. P.G. Deptt. of Geography, B.R.A. Bihar University, Muzaffarpur
2.	Dharmesh Nanda	महादलित की सामाजिक-आर्थिक दशा में परिवर्तन के भौगोलिक आयाम : ५० चम्पारण जिला के सन्दर्भ में।	Dr. Kare Lal Manjhi, Retd. Ex-Head, Univ. P.G. Deptt. of Geography, B.R.A. Bihar University, Muzaffarpur
3.	Sanoj Kumar	A Geomorphoc Study of Bagmati Drainage Basin in Muzaffarpur District.	Dr. Kare Lal Manjhi, Retd. Ex-Head, Univ. P.G. Deptt. of Geography, B.R.A. Bihar University, Muzaffarpur
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Sl. No.	Venue	President	Presided over	Convener	General Secretary	Treasurer	Date	Remarks
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2.	Patna University Patna	Prof. L. N. Ram	Prof. L. N. Ram	Prof. G. P. Jha	Prof. R. B. P. Singh	Prof. D. P. Singh	23-24 Nov., 1999	1st Annual Conference
3.	B. R. A. Bihar Univ. Muzaffarpur	Prof. L. C. C. N. Sahdeo	Prof. L. N. Ram	Prof. B. P. Mishra	Prof. R. B. P. Singh	Prof. D. P. Singh	17-18 March, 2001	2nd Annual Conference
4.	Magadh Univ. Bodh Gaya	Prof. L. N. Ram	Prof. L. N. Ram	Prof. M. Prasad	Prof. R. B. P. Singh	Prof. D. P. Singh	16-17 March, 2002	3rd Annual Conference
5.	Rajendra College, Chapra (J. P. Unit)	Prof. R. N. P. Sinha	Prof. R. N. P. Sinha	Prof. B. L. Sinha	Prof. R. B. P. Singh	Prof. D. P. Singh	4-5 Dec., 2003	4th Annual Conference
6.	T. M. Bhagalpur Univ., Bhagalpur	Prof. V. N. P. Sinha	Prof. V. N. P. Sinha	Prof. R. B. Mandal	Prof. R. B. P. Singh	Prof. D. P. Singh	18-19 Oct., 2004	5th Annual Conference
7.	Vinoba Bhave Univ., Hazaribag	Prof. R. Gauntia	Prof. R. Gauntia	Dr. Kamla Prasad	Prof. R. B. P. Singh	Prof. D. P. Singh	9-10 Oct., 2005	6th Annual Conference
8.	V. K. S. University Ara	Prof. S. N. Prasad	Prof. S. N. Prasad	Prof. B. K. Singh	Prof. K. N. Paswan	Prof. Md. Ataullah	27-28 Dec., 2006	7th Annual Conference

9.	M. J. K. College, Bettiah (BRA Bihar)	Prof. Bahura Ekka	Prof. Rana Pratap	Dr. B. N. Choubey	Prof. K. N. Paswan	Dr. Md. Ataullah	3 - 4 Feb., 2007	8th Annual Conference
10.	Nalanda Open Univ., Patna	Prof. Rana Pratap	Prof. Rana Pratap	Prof. R. B. P. Singh	Prof. K. N. Paswan	Dr. Md. Ataullah	9 - 10 Dec., 2007	9th Annual Conference
11.	Magadh University Bodh Gaya	Prof. N. Sharma	Prof. N. Sharma	Prof. Rana Pratap	Prof. K. N. Paswan	Dr. Md. Ataullah	6 - 7 Dec., 2008	10th Annual Conference
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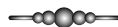
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