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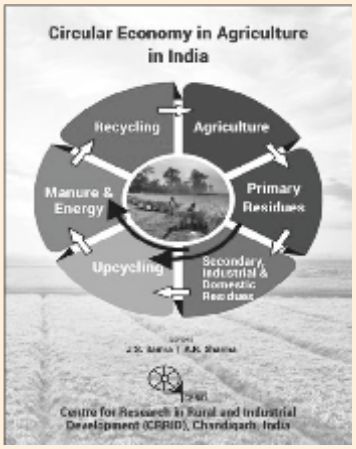
CIRCULAR ECONOMY IN AGRICULTURE IN INDIA

Editors

J. S. Samra and A. R. Sharma



This book presents a comprehensive assessment of the socio-economic transformations brought about by recycling the agriculture residue in India. It highlights strengthening of rural livelihoods, inclusive development, energy security and environmental sustainability. The volume examines policy interventions, institutional mechanisms, technological innovations and community participation in renewable energy adoption. It also discusses challenges related to implementation, financing, infrastructure and capacity building while offering practical recommendations for future actions. The book serves as a valuable resource for researchers, policymakers, development practitioners, students and all stakeholders working towards sustainable development.

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Editorial Note

This issue of Man & Development (Vol. XLV, No. 1, March 2023) brings together five papers spanning macroeconomics, trade policy, regional development, public health, and psychology, reflecting the journal's continuing commitment to interdisciplinary social science scholarship.

The issue opens with Maninder Kaur's re-examination of the energy-growth nexus in India. Using bivariate and multivariate time-series techniques on data from 1991 to 2019, the paper shows that the relationship between energy use and economic growth is sensitive to model specification, and draws out the policy implications for India's pursuit of sustainable electricity generation.

Meenakshi Mritunjay and Ranjit Singh follow with a study of tariffs, MSME credit, and manufacturing performance in India over 2008-2024. Employing the ARDL bounds testing approach, they find that institutional credit availability contributes more robustly to manufacturing growth than tariff protection, a timely empirical counterpoint to current trade-policy debates.

Sanjeev Kumar, Sanjay Kumar, and Diksha Kumari turn to the sub-regional level, examining socio-economic inequality across villages in Bharmour block, Himachal Pradesh, between 1991 and 2011. Using Composite Principal Component Analysis and Moran's I, they document a gradual narrowing of inter-village disparities alongside an emerging spatial clustering of development.

Pawan Kumar Sharma and Neetu Gaur examine the rising burden of non-communicable disease in Punjab, drawing on NFHS-4 and NFHS-5 data to track sharp increases in obesity, hypertension, and elevated blood glucose across the state's 22 districts. Their findings underline the urgency of preventive and district-level public health strategies.

The issue closes with Komila Parthi's psychological study of driving anger, aggression, and locus of control among licensed drivers. Comparing younger and middle-aged adults, the paper finds that anger and aggression while driving rise with age, while younger drivers report a stronger sense of internal control, a finding with direct relevance for road-safety interventions.

Together, these papers illustrate the range of methods and concerns that continue to animate the study of development in India, from macro-level policy analysis to the everyday psychology of the road.

Editor

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REVISITING THE ENERGY-GROWTH NEXUS IN INDIA: A COMPARATIVE BIVARIATE AND MULTIVARIATE TIME-SERIES ANALYSIS WITH POLICY IMPLICATIONS

Maninder Kaur[1]

Abstract: Energy is considered one of the crucial factors contributing towards economic growth. The paper examines the empirical relationship between economic growth and energy use in India using annual data covering the period from 1991 to 2019. Bivariate and multivariate analyses have been performed, since energy is one of the important inputs in the production process along with capital and labour. The Augmented Dickey-Fuller test and Phillips-Perron test revealed that all the series, after logarithmic transformation, are non-stationary and individually integrated of order one. The study performed the Johansen cointegration test to identify long-run relationships, Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) for short-run relationships (on the basis of cointegration results), and residual diagnostic tests for autocorrelation, heteroscedasticity, and normality for both the bivariate and multivariate models. Pair-wise Granger causality tests were also conducted to examine the causal relationship between the selected variables.

In the bivariate analysis, neither a long-run relationship nor a causal relationship was found between Gross Domestic Product per capita (GDPPC) and per capita power consumption (PCPC). In the multivariate analysis, the trace statistic showed a long-run relationship among the variables. The coefficient on Energy Generated (EG) was positive but insignificant, while Gross Capital Formation (GCF) had a positive and significant impact on GDP. Moreover, the coefficient of the first difference of EG lagged one period in the GDP equation indicates short-run unidirectional causality.

The study identifies important policy implications: due to the scarcity of energy resources, India needs to focus on the development of sustainable modes of electricity

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production to achieve high economic growth in the years to come. Thus, the study provides a methodological and policy-oriented re-examination of the energy-growth nexus in India by demonstrating the sensitivity of results to model specification.

Keywords: Economic growth, Energy sector, Stationarity, Vector Autoregressive model, Vector Error Correction Model, Granger causality.

JEL codes: O4, C22, C32, Q43

1. Introduction

Energy is considered a crucial component of infrastructure and a key driver of economic growth because almost all production and consumption activities use energy as a basic input. The existence and development of adequate energy supplies are essential for sustained economic growth and the welfare of the nation. Together with capital, labour, and technology, energy is regarded as a fundamental input in the production process. According to Barney and Franzi (2002), energy accounts for less than a tenth of production costs yet at least half of industrial growth in a modern economy. Any energy shortage will have a detrimental impact on economic growth, since a steady supply of energy is needed to sustain and enhance the current levels of industrial activity. A country can only attain a given degree of economic growth by consuming a specific amount of energy. It seems impossible to manufacture goods and services in the modern world without a sufficient supply of energy (IAEA, 2009).

Likewise, a nation's level of energy consumption may be impacted by its economic growth. Over the past 20 years, there has been a notable global increase in energy use. By 2040, the world's energy consumption is expected to increase by almost 48 per cent, with fossil fuels continuing to dominate the energy mix (International Energy Outlook, 2016). In this context, academics and policymakers are highly interested in understanding how energy conservation programs affect economic growth. In addition, public concerns about greenhouse gas emissions, global warming, and their consequences are growing. Therefore, policymakers must have a thorough understanding of the relationship between energy consumption and economic growth in order to design effective energy regulations (Shastri et. al., 2020).

India's demand for electricity has been rising rapidly, and this trend is expected to continue in the coming years. However, due to insufficient fuel supply and limited power generation and transmission capacity, the country faces chronic electricity shortages. Consequently, infrastructure and energy investment have been a major policy focus in India, as the development of adequate power and energy infrastructure is essential to overall economic expansion, particularly in the manufacturing sector. Private-sector participation has increased these investments manifold over time. The installed generating capacity must be greatly expanded to meet the nation's growing demand for power.

As of 2020, India ranked fourth globally in wind and renewable power installed capacity and fifth in solar power. The Indian power sector is undergoing a significant transformation that has redefined the industry outlook. It is inevitable that sustained economic growth will continue to drive electricity demand in India. The Indian government's endeavours to achieve "Power for All" have accelerated the nation's capacity expansion. With an installed power capacity of 395.07 GW as of January 2022, India is the world's third-largest producer and second-largest consumer of electricity. Among G20 countries, India is the only one on track to meet the goals set forth in the Paris Agreement. Studying the pattern, trend, and contribution of the energy sector to the country's economic progress in recent decades is therefore of considerable interest.

Since electricity is the most versatile energy source and one of the most critical infrastructure inputs, a country's social and economic development is heavily reliant on its energy infrastructure. Electricity, a secondary energy source produced by converting primary sources such as coal, wind, and other fuels, is the most common form of energy used today.

Although coal has historically been the dominant source, the share of oil in the power sector has declined since the late 1970s due to sharp increases in oil prices, while the shares of nuclear and natural gas have grown in recent years (IEA, 2013). Since 2000, the proportion of fossil fuels in the energy mix has increased due to higher coal consumption and a shift by households away from traditional biomass toward cleaner fuels such as liquefied petroleum gas for cooking. Per capita energy consumption, which stood at only 16.3 kWh in 1947, rose to 227.47 kWh and further to 752 kWh in 2018 amid surging electricity demand (Central Electricity Authority, Government of India, 2015). Over the past 30 years, India's economic growth has been accompanied by an average annual growth rate of 3.6 per cent in energy demand (Central Electricity Authority, Government of India, 2012). India's energy consumption is projected to grow at 4.2 per cent annually until 2035, the highest among major economies, with fossil fuel consumption also expected to rise significantly. Additionally, the burning of coal and oil products remains a major source of greenhouse gas emissions (Shastri et. al., 2020). As a result, the government has implemented several energy reforms, including the reduction of petroleum subsidies, regulation of electricity transmission, reform of natural gas pricing, reduction of distribution losses, and provision of financial incentives for energy infrastructure investment.

Against this backdrop, the objective of the present study is to evaluate the relationship between economic growth and energy consumption in India for the period 1991 to 2019 using various econometric techniques. Moreover, the study examines the causal relationship between economic growth and energy use through the well-known Granger causality test. It is believed that this study will contribute both contextually and empirically to the existing literature on energy

consumption, particularly electricity use, and economic growth. Unlike earlier studies that rely on a single empirical framework, the present study re-examines the energy-growth nexus in India through alternative model specifications (bivariate and multivariate), thereby demonstrating the sensitivity of results to methodological choices and the importance of robust specification for reliable policy conclusions.

2. Review of Literature

Several researchers have used different methodological approaches to examine the relationship between energy consumption and economic growth. Masih and Masih (1999) investigated the relationship between energy consumption and real income in six Asian economies, including India, using Johansen's multivariate cointegration tests preceded by unit root tests. To investigate the link in India, Ghosh (2002) employed a three-step process involving the Augmented Dickey-Fuller and Phillips-Perron tests, the Johansen VAR approach, and Granger causality tests. More recent studies, such as Giri and Mohapatra (2021), have incorporated advanced techniques including the Ng-Perron unit root test, Zivot-Andrews structural break unit root test, and the bounds testing approach to analyse long-run equilibrium relationships.

There are significant variations in the direction of causality between energy consumption and economic growth in the literature. Ghosh's (2002) findings of unidirectional causality from economic growth to power consumption, Masih and Masih (1999) found unidirectional causality from energy to income in India. At the aggregate level, Ramakrishna and Rena (2013) identified a bidirectional (reciprocal) relationship between India's GDP and energy consumption. The most recent study by Giri and Mohapatra (2021) reported unidirectional causality running from electricity consumption to technological development and economic growth. These differing results suggest that the relationship may change over time or be sensitive to the inclusion of additional variables.

Empirical findings also vary considerably across time periods and geographical contexts. Wolde-Rufael (2006) identified diverse causal patterns across 17 African countries, with only nine showing a statistically significant relationship between GDP and electricity consumption. In contrast to studies focused solely on India, Zahid (2008) found no causal relationship in either direction for India, whereas Pakistan, Sri Lanka, Bangladesh, and Nepal exhibited various forms of unidirectional causality. Such differences even among neighbouring countries underscore the importance of nation-specific factors in shaping energy-economy linkages.

More recent studies have moved beyond conventional bivariate analysis to incorporate additional variables that may influence the energy-growth

relationship. For instance, Ramakrishna and Rena (2013) examined energy security and energy efficiency alongside consumption and GDP. Tabasi and Aslani (2016) included population growth and industrial growth rates in their model, while Giri and Mohapatra (2021) highlighted technological development as a significant factor with a negative short- and long-run impact on electricity consumption, while confirming a positive relationship between economic growth and electricity use.

While several studies have examined the energy-growth nexus in India, few have integrated both bivariate and multivariate frameworks using recent time-series data to assess the sensitivity of empirical outcomes to model specification. The findings further demonstrate that reliance on bivariate models may lead to incomplete or misleading conclusions due to omitted variable bias, as the inclusion of capital and labour substantially alters the nature of the long-run relationship between energy and economic growth.

This study contributes to the existing literature in three ways. First, it provides a comparative analysis of bivariate and multivariate frameworks to examine the energy-growth nexus in India. Second, it demonstrates the sensitivity of causality results to model specification by incorporating capital and labour variables. Third, it offers updated empirical evidence using recent time-series data (1991-2019), thereby revisiting the neutrality hypothesis in the Indian context.

3. Theoretical Framework

There has always been considerable debate regarding the relationship between economic growth and energy consumption, with employment or income often used as a proxy for growth. Studies on this topic have produced conflicting results. The seminal work by Kraft and Kraft (1978) provided evidence of a causal relationship between energy use and GNP in the United States for the period 1947-1974.

This finding was subsequently supported by several other researchers. For example, Akarca and Long (1979) found unidirectional Granger causality running from energy consumption to employment in the United States for the period 1973-1978, with a long-run elasticity of total employment with respect to energy consumption of −0.1356. However, these findings have been challenged by other researchers. Akarca and Long (1980), Yu and Hwang (1984), Yu and Choi (1985), and Erol and Yu (1987) found no evidence of causality between GNP and energy consumption. Moreover, the “neutrality hypothesis”, that energy consumption has no causal relationship with employment, was supported by researchers such as Yu et al. (1988), Erol and Yu (1987b, 1989), and Yu and Jin (1992).

Such conflicting empirical results stem largely from the variety of methodologies and testing procedures employed. Many earlier studies relied on log-linear models estimated by ordinary least squares (OLS), without adequately addressing the time-series properties of the variables. However, subsequent research has shown that most macroeconomic time-series variables are non-stationary in their levels (Granger and Newbold, 1974). Consequently, failure to account for these properties can lead to spurious regression results. In response to these advances in time-series econometrics, researchers have increasingly applied bivariate causality tests based on Granger (1969) and Sims (1972). Nevertheless, such tests may fail to identify additional channels of causality and can produce ambiguous results, as energy consumption represents only one of several key inputs, alongside capital and labour, that influence economic growth.

The direction of causality between energy consumption and economic growth carries significant policy implications. Unidirectional causality running from income to energy consumption suggests that energy conservation measures may have little or no adverse effect on economic growth. Conversely, unidirectional causality from energy consumption to income implies that changes in energy availability can directly affect employment and income levels. The neutrality hypothesis, which posits no causal relationship in either direction, indicates that energy-saving policies would have no impact on economic expansion (Yu and Jin, 1992). Additionally, model misspecification arising from the omission of relevant variables can further distort empirical findings (Pradhan, 2010; Saad, 2012).

Therefore, recognising the properties of time-series data, the present study extends the traditional bivariate model by incorporating capital and labour as additional key factor inputs in the production process. The analysis employs modern time-series techniques: the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to examine stationarity. The PP test serves as a complementary check to the ADF test because it is more robust to issues of non-normality, serial correlation, and heteroskedasticity (Alhajhoj, 2007; Eusuf and Ahmed, 2007; Ray, 2011; Abbas, 2012). Johansen cointegration analysis is then applied to identify long-run relationships among the variables. Short-run dynamics are examined using Vector Autoregression (VAR) and Vector Error Correction Model (VECM) techniques, followed by residual diagnostic tests for autocorrelation, heteroscedasticity, and normality.

4. Objectives and Methodology

The present analysis addresses the following objectives:

1. To examine trends in the growth rates of GDP and key energy infrastructure variables.

2. To investigate the short-run and long-run relationships between economic growth and energy use.
3. To test for causal relationships between economic growth and energy variables.
4. To derive useful policy implications.

Methodologically, this study contributes by systematically comparing bivariate and multivariate time-series frameworks to assess the robustness of the energy-growth nexus. By explicitly incorporating capital and labour into the model, the study demonstrates the sensitivity of causality and cointegration results to model specification, thereby addressing potential biases arising from omitted variables.

Average annual growth rates were calculated for the selected variables using the following simple formula:

Average Annual Growth Rate = $(1/n) \times \log(\text{current value/initial value}) \times 100$

The study uses logarithmic transformations of all selected time-series variables. This log transformation allows the interpretation of coefficients as elasticities and helps reduce heteroskedasticity.

Before performing the regression analysis, stationarity testing is essential, because non-stationary time series can produce misleading regression results. The Augmented Dickey-Fuller (ADF) test was therefore employed. When applying the ADF unit root test, the hypotheses are formulated as follows:

The Dickey-Fuller derivation is given by,

$$Y_t = b\, Y_{t-1} + e \quad \text{..... (1)}$$

Now, Subtract Y_{t-1} from equation 1

$$Y_t - Y_{t-1} = (b-1)(Y_{t-1}) + e$$

$$dY_t = (b-1)(Y_{t-1}) + e$$

$$dY_t = C^*(Y_{t-1}) + e \text{ , where } C=(b-1) \quad \text{.....(2)}$$

$$dY_t = C^*(Y_{t-1}) + e \text{ , none} \quad \text{.....(3)}$$

$$dY_t = a + C^*(Y_{t-1}) + e \text{ , with intercept} \quad \text{.....(4)}$$

$$dY_t = a + W^*t + C^*(Y_{t-1}) + e \text{ , trend and intercept} \quad \text{.....(5)}$$

If we increase the model fitness by adding the lag value of dependent variable, then the Dickey-Fuller function will become Augmented Dickey-Fuller which is given by,

$$dY_t = a + W^*t + C^*(Y_{t-1}) + d(Y_{t-1}) + e \quad \text{.....(6)}$$

When we apply Unit root of Augmented Dickey-Fuller test, then hypothesis are formed as,

H_0=Series is non-stationary

H_1 = series is stationary

If the p-value is greater than 0.05, the null hypothesis is not rejected, indicating that the series is non-stationary. Otherwise, the series is considered stationary.

In addition to the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test (Phillips and Perron, 1988), Johansen cointegration test, Vector Autoregression (VAR)-based cointegration tests, Vector Error Correction Model (VECM), and Granger causality test were applied.

Phillips and Perron (1988) proposed a nonparametric approach to account for serial correlation in unit root testing. As Engle and Granger (1987) noted, "A linear combination of two or more non-stationary series may be stationary." The non-stationary time series are referred to as cointegrated if there is such a stationary linear combination. This cointegration displays the variables' long-term equilibrium relationship. The Vector Error Correction Model (VECM) specification is based on the existence of a cointegrating relationship. The approach developed by Johansen (1991, 1995) was used in this study to conduct VAR-based cointegration tests.

The Granger causality test (Granger, 1969) provides a method for assessing whether one time series is useful in predicting another. The central idea is that if past values of variable X can be used to explain or predict variable Y, then variable X Granger-causes Y. Granger causality does not necessarily imply that X causes Y, of course. For this reason, the term "Granger causality" is preferred over simply "causality." Granger causality applies exclusively to time-series variables.

5. Economic Growth and Energy Sector

The energy sector is an integral part of economic growth. In this study, several indicators of economic growth and the energy sector have been considered to analyse the pattern of growth. To gain a better understanding of the energy infrastructure of India, the main components of the energy sector examined are Energy Generated (utilities) and Per Capita Power Consumption (utilities), as both contribute towards growth. Along with these variables, Gross Domestic Product per capita (GDPPC) has been included as the primary indicator of economic growth. Additionally, Gross Domestic Product (GDP), Gross Capital Formation (GCF), and total labour force have been considered as other key economic variables.

For the analysis of growth patterns, the entire period was divided into four sub-periods: 1990-91 to 1999-00, 2000-01 to 2009-10, 2010-11 to 2018-19, and the overall period 1990-91 to 2018-19. The growth variables, namely the annual growth rate of Gross Domestic Product and per capita Gross Domestic Product, exhibited a continuous rise over the period under study. Per capita power consumption growth increased steadily from 3.28 per cent during 1990-91 to 1999-00 to 4.36 per cent during 2000-01 to 2009-10, and further to 4.70 per cent during 2010-11 to 2018-19. Similarly, energy generation growth experienced a decline in the second sub-period, falling from 5.98 per cent during 1990-91 to 1999-00 to 4.71 per cent during 2000-01 to 2009-10, before recovering to 5.39 per cent during 2010-11 to 2018-19.

Since labour and capital are crucial production inputs, the table also reveals India's growth trends over the study period. Gross Capital Formation recorded a sharp increase across the sub-periods, rising from 6.86 per cent during 1990-91 to 1999-00 to 17.74 per cent during 2000-01 to 2009-10, and further to 26.57 per cent during 2010-11 to 2018-19. The total labour force first increased and then declined in the third sub-period; however, on average, it grew by 1.39 per cent over the entire study period.

Table-1
Average Annual Growth Rate of Selected Indicators

Variables	1990-91 to 1999-00	2000-01 to 2009-10	2010-11 to 2018-19	1990-91 to 2018-19
Gross Domestic Product (Rs. Crore)	5.05	5.70	5.81	5.92
Gross Domestic Product Per Capita	3.62	4.66	4.70	4.55
Energy Generated (Billion KW)	5.98	4.71	5.39	5.68
Per capita power consumption (KWH)	3.28	4.36	4.70	4.31
Gross Capital Formation (Rs. Lakhs)	6.86	17.74	26.57	17.27
Total Labour Force (Crores)	2.01	1.22	0.60	1.39

Source: Author's Calculations on the basis of data from Handbook of Statistics on Indian Economy, Various Issues, GOI.

6. Results and Discussion

6.1 Relationship between Growth and Energy: Bivariate Analysis

To examine the relationship between economic growth and energy consumption, Per Capita Gross Domestic Product (GDPPC) and Per Capita Power Consumption (PCPC) have been selected for the analysis. Most of the

macroeconomic variables are non-stationary in nature at their levels. Applying ordinary least squares (OLS) regression directly to non-stationary variables can produce spurious results that have no real economic meaning and may lead to misleading policy conclusions.

Time series is said to be stationary if its mean, variance, and covariance do not change over time (Asteriou & Hall, 2007). Prior to testing the long-run cointegration and causal relationship between different variables, unit root testing is essential. Such a test examines whether a time series is stationary or not, and the order of integration if it is non-stationary. There are a number of tests available to test for stationarity. The present study has used the two most commonly used unit root tests, namely the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Both tests investigate the null hypothesis that there is a unit root at the variable's level.

Variables X and Y are integrated of order zero, or I (0), if the computed ADF and PP statistics are less than their critical values. If this does not hold, the first differences of X and Y (i.e., ΔX and ΔY) are subjected to the ADF and PP tests. The variables X and Y are said to be integrated of order one, or I(1), if they become stationary after first differencing.

The natural logs of each of these two variables are used in the analysis since log transformation can reduce the heteroscedasticity issue. According to Gujarati (1995), it reduces a ten-fold difference between two values to a twofold difference by compressing the scale.

The following time series data are analysed in this study:

1. LNGDPPC = Log of Gross Domestic Product Per Capita
2. LNPCPC = Log of per Capita Power Consumption

The hypotheses for the ADF and PP tests are as follows:

H_o: The series is non-stationary. H_a: The series is stationary.

Here, 'LN' stands for the natural logarithm of the time series data. Log transformation allows the interpretation of coefficients as elasticities and reduces heteroskedasticity. Unit root tests on both series were conducted using the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. After checking the stationarity of these two series, the Johansen-Juselius cointegration procedure was applied to find the long-run relationship between the variables. Finally, the Granger causality test was performed to examine the causal relationship between them.

The results of the ADF and PP tests at levels and first differences are reported in Table 2 (with intercept and trend). The results indicate that the null hypothesis of non-stationarity cannot be rejected for all selected variables at their

levels (see Table 2). However, the results demonstrate that the selected variables are stationary at first differences and are therefore integrated of order one, i.e., I (1).

Table-2
Results of Unit Root Test

Indicators	ADF (Test Statistics)		PP (Test Statistics)		Order of Integration
	Level	First Difference	Level	First Difference	
LNGDPPC	-2.2949	-5.8994*	-2.2455	-7.2470*	I(1)
	(0.4229)	(0.0003)	(0.4479)	(0.0000)	
LNPCPC	-0.5633	-3.3062***	-1.0076	-3.2472***	I(1)
	(0.9735)	(0.0866)	(0.9268)	(0.0967)	

Note: *, ** and *** denote significance at the 1%, 5% and 10% respectively. Values in the parentheses provide p-values.

Therefore, the results of the ADF and PP tests imply the need for cointegration analysis for these two variables. Cointegration testing examines whether, despite being individually non-stationary, a linear combination of two or more time series can be stationary (Gujarati and Sangeetha, 2010). As shown by Engle and Granger (1987), a linear combination of two or more non-stationary series can be stationary.

For the application of cointegration analysis, it is necessary that the variables are integrated of the same order. The study employed the Johansen (1991, 1995) cointegration methodology, which is considered more robust and has several advantages over the Engle-Granger (1987) approach (Gonzalo, 1994; Afzal and Hussain, 2010). Engle-Granger cointegration identifies only one cointegrating equation, whereas the Johansen method can identify multiple cointegrating relationships.

Before conducting Johansen's cointegration test, the optimal lag length must be selected, as different lag lengths can lead to different results. The choice of lag length has a significant impact on the outcomes of cointegration analysis. Although several criteria are available for determining the optimal Vector Autoregression (VAR) lag order, Lutkepohl (1985) found that Schwarz's Bayesian Information Criterion (SBIC) most frequently selects the correct order and produces the smallest mean squared forecasting error. Therefore, the study used Schwarz's criterion to determine the optimal lag length.

The hypotheses for the Johansen cointegration test are as follows:

H_0: There is no cointegration.

H_a: There is cointegration.

Table-3
Results of Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesis No. of CE(s)	**Eigenvalue**	**Trace Statistics**	**0.05 Critical Value**	**Prob. ****
None	0.353832	16.79220	25.87211	0.4306
At most 1	0.169093	5.001414	12.51798	0.5962
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypotesized No. of CE(s)	Hypotesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value
None	0.353832	11.79078	19.38704	0.4306
At most 1	0.169093	5.001414	12.51798	0.5962
Normalized cointegrating coefficients (Standard Errors in parentheses)				
GDP		PCPC	@Trend	
1.000000		-0.132294*	-0.015456*	
		(0.02900)	(0.00125)	

Source: Author's Calculations using Eviews 12.

The results show that both the trace statistic and the maximum eigenvalue statistic indicate no cointegrating equations. Thus, the null hypothesis of no cointegration cannot be rejected, implying no long-run equilibrium relationship between LNGDPPC and LNPCPC.

To examine the short-run relationship between these two variables, a Vector Autoregression (VAR) model was estimated. The VAR model reveals that each variable has a statistically significant impact on its own lagged values but no significant impact on the other variable. As shown in Table 5, the lagged value of GDP exerts a statistically significant influence on current GDP, indicating strong persistence and a high autoregressive coefficient. Similarly, the lagged values of PCPC have a statistically significant effect on its current value, reflecting strong persistence over time.

Table-4
VAR Lag Order Selection Criteria

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	49.60089	NA	0.000101	-3.525992	-3.430004	-3.497450
1	152.1592	182.3260*	6.82e-08	-10.82661	-10.53865*	-10.74098*
2	156.2830	6.720251	6.81e-08*	-10.83578*	-10.35584	-10.69307

Note: * indicates lag order selected by the criterion.
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwrz information criterion
HQ: Hanna-Quinn information criterion

Residual diagnostic tests were also performed on the VAR model. Specifically, the Autocorrelation LM test, Jarque-Bera normality test, and VECM residual heteroskedasticity test (levels and squares) were conducted. The results indicate that all p-values are greater than 0.05, implying that the residuals are statistically insignificant at the 5 per cent level. Thus, the null hypotheses of no autocorrelation, normality, and homoscedasticity cannot be rejected, suggesting that the model is stable and well-specified. The findings of these residual diagnostics are presented in Table 6.

Table-5
Results of VAR Model

	GDPPC	**PCPC**
GDPPC(-1)	0.998677*	0.255707
PCPC(-1)	0.007773	0.898340*
C	-0.019816	-0.553432

Source: Author's Calculations using Eviews 12.

Table-6
Results of Residual Diagnostic

Autocorrelation LM Test
Null Hypothesis: No Serial Correlation at Lag h

Lag	**LRE*stat**	**df**	**Prob.**	**Rao F-stat**	**df**	**Prob.**
1	6.7890	4	0.1475	1.7912	(444.0)	0.1477

Jarque-Bera Normality Test

Component	Jarque-Bera	df	Prob.
1	1.6337	2	0.4418
2	1.2330	2	0.5398
Joint	2.8667	4	0.5804

VEC Residual Heteroskedasticity Test (Levels and Squares)

Chi-sq.	df	Prob
9.3416	12	0.6735

Source: Author's Calculations using Eviews 12.

Causality between GDPPC and PCPC

The Johansen cointegration test only indicates the existence (or absence) of cointegration but does not provide information about the direction of causality. When cointegration exists, Granger causality is expected to be present at least in one direction (Granger, 1988; Mishra, 2011). The results of the Granger causality test between the two variables are presented in Table 7.

The hypotheses for the Granger causality test are formulated as follows:

H_0: X does not Granger-cause Y. **H_a:** X Granger-causes Y.

Table-7
Results of Granger Causality between GDPPC and PCPC

Null Hypothesis	Observations	F-statistic	Prob.
D(PCPC) does not Granger Cause D(GDPPC)	27	0.94535	0.3406
D(GDPPC) does not Granger Cause D(PCPC)	27	0.08401	0.7744

Source: Author's Calculations using Eviews 12.

The results in Table 7 show that the p-values are greater than the critical value in both directions. Therefore, the null hypothesis cannot be rejected. This indicates that neither PCPC Granger-causes GDPPC nor GDPPC Granger-causes PCPC. This implies no causal relationship between these two variables.

6.2 Relationship between Growth and Energy: Multivariate Analysis

There are certain limitations associated with bivariate analysis. It has been argued that the omission of relevant variables may lead to model misspecification (Pradhan, 2010; Saad, 2012). There is a possibility that PCPC may not appear to cause changes in economic growth in a bivariate model, but this relationship may differ in a more comprehensive model that includes other relevant variables such as labour and capital.

In order to better capture the causal relationship between the variables, a multivariate analysis was conducted by incorporating additional significant variables — labour, energy consumption, and gross capital formation — into a multivariate time-series framework. The same econometric procedure was followed as in the bivariate analysis. The following transformed time series are analysed in this study:

LNGDP = Log of Gross Domestic Product

LNEG = Log of Energy Generated

LNGCF = Log of Gross Capital Formation

LNLF = Log of Total Labour Force

Table 8 presents the results of the ADF and PP unit root tests for the selected variables. The results show that all variables were non-stationary at their levels but became stationary after first differencing.

Table 9 reports the Johansen cointegration test results for the long-run relationship. Both the trace test and the maximum eigenvalue test yielded mixed results. The trace test indicates one cointegrating equation, while the maximum eigenvalue test indicates no cointegrating equation at the 5 per cent significance level. According to the trace statistic, the null hypothesis of no cointegration is rejected at the 5 per cent level, suggesting the presence of one cointegrating

equation. This implies that the variables share a common long-run stochastic trend. In contrast, the maximum eigenvalue statistic fails to reject the null hypothesis of no cointegration. When the trace and maximum eigenvalue tests produce conflicting results, the trace test is generally preferred (Lütkepohl, Saikkonen, and Trenkler, 2001).

Table-8
Results of Unit Root Test

Indicators	**ADF (Test Statistics)**		**PP (Test Statistics)**		**Order of Integration**
	Level	**First Difference**	**Level**	**First Difference**	
LNGDP	3.5222	-5.3574*	-3.4960	-8.4780*	I(1)
	(0.0563)	(0.0009)	(0.0593)	(0.0000)	
LNEG	-2.2779	-5.3002*	-2.3134	-5.2979*	I(1)
	(0.4314)	(0.0011)	(0.4136)	(0.0011)	
LNECF	-1.7324	-6.0488*	-1.6866	-6.1079*	I(1)
	(0.7096)	(0.0002)	(0.7304)	(0.0002)	
LNLF	-1.2397	-3.7089*	-1.2361	-3.8501*	I(1)
	(0.8820)	(0.0390)	(0.8829)	(0.0291)	

Source: Author's Calculations using Eviews 12.

Table-9
Results of Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesis No. of CE(s)	**Eigenvalue**	**Trace Statistics**	**0.05 Critical Value**	**Prob. ****
None*	0.654524	56.00302	55.24578	0.0428
At most 1	0.390048	27.30656	35.01090	0.2613
At most 2	0.286386	13.95844	18.39771	0.1872
At most 3*	0.164368	4.848292	3.841465	0.0277
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesis No. of CE(s)	Hypothesis No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value
None	None	0.654524	28.69645	30.81507
At most 1	At most 1	0.390048	13.34812	24.25202
At most 2	At most 2	0.286386	9.110152	17.14769
At most 3*	At most 3*	0.164368	4.848292	3.841465
Normalized cointegrating coefficients (Standard Errors in parentheses)				
GDP		EG	GCF	L
1.000000		-0.009985	-0.023327	0.065897
		(0.092926)	(0.00559)	(0.09719)

Source: Author's Calculations using Eviews 12.

The cointegrating equation presented in Table 9 has been normalised on GDP. The long-run coefficients show that Energy Generated (EG) and Gross Capital Formation (GCF) have positive impacts on GDP, while labour force (L) is negatively related. Moreover, the equation indicates that GCF has a positive and statistically significant long-run effect on GDP.

Since cointegration exists in the multivariate model, the Vector Error Correction Model (VECM) was applied to examine short-run causality. The Schwarz Information Criterion was used to determine the optimal lag length. Table 10 presents the results of the VAR lag order selection criteria. The VECM results for India are reported in Table 11.

Table-10
VAR Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	85.92819	NA	2.72e-08	-6.068755	-5.876779	-6.011670
1	246.0078	260.8705*	6.41e-13*	-16.74132*	-15.78144*	-16.45589*
2	251.7377	7.639900	1.50e-12	-15.98057	-14.25279	-15.46681

Source: Author's Calculations using Eviews 12.

Table-11
Short run Causality Bases on VECM

Error Correction	D(GDP)	D(EG)	D(GCF)	D(L)
CointEq1	-0.975174	-0.370240	0.174869	-0.226590
D(GDP(-1))	0.137598	0.030866	-3.630780	-0.004698
D(EG(-1))	0.297246*	-0.029687	7.327144	0.068586
D(GCF(-1))	-0.010171	-0.007893	-0.223064	-0.005878
D(L(-1))	0.019221	-0.618406	15.05871	0.063222
C	0.030659*	0.078206*	-0.705493	0.020711
@Trend(91)	0.000529	-0.000681	0.033180*	-0.000683

Source: Author's Calculations using Eviews 12.

Table-12
Results of Diagnostic Test

Autocorrelation LM Test Null Hypothesis: No Serial Correlation at Lag h						
Lag	LRE*stat	df	Prob.	Rao F-stat	df	Prob.
1	18.5280	16	0.2839	1.2077	(1640.4)	0.3037
VEC Residual Heteroskedasticity Test (Levels and Squares)						
Chi-sq.				df	Prob	
112.510				120	0.6739	

Source: Author's Calculations using Eviews 12.

Edited Version (with tracked changes)

Additions are marked in green underline Deletions are marked in

Table 11 presents the error correction coefficients, which indicate the speed of adjustment towards long-run equilibrium following any short-run disturbances. The results show that the coefficient of the error correction term (ECT) when GDP is the dependent variable is statistically insignificant at the 5 per cent level, although it carries the expected negative sign. The error correction term coefficients for EG and L were also negative but statistically insignificant at the 5 per cent level. Short-run unidirectional causality from energy generation to economic growth is indicated by the statistical significance of the coefficient on the first difference of EG lagged one period in the GDP equation.

Diagnostic tests for serial correlation and heteroskedasticity are reported in the subsequent table. Table 12 shows that the model passed all diagnostic tests.

7. Conclusion and Policy Implications

The findings highlight the importance of model specification in examining the relationship between economic growth and the energy sector in India. The bivariate analysis between gross domestic product per capita (GDPPC) and per capita power consumption (PCPC) reveals neither a long-run relationship nor causality. Similarly, the VAR estimates suggest strong persistence within individual variables through high autoregressive coefficients, while cross-variable effects remain insignificant.

However, when additional macroeconomic variables such as capital formation and labour are incorporated in the multivariate framework, the results change considerably. The Johansen cointegration test confirms the existence of a long-run relationship among GDP, energy generation, gross capital formation, and the labour force. These findings demonstrate that the results of the energy-growth nexus are highly sensitive to model specification and the inclusion of relevant control variables.

The empirical results reveal a mixed and conditional relationship between economic growth and the energy sector in India. The growth analysis indicates that gross domestic product, per capita income, capital formation, labour force, and power consumption have generally increased over the study period. Per capita power consumption has shown a continuous rise across all sub-periods, whereas the growth rate of energy generation has experienced fluctuations and remained lower in the later years compared to the initial reform period.

The multivariate VECM results indicate convergence from short-run dynamics toward long-run equilibrium and provide evidence of short-run unidirectional causality from energy generation to GDP. Nevertheless, no strong causal relationship is observed among the selected variables in the long run. The findings therefore suggest that the energy-growth relationship in India is not uniform but conditional upon the broader macroeconomic and structural environment.

From a policy perspective, the findings suggest that energy policy in isolation may not be sufficient to drive economic growth. The contrasting results between bivariate and multivariate models indicate that the growth impact of energy is conditional upon complementary factors such as capital formation and labour dynamics. Therefore, policymakers should adopt an integrated approach that simultaneously strengthens energy infrastructure, the investment climate, and labour productivity to achieve sustainable economic growth.

8. Limitations and Future Research Directions

The findings focus on the short-run, long-run, and causal relationships among the selected variables and indicate the absence of any significant causal relationship among them. However, future projections of economic growth, energy use, and energy generation are beyond the scope of the present analysis. Given the possibility of structural breaks, future research may incorporate break-adjusted unit root tests or structural break cointegration techniques. Another limitation is the data-intensive nature of VAR/VECM models. Additionally, it should be noted that Granger causality reflects predictive precedence rather than true economic causation.

References

Akarca, A.T., Long, T.V., (1979): “Energy and employment: a time series analysis of the causal relationship”, Resources Energy, 2, 151-162.

Akarca, A.T., Long, T.V., (1980): “On the relationship between energy and GNP: a re-examination”, Journal of Energy Development, 5, 326-331.

Azam, A., Rafiq, M., Shafique, M., Ateeq, M and Yuan, j. (2020): “Causality Relationship between Electricity Supply and Economic Growth: Evidence from Pakistan”, *Energies*, 13,837.

Barney .F, Franzi .P.(2002). “The future of energy From Future Dilemmas: Options to 2050 for Australia’s population, technology, resources and environment”. CSIRO Sustainable Ecosystems.pp157 – 189.

Central Electricity Authority (2012): Annual Report, Ministry of Power, Government of India.

Ghosh, S. (2002): “Electricity Consumption and Economic Growth in India”. Energy Policy 30: 125-129.

Giri, A.K., Mohapatra, G. (2021): “Examining the Relationship between Electricity Consumption, Economic Growth, Energy Prices and Technology Development in India”, *The Indian Economic Journal*, 1-19.

Hwang, D., Gum, B., (1992): “The causal relationship between energy and GNP: the case of Taiwan”, J. Energy Dev. Spring, 219-226.

International Energy Outlook (2016): Independent Statistics and Analysis, U.S. Energy Information Administration.

Johansen, S., Juselius, K., (1990): “Maximum likelihood estimation and inferences on cointegration with approach”, Oxford Bulletin of Economics and Statistics May, 169-209.

Kumari, A. and Sharma, A.K., (2016): “Analyzing the causal relations between electric power consumption and economic growth in India”, The Electricity Journal 29, 28–35.

Kraft, J. and Kraft, A., (1978): “On the relationship between energy and GNP”, *Journal of Energy and Development* 3, 401–403.

Masih, A.M.M., Masih, R. (1999): “Energy Consumption, Real Income and Temporal Causality: Results from a Multi-Country Study based on Cointegration and ErrorCorrection Modelling Techniques”. Energy Economics 18: 165-183.

Morimoto, K., Hope, C., (2004): “Impact of electricity supply on economic growth in Sri Lanka”. Energy Economics 26, 77–85.

Majeeed, T. M., Anwar, A. and Luni, T.(2021): “The Impact of Renewable and Non-Renewable Energy Consumption on Economic Growth: A Global Perspective with Developed and Developing Economies” *Pakistan Journal of Research and Social Sciences*, Vol. 15 (2), 286-307.

Masuduzzaman, M.,(2012): “Electricity consumption and economic growth in Bangladesh: cointegration and causality analysis”, *Global Journal of Management and Business Research*, 12, 11, 46–56.

Rufael, Y. Wolde, (2006): “Electricity consumption and economic growth: A time series experience for 17 African countries”. Energy Policy 34: 1106 – 1114.

Ramakrishna, G., Rena, R. (2013): An empirical analysis of energy consumption and economic growth in India: are they casually related?, *STUDIA OECONOMICA*, 58(2): 22-40.

Stern, D.I. (1993) Energy and Economic Growth in the USA: A Multivariate Approach, *Energy Economics*, 15(1), 137-150.

Tabasi, S., Aslani A. (2016): "Prediction of Energy Consumption by Using Regression Model", *Computational Research Progress in Applied Science & Engineering*, Vol. 02(03), 110-115.

Yang, H.Y.(2000) A Note on the Causal Relationship between Energy and GDP in Taiwan, *Energy Economics*, 22, 309-317.

Zahid, A. (2008): "Energy-GDP Relationship: A Causal Relationship for the five countries of South Asia", *Applied Econometrics and International Development,* Vol. 8-1.

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TARIFFS, MSME CREDIT, AND MANUFACTURING PERFORMANCE IN INDIA: AN EMPIRICAL ANALYSIS (2008-2024)

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Abstract: This study examines the relationship between industrial credit, trade penetration, tariff protection, and manufacturing output in India using annual time-series data covering the period 2008-09 to 2023-24. Manufacturing output data were obtained from UNIDO, industrial credit from the Reserve Bank of India, manufacturing trade data from the Directorate General of Commercial Intelligence and Statistics (DGCI&S), and tariff rates from the World Integrated Trade Solution (WITS). Import and export penetration ratios were constructed using major manufacturing HS Chapters 28-37, 38-40, 50-56, 57-63, 72-73, 74-83, and 84-85 to ensure consistency between trade and manufacturing output. The study employs the Autoregressive Distributed Lag (ARDL) Bounds Testing approach to estimate both long-run and short-run relationships after establishing the order of integration using Augmented Dickey-Fuller, Phillips-Perron and KPSS tests. The results reveal the existence of a stable long-run equilibrium relationship among the variables. Industrial credit exhibits a positive and statistically significant association with manufacturing output, whereas import penetration is negatively associated with domestic manufacturing performance. Tariff protection demonstrates a modest but positive influence in both the long-run and short-run, while export penetration does not exhibit an independent statistically significant relationship after controlling for other determinants. Diagnostic tests confirm the adequacy of the estimated model. The findings suggest that strengthening institutional credit availability together with improvements in technological capability and industrial competitiveness is likely to contribute more to sustainable manufacturing growth than reliance on trade protection measures alone.

Keywords: Manufacturing Output; Industrial Credit; Trade Penetration; Tariff Protection; ARDL; India

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Introduction

For both advanced and emerging nations, the path to economic transformation has almost always been paved by manufacturing-led expansion. However, reaching a sustainable industrial scale is rarely a simple matter of amassing raw materials or labour; it requires a precise alignment between deep financial liquidity and a stable, predictable policy environment. To fortify their industrial core, modern economies must strike a balance between their internal capabilities and external catalysts, specifically global trade and the movement of international capital. In the Indian economy, Micro, Small, and Medium Enterprises (MSMEs) serve as a powerful catalyst, driving the nation’s manufacturing sector forward through consistent production, large-scale employment, and growing global competitiveness.

The strategic importance of India’s MSME sector is rooted in its highly diverse production structure, its presence across nearly every geographic region, and its considerable capacity for labour absorption. Often labelled the 'backbone' of the country’s industrial sector, these firms are the primary drivers of inclusive economic progress (Patil & Chavan, 2020). Official estimates indicate that the MSME sector's contribution to India's Gross Value Added (GVA) increased from 27.3 per cent in 2020-21 to 29.6 per cent in 2021-22 and further to 30.1 per cent in 2022-23, reflecting the sector's strong post-pandemic recovery and growing contribution to the Indian economy (Ministry of Micro, Small and Medium Enterprises [MSME], 2024). This contribution is concentrated in labour-intensive clusters, such as, textiles, chemicals, and metal fabrication, where MSMEs account for the majority of value and output.

The sector's significance extends beyond production output alone. MSMEs constitute India’s principal source of non-farm employment, providing employment to more than 280 million persons while contributing to inclusive growth, poverty reduction and balanced regional development (Ministry of MSME, 2024). The sector has also increasingly expanded its export orientation, linking domestic production more closely with global market demand. MSME-related products accounted for 45.73 per cent of India's total exports in 2023-24, while MSME exports increased substantially from ₹3.95 lakh crore in 2020-21 to ₹12.39 lakh crore in 2024-25, reflecting the sector's growing integration with global markets. This dual contribution to domestic employment and export performance underscores the centrality of MSMEs to India’s manufacturing and trade strategy.

Institutionally, the evolution of MSMEs in India has been shaped by a long policy history. The origins of formal small enterprise promotion can be traced back to the establishment of the Small Industries Development Organization (SIDO) in 1954. A major milestone was the enactment of the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006, which

provided a legal framework for enterprise classification, policy support, and institutional credit facilitation. Subsequently, in 2007, the Ministry of MSME was formed through the merger of the Ministry of Small-Scale Industries and the Ministry of Agro and Rural Industries, further strengthening policy focus on the sector.

A defining feature of MSME policy in India has been the periodic revision of enterprise definitions, reflecting changes in economic scale, inflation, and business conditions. Initially, MSMEs were classified solely on the basis of investment in plant and machinery (for manufacturing) or equipment (for services). Recognising the limitations of this approach, the definition was revised in 2020 to incorporate both investment and turnover criteria, thereby better capturing enterprise size and market activity. More recently, the Union Budget 2025-26 further enhanced the investment and turnover thresholds, providing greater operational flexibility and growth space for MSMEs.

Table-1
Evolution of MSME Classification Criteria in India

Year	Classification	Micro	Small	Medium
2006	Manufacturing (investment in plant/machinery)	≤Rs25 Lakhs	>Rs 25 Lakhs and ≤Rs 5 crores	> Rs 5 crores and ≤ Rs10 crores
	Services (investment in equipment)	≤Rs 10 Lakhs	>Rs 10 Lakhs ≤ Rs 2 crores	>Rs 2 crores and ≤ Rs 5 crores
2020	Investment (in plant /machinery, equipment)	Up to Rs 1crore (Rs10 Million)	Up to Rs 10 Crore (Rs100 Million)	Up to Rs 50 crore (Rs500 Million)
	Annual turnover	Up to Rs 5 crore (Rs50 Million)	Up to Rs 50 Crore (Rs500 Million)	Up to Rs 250 crore (Rs2.5 billion)
2025	Investment	Up to Rs 2.5 Crore	Up to Rs 25 Crore	Up to Rs 125 Crore
	Turnover	Up to Rs 10 Crore	Up to Rs 100 Crore	Up to Rs 500 Crore

Source: Author's compilation from GoI documents

In parallel with definitional reforms, the Government of India has undertaken major initiatives to formalise and expand the MSME base. The launch of the Udyam Registration portal represented a significant step toward formalization in India, enabling small enterprises to establish visibility and access institutional finance more rapidly. With Udyam registrations exceeding 45 million

enterprises, the portal has become a key instrument for formalising MSMEs and facilitating access to institutional credit, government schemes, and policy support (Ministry of MSME, 2025). This transition reflects more than an administrative change; it has forged a closer link between MSMEs and the formal banking sector, positioning credit availability as an important determinant of firm performance.

Despite this progress, MSMEs continue to face persistent operational challenges. These enterprises continue to operate within an environment characterized by financial constraints, fluctuating trade barriers, and an evolving policy landscape. MSME owners must therefore manage limited credit access alongside import competition and the demands of export growth. While trade liberalization has opened access to new global markets, it has also intensified the competitive pressure on manufacturing enterprises that lack sufficient financial resources to compete internationally.

This study examines the intersection of finance and trade policy in shaping manufacturing outcomes. Specifically, it investigates how MSME credit availability, tariff policies, and both import and export trade penetration have collectively influenced India's manufacturing output over the 2008-2024 period. By integrating these financial and trade dimensions into a single analytical framework, the study aims to move beyond fragmented, single-factor analyses common in the existing literature. The objective is to provide policy-relevant evidence on how a more resilient industrial base can be built through financially stable MSMEs.

Literature Review

A substantial body of literature has examined the role of MSMEs in fostering economic growth, employment, and industrial development, particularly in emerging economies such as India. A key strand of this literature focuses on the importance of credit availability as a driver of MSME performance. Beck et al. (2005) argue that access to finance is a critical determinant of firm growth, particularly for smaller enterprises that face greater financial constraints than larger firms. Similarly, Ayyagari et al., (2014) show that small and medium enterprises contribute significantly to employment generation and economic development in developing countries, although access to institutional finance remains uneven across sectors and regions. These findings underscore the importance of examining how credit availability influences manufacturing performance, as undertaken in the present study.

Another influential stream of research investigates the interaction between trade liberalization and manufacturing productivity. Amiti and Konings (2007) demonstrate that trade liberalization can enhance firm productivity through improved access to imported intermediate inputs. Similarly, Melitz

(2003) shows that gains from trade are often concentrated among more productive firms, while less productive firms may struggle to benefit from increased competition. The literature therefore suggests that although an open trade regime can strengthen economic performance overall, MSMEs frequently face structural constraints that limit their ability to capture the full benefits of liberalization.

Export-led growth also presents an unresolved tension in the literature. Manova (2013) argues that access to finance plays a critical role in enabling firms to participate successfully in international markets, while Melitz (2003) highlights that only relatively productive firms are able to sustain export activity. These findings suggest that export participation alone does not necessarily translate into higher domestic production unless firms possess adequate financial and technological capabilities. This concern is particularly relevant for MSMEs, which often face greater financing constraints than larger firms.

Recent developments in financial systems have expanded opportunities for improving credit access among small enterprises. OECD (2018) highlights the growing role of institutional mechanisms and financial integration in supporting enterprise development, while evidence from financial development literature suggests that improved access to formal credit can contribute to investment, productivity enhancement and employment generation (Beck et al., 2005; Ayyagari et al., 2014). These contributions reinforce the view that easing financing constraints remains an important determinant of industrial performance.

Meanwhile, the debate over trade protectionism remains divided. Chang (2002) argues that carefully designed protection measures may support industrial development by allowing domestic industries time to strengthen their productive capabilities. In contrast, Rodrik (2001) cautions that trade policy alone cannot generate sustainable industrial growth without complementary institutional and technological improvements. These contrasting perspectives suggest that tariff policies may produce complex and context-specific effects on industrial performance.

Widening this institutional perspective further, Ayyagari et al., (2014) highlight the broader contribution of small and medium enterprises to employment generation, entrepreneurship and economic development. Similarly, Beck et al., (2005) demonstrate that financial constraints significantly affect firm expansion and productivity. Taken together, the literature indicates that MSMEs are central drivers of economic development and that their performance depends substantially on reliable financial mechanisms. Although a substantial body of literature has examined the relationship between finance, trade and manufacturing growth, important gaps remain. Existing studies have generally analysed industrial credit or trade openness separately, with limited attention to their combined influence on manufacturing output. Moreover, empirical findings on

the effects of import penetration, export penetration and tariff protection remain inconclusive. Many studies also rely on aggregate trade measures, which may create inconsistencies between trade indicators and manufacturing output. The present study addresses these gaps by constructing manufacturing-specific import and export penetration ratios using consistent HS manufacturing chapters and examining the joint relationship between industrial credit, trade penetration, tariff protection and manufacturing output in India. Using the ARDL Bounds Testing approach, the study estimates both the long-run equilibrium relationship and short-run dynamics over the period 2008-09 to 2023-24, thereby providing updated evidence on the interaction between financial development, trade policy and manufacturing performance.

This study aims to identify the extent to which credit access influences manufacturing output while accounting for the effects of trade policy and global exposure. Rather than examining simple bivariate correlations, the study incorporates these financial and trade variables into a single econometric framework to provide practical, policy-relevant insights into how MSME-led manufacturing can be sustained under changing trade and policy environments.

Methodology

The present study examines the relationship between industrial credit, trade penetration, tariff protection and manufacturing output in India using annual time-series data for the period 2008-09 to 2023-24. The analysis is based exclusively on secondary data collected from official and internationally recognized sources. Manufacturing gross output data were obtained from the United Nations Industrial Development Organization (UNIDO); Industrial Statistics Database; industrial credit (proxied by RBI MSME Credit) from Reserve Bank of India (RBI) publications; import and export statistics from the Directorate General of Commercial Intelligence and Statistics (DGCI&S), Ministry of Commerce and Industry; and tariff protection, measured by the simple average Most Favoured Nation (MFN) applied tariff on non-agricultural products (NON_AG), from the WITS-TRAINS database. Non-agricultural tariffs are used as a proxy for tariff protection affecting India's manufacturing sector because manufacturing constitutes the dominant component of non-agricultural trade. The study comprises sixteen annual observations, representing the complete period for which comparable data on all variables was available.

To measure India's manufacturing trade exposure, import and export penetration ratios were constructed using manufactured commodities classified under HS Chapters 28-37 (Chemicals), 38-40 (Chemical Products, Plastics and Rubber), 50-56 (Textiles and Textile Materials), 57-63 (Textile Articles), 72-73 (Iron and Steel), 74-83 (Non-ferrous Metals and Articles), and 84-85 (Machinery, Mechanical Appliances and Electrical Equipment). These commodity groups represent the principal manufacturing industries consistently reported throughout

the study period and broadly correspond to manufacturing activities under internationally recognized industrial classifications adopted by the World Customs Organization (WCO), United Nations Statistics Division (ISIC Rev.4), UNIDO, the World Trade Organization (WTO), and the Ministry of Commerce and Industry, Government of India. Collectively, these chapters account for a substantial share of India's organized manufacturing trade and therefore provide an appropriate measure of manufacturing trade exposure. To ensure conceptual consistency and eliminate denominator mismatch, both the numerator and denominator were restricted to comparable manufacturing activities. Manufacturing exports and imports were aggregated using HS Chapters 28-40, 50-63 and 72-85, while the denominator comprises manufacturing gross output reported by UNIDO for the corresponding manufacturing industries. Accordingly, the trade penetration ratios are defined as follows:

Export Penetration

$$EP_t = \frac{EX_t^{MFG}}{GO_t^{MFG}}$$

where,

EP_t= Manufacturing export penetration in year t

EX_t^MFG= Value of manufactured exports (HS Chapters 28-40, 50-63, and 72-85)

GO_t^MFG= Manufacturing gross output reported by UNIDO.

Import Penetration

$$IP_t = \frac{IM_t^{MFG}}{GO_t^{MFG}}$$

where,

IM_t^MFG= Value of manufactured imports (same HS chapters)

GO_t^MFG= Manufacturing gross output reported by UNIDO.

Both the numerator and denominator represent comparable manufacturing activities. Trade values were aggregated using the selected manufacturing HS chapters, while manufacturing gross output was obtained from UNIDO Industrial Statistics to maintain conceptual consistency between trade flows and manufacturing production.

All continuous variables, except tariff rates, were transformed into natural logarithms to reduce scale differences, improve normality and permit interpretation of estimated coefficients as elasticities (Gujarati & Porter, 2009; Wooldridge, 2019). Tariff rates were retained in percentage form because they

already represent proportional measures and exhibit comparatively limited variation over the study period. The empirical relationship is specified as:

$$\ln(Output_t) = \beta_0 + \beta_1 \ln(Credit_t) + \beta_2 \ln(Import_t) + \beta_3 \ln(Export_t) + \beta_4 Tariff_t + \varepsilon_t$$

where,

ln (Output) denotes manufacturing gross output, ln (Credit) represents industrial credit, ln (Import) and ln (Export) denote manufacturing import and export penetration ratios, respectively, Tariff represents the average applied tariff rate, and ε_t is the random disturbance term.

Table-2
Description of Variables

Variable	Symbol	Measurement	Expected Sign
Manufacturing Gross Output	ln_output	Natural logarithm of manufacturing gross output	Dependent Variable
Industrial Credit	ln_credit	Natural logarithm of industrial credit	Positive
Import Penetration	ln_import	Natural logarithm of manufacturing import penetration ratio (HS Chapters mentioned above)	Negative
Export Penetration	ln_export	Natural logarithm of manufacturing export penetration ratio (HS chapters mentioned above)	Positive
Tariff Rate	tariff	Simple average MFN applied tariff (%) on non-agricultural products (NON_AG), used as a proxy for manufacturing tariff protection	Ambiguous

Source: Authors calculation

The empirical analysis commenced with descriptive statistics and Pearson's correlation analysis to examine the distribution of the variables and their pairwise associations. Multicollinearity was assessed using the Variance Inflation Factor (VIF), where values below the conventional threshold indicate that multicollinearity is unlikely to bias the estimated coefficients (Belsley, Kuh, & Welsch, 1980).Because regression involving non-stationary time-series may produce spurious results (Granger & Newbold, 1974), the order of integration of each variable was examined using the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and KPSS unit root tests. The ADF and PP tests evaluate the null hypothesis of a unit root, whereas the KPSS test assumes stationarity under the null hypothesis, providing complementary evidence on the stochastic properties of the series.

The Autoregressive Distributed Lag (ARDL) approach developed by Pesaran, Shin and Smith (2001) are appropriate provided that no variable in the model is integrated of an order higher than one, a condition confirmed by the unit root results reported in the following section. The ARDL framework is particularly appropriate for relatively small samples because it accommodates a mixture of I (0) and I (1) variables, allows different lag structures across regressors, and simultaneously estimates both long-run equilibrium relationships and short-run dynamics (Pesaran et al., 2001; Narayan, 2005). Compared with conventional cointegration techniques such as the Johansen procedure, ARDL generally provides more reliable inference in small samples. The optimal lag specification was selected using the Akaike Information Criterion (AIC).The ARDL model estimated in the present study is expressed as:

$$\begin{aligned}\Delta\ln(Output_t) = {} & \alpha + \sum_{i=1}^{p} \beta_i \Delta\ln(Output_{t-i}) + \sum_{j=0}^{q_1} \gamma_j \Delta\ln(Credit_{t-j}) \\ & + \sum_{k=0}^{q_2} \delta_k \Delta\ln(Import_{t-k}) + \sum_{l=0}^{q_3} \theta_l \Delta\ln(Export_{t-l}) \\ & + \sum_{m=0}^{q_4} \psi_m \Delta Tariff_{t-m} + \lambda_1 \ln(Output_{t-1}) \\ & + \lambda_2 \ln(Credit_{t-1}) + \lambda_3 \ln(Import_{t-1}) + \lambda_4 \ln(Export_{t-1}) + \lambda_5 Tariff_{t-1} + \varepsilon_t\end{aligned}$$

Based on the Akaike Information Criterion (AIC), the optimal specification selected for estimation was ARDL (1,1,1,0,1), which was subsequently used for the Bounds cointegration test, estimation of long-run elasticities, and the Error Correction Model.

Long-run cointegration was examined using the Pesaran Bounds Test, where rejection of the null hypothesis indicates the existence of a stable long-run relationship among the variables. Following confirmation of cointegration, long-run elasticities were estimated using ARDL long-run multipliers, while short-run adjustments were analysed through the Unrestricted Error Correction Model (UECM):

$$\begin{aligned}\Delta\ln(Output_t) = {} & \alpha + \sum_{j=0}^{q_1} \gamma_j \Delta\ln(Credit_{t-j}) + \sum_{k=0}^{q_2} \delta_k \Delta\ln(Import_{t-k}) \\ & + \sum_{l=0}^{q_3} \theta_l \Delta\ln(Export_{t-l}) + \sum_{m=0}^{q_4} \psi_m \Delta Tariff_{t-m} + \phi ECT_{t-1} + \varepsilon_t\end{aligned}$$

where,

ECT_{t-1} denotes the lagged error correction term and ϕmeasures the speed with which short-run disequilibrium converges towards long-run equilibrium. A negative and statistically significant error correction coefficient indicates the existence of a stable long-run equilibrium relationship.

Finally, the adequacy of the estimated model was assessed using the Breusch-Godfrey LM test for serial correlation, the Breusch-Pagan test for heteroscedasticity, the Jarque-Bera test for residual normality, and the Variance Inflation Factor for multicollinearity. Model stability was further assessed using the Recursive CUSUM test based on recursive residuals to examine the stability of the estimated coefficients over the sample period. These diagnostic procedures ensure that the estimated ARDL model satisfies the principal assumptions required for reliable statistical inference.

Although the ARDL framework is well suited to small samples, the analysis is constrained by the availability of only sixteen annual observations. Furthermore, manufacturing-specific MSME credit is not consistently available in official databases; consequently, aggregate MSME credit has been used as a proxy. As an additional robustness check, a pairwise Granger causality test was conducted and indicated a unidirectional predictive relationship from industrial credit to manufacturing output, thereby reducing concerns regarding reverse causality. Nevertheless, the estimated relationships should be interpreted with caution rather than as definitive causal effects, since omitted macroeconomic factors, measurement limitations, and potential endogeneity arising from unobserved variables cannot be entirely ruled out. These limitations are acknowledged when interpreting the empirical findings.

Results and Discussion

The empirical analysis is based on annual time-series data covering the period 2008-09 to 2023-24 (n = 16) to examine the relationship between manufacturing output, industrial credit, trade penetration and tariff protection in India. Manufacturing gross output is specified as the dependent variable, while industrial credit, import penetration, export penetration and weighted average applied tariff rates serve as the explanatory variables. The analysis proceeds through descriptive statistics, correlation analysis, unit root testing, ARDL bounds cointegration, long-run estimation, Error Correction Model (ECM) estimation and post-estimation diagnostic tests.

Table 3 indicates moderate variation across the study variables over the sample period. Manufacturing output exhibits relatively low dispersion (SD = 0.11), reflecting a stable long-term growth trajectory despite fluctuations in the industrial sector. Industrial credit shows steady expansion with a mean

logarithmic value of 5.69, while both import and export penetration ratios display limited variability, suggesting gradual changes in manufacturing trade exposure. Tariff rates exhibit comparatively higher variation (SD = 2.31), reflecting periodic changes in India's trade policy. Overall, the variables provide sufficient variation for econometric estimation without evidence of extreme observations.

Table-3
Descriptive Statistics

Variable	Mean	SD	Minimum	Maximum
ln_output	12.05	0.11	11.86	12.25
ln_credit	5.69	0.15	5.46	6.01
ln_import	-0.84	0.04	-0.92	-0.78
ln_export	-0.94	0.04	-1.01	-0.89
Tariff	11.39	2.31	8.99	14.65

Source: Author's computation based on RBI, UNIDO, DGCI&S, WITS and World Bank data.

Table-4
Correlation Matrix

Variable	Credit	Output	Import	Export	Tariff
ln_credit	1				
ln_output	0.900***	1			
ln_import	0.554**	0.45	1		
ln_export	0.512**	0.359	0.640***	1	
Tariff	0.723***	0.724***	0.641***	0.535**	1

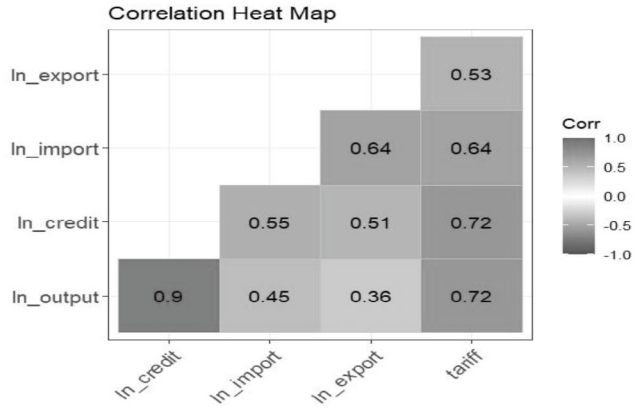
*Significance: *** p < 0.01, ** p < 0.05*
Source: Author's computation based on RBI, UNIDO, DGCI&S, WITS and World Bank data.

Table 4 shows that manufacturing output is strongly and positively correlated with industrial credit (r = 0.90), suggesting that periods of higher institutional lending are generally associated with higher manufacturing activity. Output also exhibits a positive correlation with tariff protection (r = 0.72), whereas its correlations with import penetration (r = 0.45) and export penetration (r = 0.36) are comparatively weaker. Correlations among the explanatory variables remain moderate, and the Variance Inflation Factor (VIF) values range from 1.82 to 2.56, confirming the absence of serious multicollinearity. These results indicate that each explanatory variable contributes distinct information to the regression model.

Figure 1 displays the Pearson correlation coefficients reported in Table 5. Darker shades indicate stronger positive correlations among the variables. The figure confirms that manufacturing output exhibits the strongest positive association with industrial credit (r = 0.90), followed by tariff protection (r = 0.72), while its relationships with import penetration (r = 0.45) and export

penetration (r = 0.36) are comparatively weaker. The absence of high correlations among the explanatory variables further supports the VIF results, indicating that multicollinearity is unlikely to affect the estimated ARDL coefficients.

Figure-1
Pearson Correlation Heat Map of the Study Variables



Source: Author's computation based on RBI, UNIDO, DGCI&S, WITS and World Bank data.

Prior to estimating the ARDL model, the stationarity properties of the variables were examined using the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and KPSS tests. The results indicate that all variables are non-stationary in levels but become stationary after first differencing, confirming that each series is integrated of order one, I (1) across all three tests. Since none of the variables is integrated beyond the first order, the ARDL methodology is appropriate. Based on the Akaike Information Criterion (AIC), the ARDL (1,1,1,0,1) specification was selected as the optimal model. The Pesaran Bounds Test produced an F-statistic of 7.57 ($p < 0.001$), exceeding the upper critical bound reported by Pesaran et al., (2001) at the 1 per cent significance level, confirming the existence of a stable long-run cointegrating relationship among manufacturing output, industrial credit, import penetration, export penetration and tariff protection.

Table-5
Long-run ARDL Estimates

Variable	Coefficient	Std. Error	t-value	p-value
Industrial Credit	0.719	0.176	4.094	0.006***
Import Penetration	-2.001	0.922	-2.17	0.073*
Export Penetration	-0.301	0.322	-0.933	0.387
Tariff	0.0302	0.0107	2.835	0.030**

*Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$*

Source: Author's computation based on RBI, UNIDO, DGCI&S, WITS and World Bank data.

Table 5 presents the estimated long-run coefficients obtained from the ARDL (1,1,1,0,1) model. Since the Bounds test confirmed the existence of cointegration, these coefficients represent the long-run equilibrium relationship between manufacturing output and its determinants.

Industrial credit exhibits a positive and statistically significant relationship with manufacturing output ($\beta = 0.719$, $p = 0.006$). The estimated elasticity indicates that a one per cent increase in industrial credit is associated with an approximately 0.72 per cent increase in manufacturing output, ceteris paribus. The result suggests that greater access to formal finance supports investment in fixed capital, technological modernization, working capital and productive capacity, thereby facilitating industrial expansion. This finding is consistent with the financial development literature, which argues that efficient credit allocation relaxes financing constraints and enhances manufacturing productivity (Beck et al., 2005; Ayyagari et al., 2014). It also supports the argument of Manova (2013) that financial access plays an important role in improving firms' production capabilities and international competitiveness.

Import penetration records a negative coefficient ($\beta = -2.001$) and is statistically significant at the 10 per cent level ($p = 0.073$). The result indicates that greater penetration of imported manufactured products is associated with lower domestic manufacturing output in the long-run. A possible explanation is that increased import competition may reduce market opportunities for domestic manufacturers, particularly MSMEs that often face technological disadvantages, limited economies of scale and restricted access to finance. Although trade liberalization can generate productivity gains through technology diffusion and competitive pressure, the present findings suggest that these benefits appear insufficient to offset the competitive challenges faced by domestic manufacturing during the study period. Similar evidence has been reported by Autor et al. (2013), who document the adverse effects of import competition on domestic manufacturing employment and production, while Amiti and Konings (2007) show that the gains from trade openness depend largely on firms' ability to improve productivity.

Export penetration exhibits a negative but statistically insignificant coefficient ($\beta = -0.301$, $p = 0.387$). The absence of statistical significance suggests that export intensity does not independently explain variations in aggregate manufacturing output after accounting for industrial credit, import competition and tariff protection. This finding should not be interpreted as evidence that exports adversely affect manufacturing. Rather, export performance is influenced by several structural factors, including firm productivity, technological capability, product quality and access to finance. According to Melitz (2003), more productive firms are generally self-selected into export markets, while Manova (2013) demonstrates that financial constraints

significantly influence firms' export participation. The findings further suggest that export intensity alone may not translate into higher aggregate manufacturing output unless accompanied by improvements in productivity, technological capability and access to finance.

Tariff protection demonstrates a positive and statistically significant association with manufacturing output ($\beta = 0.030$, $p = 0.030$). The estimated coefficient implies that a one percentage-point increase in the average applied tariff rate is associated with an approximately 3.02 per cent increase in manufacturing output in the long run. Although the magnitude of the coefficient remains modest, it suggests that selective tariff protection may temporarily shield domestic producers from external competition, allowing firms additional time to strengthen productive capacity and adjust to international market conditions. This finding is broadly consistent with the strategic trade and infant industry arguments advanced by Rodrik (2001) and Chang (2002), who contend that carefully designed trade protection can support industrial development under appropriate institutional conditions. However, the estimated effect is economically modest, suggesting that tariff protection provides only limited support to domestic manufacturing. Moreover, prolonged reliance on tariff protection may entail economic costs, including higher input prices for domestic producers, the possibility of retaliatory trade measures by trading partners, and reduced competitive pressure that may weaken incentives for productivity improvement and innovation. Therefore, tariff protection should be viewed as a complementary and temporary policy instrument rather than a substitute for long-term improvements in industrial productivity, technological capability and international competitiveness.

Overall, the long-run estimates identify industrial credit as the most influential determinant of manufacturing output among the variables included in the model. Import penetration is associated with lower manufacturing output, while tariff protection provides limited but statistically significant support to domestic production. Export penetration does not exhibit an independent long-run relationship with manufacturing output once the remaining explanatory variables are taken into account. These findings indicate that strengthening institutional credit and enhancing industrial competitiveness are likely to play a more important role in promoting manufacturing growth than relying solely on trade policy measures.

Export penetration does not appear in the short-run ECM because the selected ARDL (1,1,1,0,1) specification assigns a lag order of zero to this variable. Consequently, only its long-run effect is estimated.

Table 6 reports the short-run dynamics estimated through the Error Correction Model (ECM). The error correction term is negative and statistically significant (ECT = -0.819, $p = 0.007$), confirming the existence of a stable long-

run equilibrium relationship among the variables. The coefficient indicates that approximately 82 per cent of short-run disequilibrium is corrected within one year, reflecting a relatively rapid adjustment of manufacturing output towards its long-run equilibrium following temporary economic shocks.

Table-6
Error Correction Model (ECM) Estimates

Variable	Coefficient	Std. Error	p-value
ECT (-1)	-0.819	0.203	0.007***
ΔCredit	0.039	0.247	0.881
ΔImport Penetration	-0.487	0.567	0.423
ΔTariff	0.025	0.01	0.045**

*Significance: *** p < 0.01, ** p < 0.05, * p < 0.10*
Source: Author's computation based on RBI, UNIDO, DGCI&S, WITS and World Bank data.

Among the short-run variables, only changes in tariff protection exhibit a positive and statistically significant effect on manufacturing output ($\beta = 0.025$, $p = 0.045$). In contrast, changes in industrial credit and import penetration are statistically insignificant, indicating that their influence on manufacturing output materialises primarily over the long-run rather than immediately. The absence of a differenced export penetration term reflects the optimal ARDL (1,1,1,0,1) lag specification selected using the Akaike Information Criterion and should not be interpreted as implying that exports are economically unimportant.

Table 7
Diagnostic Test Results

Diagnostic Test	Statistic	p-value	Conclusion
Bounds Test	F = 7.57	0.0007	Cointegration confirmed
Breusch-Godfrey LM	0.973	0.324	No serial correlation
Breusch-Pagan	5.697	0.681	Homoscedastic residuals
Jarque-Bera	0.176	0.916	Residuals normally distributed
Maximum VIF	2.56	-	No multicollinearity

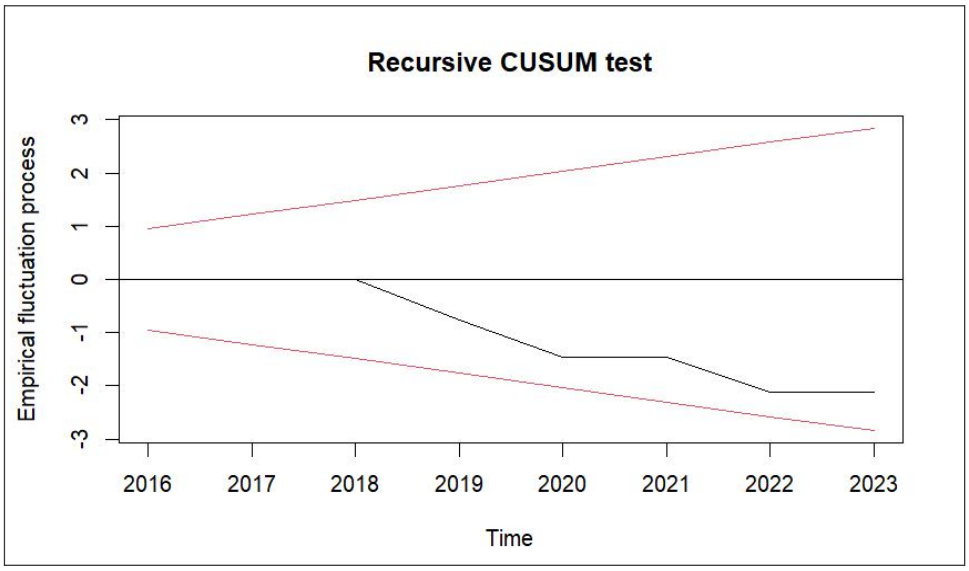
Source: Author's computation based on RBI, UNIDO, DGCI&S, WITS and World Bank data.

As a robustness assessment, a pairwise Granger causality test was conducted to examine the direction of predictive causality between industrial credit and manufacturing output. The results indicate that industrial credit Granger-causes manufacturing output ($F = 3.279$, $p = 0.095$), suggesting that past

values of industrial credit improve the prediction of manufacturing output at the 10 per cent significance level. In contrast, manufacturing output does not Granger-cause industrial credit (F = 0.380, p = 0.549). These findings provide no evidence of reverse causality and lend additional support to the interpretation that industrial credit precedes changes in manufacturing output within the sample period.

The diagnostic results indicate that the estimated ARDL model satisfies the principal assumptions required for valid statistical inference. The Breusch-Godfrey LM test confirms the absence of serial correlation, the Breusch-Pagan test indicates homoscedastic residuals, and the Jarque-Bera test supports the normality of the residuals. Furthermore, the maximum VIF value of 2.56 suggests that multicollinearity is not a concern. Collectively, these results support the diagnostic results indicate that the estimated ARDL (1,1,1,0,1) model satisfies the principal assumptions underlying regression analysis, supporting the robustness and reliability of both the long-run and short-run estimates.

Figure-2
Recursive CUSUM Test for Parameter Stability of the Estimated ARDL



Source: Author's computation

As an additional robustness check, the Recursive CUSUM test was employed to examine the stability of the estimated coefficients over the sample period. Figure 2 shows that the recursive cumulative sum remains within the 5 per cent critical bounds throughout the sample period. Consistent with the formal test statistic (S = 0.779, p = 0.157), the null hypothesis of parameter stability

cannot be rejected, indicating that the estimated ARDL model remains stable despite the occurrence of major economic events, including the Global Financial Crisis, demonetisation, the GST implementation and the COVID-19 pandemic.

The empirical findings indicate that industrial credit is the most important long-run determinant of manufacturing output in India. Greater access to institutional finance is associated with higher manufacturing production, suggesting that improved credit availability supports investment, technological upgrading and productive capacity expansion within the manufacturing sector. In contrast, higher import penetration is associated with lower domestic manufacturing output, implying that increased foreign competition may adversely affect domestic producers, particularly firms with relatively limited technological capability and financial resources. Export penetration does not exhibit a statistically significant independent relationship with manufacturing output after controlling for the remaining variables, indicating that export performance is likely influenced by broader structural factors such as productivity, firm heterogeneity, global value-chain integration and access to finance rather than trade intensity alone. Tariff protection exerts a positive but comparatively modest influence in both the long-run and the short-run, suggesting that while selective tariff measures may provide temporary support to domestic manufacturing, sustained industrial growth depends more fundamentally on improvements in financial access, technological capability and industrial competitiveness. Overall, the findings suggest that trade policy and financial development should be viewed as complementary policy instruments rather than substitutes for promoting manufacturing-led growth in India. Given the relatively small sample size and the use of aggregate manufacturing data, the estimated relationships should be interpreted as statistically significant associations rather than definitive causal effects.

Conclusion

The present study examined the long-run and short-run relationship between industrial credit, trade penetration, tariff protection and manufacturing output in India using annual data for the period 2008-09 to 2023-24. Employing the ARDL Bounds testing approach, the study found evidence of a stable long-run equilibrium relationship among the variables. The empirical results indicate that industrial credit is positively and significantly associated with manufacturing output, highlighting the importance of institutional finance in supporting investment, technological upgrading and production expansion within the manufacturing sector.

Import penetration exhibits a negative long-run association with manufacturing output, suggesting that greater import competition may adversely affect domestic manufacturing performance, particularly where firms face technological and financial constraints. In contrast, export penetration does not exert a statistically significant independent effect after controlling for industrial

credit, import competition and tariff protection, implying that export performance is influenced by broader structural factors rather than trade intensity alone. Tariff protection demonstrates a positive but relatively modest association with manufacturing output in both the long-run and the short-run, indicating that selective trade measures may provide temporary support but cannot substitute for improvements in productivity and financial development.

The findings suggest that policies aimed at strengthening institutional credit availability, particularly for manufacturing enterprises, alongside improvements in technological capability, productivity and industrial competitiveness are likely to contribute more effectively to sustainable manufacturing growth than reliance on tariff protection alone. Trade policy should therefore complement, rather than replace, policies that improve access to finance and enhance productive efficiency.

The study is subject to several limitations. First, the analysis is based on only sixteen annual observations (2008-09 to 2023-24), which limits statistical power despite the suitability of the ARDL approach for small samples. Second, manufacturing-specific MSME credit data were not consistently available; consequently, aggregate MSME credit was used as a proxy, which may introduce measurement error. Third, the analysis does not explicitly account for other macroeconomic and institutional factors such as exchange rate movements, inflation, infrastructure, labour market conditions, GST implementation and the COVID-19 pandemic owing to data limitations. Finally, although the ARDL framework and lagged regressors help mitigate simultaneity concerns, potential endogeneity between industrial credit, trade variables and manufacturing output cannot be completely ruled out. Therefore, the estimated relationships should be interpreted as associations rather than definitive causal effects.

Future research may extend the analysis using longer time-series data, manufacturing-specific credit information, firm-level or sectoral panel data, or alternative econometric approaches such as instrumental variable estimation, Bayesian techniques and panel data methods. Future studies may also incorporate additional macroeconomic variables, including exchange rates, inflation, infrastructure and productivity indicators, to provide a more comprehensive assessment of the determinants of manufacturing performance.

References

Amiti, M., & Konings, J. (2007). Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia. American Economic Review, 97(5), 1611–1638. https://doi.org/10.1257/aer.97.5.1611

Autor, D. H., Dorn, D., & Hanson, G. H. (2013). The China syndrome: Local labour market effects of import competition in the United States. American Economic Review, 103(6), 2121–2168. https://doi.org/10.1257/aer.103.6.2121

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2014). Who creates jobs in developing countries? Small Business Economics, 43(1), 75–99. https://doi.org/10.1007/s11187-014-9549-5

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2005). Financial and legal constraints to growth: Does firm size matter? Journal of Finance, 60(1), 137–177. https://doi.org/10.1111/j.1540-6261.2005.00727.x

Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*. John Wiley & Sons.

Breusch, T. S. (1978). Testing for autocorrelation in dynamic linear models. Australian Economic Papers, 17(31), 334–355.

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. Econometrica, 47(5), 1287–1294.

Chang, H.-J. (2002). Kicking away the ladder: Development strategy in historical perspective. Anthem Press.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. Econometrica, 49(4), 1057–1072.

Godfrey, L. G. (1978). Testing against general autoregressive and moving average error models. Econometrica, 46(6), 1293–1301.

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. Journal of Econometrics, 2(2), 111–120.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill.

Jarque, C. M., & Bera, A. K. (1980). Efficient tests for normality, homoscedasticity and serial independence of regression residuals. Economics Letters, 6(3), 255–259.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity. Journal of Econometrics, 54(1-3), 159–178.

Manova, K. (2013). Credit constraints, heterogeneous firms, and international trade. Review of Economic Studies, 80(2), 711–744.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica, 71(6), 1695–1725.

Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. Applied Economics, 37(17), 1979–1990.

OECD. (2018). *OECD inter-country input-output database*. OECD Publishing.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. Biometrika, 75(2), 335–346.

Rodrik, D. (2001). The global governance of trade as if development really mattered. United Nations Development Programme.

UN Statistics Division. (2019). *International Standard Industrial Classification of All Economic Activities (ISIC Rev. 4)*. United Nations.

Wooldridge, J. M. (2019). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.

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REGIONAL INEQUALITIES IN SOCIO-ECONOMIC DEVELOPMENT IN BHARMOUR BLOCK OF HIMACHAL PRADESH

Sanjeev Kumar[1], Sanjay Kumar[2], and Diksha Kumari[3]

Abstract: Bharmour is one of the socially and economically backward blocks of Chamba district in Himachal Pradesh, predominantly inhabited by the Gaddi community. The present study, evaluates the regional inequalities in socio-economic development in this block using village-level secondary data from the 1991, 2001, and 2011 Censuses. Data were sourced from the District Census Handbooks, the Directorate of Census Operations, the Directorate of Economics and Statistics, and the Department of Health and Family Welfare, Shimla. To assess socio-economic development, Composite Principal Component Analysis was employed as a statistical technique. Moran's I was applied to examine the spatial autocorrelation of socio-economic development across the study area. In addition, the coefficient of variation has been computed to analyse regional disparities at the level of individual social and economic variables. The findings indicate that Bharmour block experienced progressive improvement in socio-economic development between 1991 and 2011, accompanied by a gradual reduction in inter-village regional inequalities. While socio-economic development showed a random spatial pattern in 1991 and 2001, it transitioned to a clustered distribution by 2011, indicating increasing regional concentration over time.

Keywords: Socio-Economic Development, Regional Inequality, Inter-village Variations

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Introduction

In India, socio-economic development has not been consistent and regional inequalities have increased in almost all socio-economic indicators. In recent decades, India has experienced a period of extraordinary economic growth. Despite this noteworthy accomplishment, India continuous to face large socio-economic disparities (Kumar and Rani, 2019). Regional disparities represent the co-existence of relatively developed and depressed or backward regions in any area. Some areas enjoy the benefits of concentrated developmental activities due to the factors such as markets development, favourable geographical conditions and government policies along with other social, economic and political reasons (Raj and Thakur, 2020). Majumdar (2021) defines Regional disparities as the unequal spatial distribution of social, economic, natural, and material resources across the nation, states, districts, or local administrative units like community development blocks, villages and municipalities. Measures of disparity are vital for identifying backward regions in relation to neighbouring regions, which helps improve planning processes (Das, 2018). Banerjee (1992) found that the rural areas of India are typically suffering from regional imbalances in socio-economic development.

Nature itself creates imbalances in the form of relief, climate, biotic cover and mineral endowments and human activity operates in this setting. The imbalances produced by nature have been aggravated by human intervention as well (Deshpande, 1982). Kuznets (1955) in his 'Inverted U-shaped' theory claimed that spatial inequalities increase initially in the process of development and follow decline subsequently. Williamson (1965) has also proved that the route of economic development at the country level is hardly ever regionally fair. Williamson (1965) and Nair (1982) have shown that national economic development is usually accompanied by increased interstate inequality, at least in the early stages. Consequently, the central objective of development remains the improvement in the quality of life through better education, health, reduced poverty, environmental sustainability, and greater equality of opportunity (World Bank, 1991).

Disparities in education, health and other dimensions of human development continue to persist despite marked progress in reducing the gaps (DESA, 2013). India has been progressing from an underdeveloped to a developing nation, gaining greater capabilities in terms of social, economic and overall development. However, the benefits of socio-economic development remain confined to small areas of certain social, economic, political or strategic significance. This trend results in regional/spatial disparities. Several studies such as Nair (1982); Chand and Puri (1983); Das and Barua (1996); Kurian (2000); Dholakia (2003); Rai and Bhatia (2004); Sahu and Kaur (2006); Rajalakshmi (2013); Nayak (2014); Singh (2014); Maiti & Marjit (2015); Sharma (2017); and

Kumar and Rani (2019) assessed the issue of regional disparities in socio-economic development in India reported significant disparities. In this context, an attempt is made in the present paper to study the regional variations in socio-economic development in the mountainous Bharmour block of Himachal Pradesh.

Objectives of the Study

The present study aims to fulfil the following objectives:

To assess the trend and pattern of socio-economic development in Bharmour block.

To examine component-wise disparities within Bharmour block.

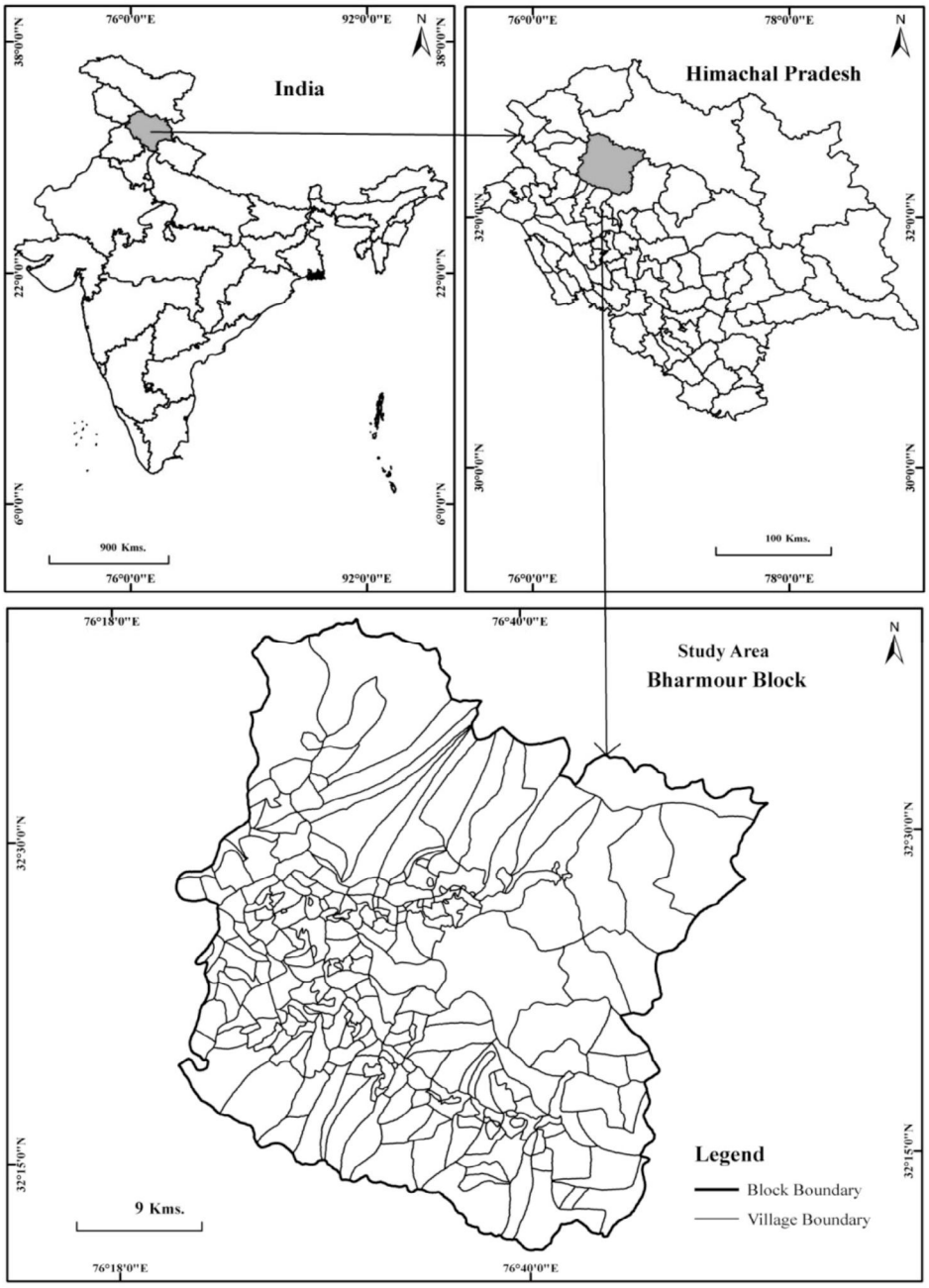
Study Area

Chamba district, designated by NITI Aayog as one of the 115 Aspirational Districts, holds a unique developmental significance in Himachal Pradesh, with Bharmour Block emerging as one of its most backward regions. Initiated in January 2018, the Aspirational Districts Programme adopts an outcome-based, data-driven approach to expedite socio-economic progress in India's least developed areas (Kumar & Thakur, 2020). Infrastructural inadequacies arising from the difficult Himalayan terrain have perpetuated socio-economic deprivation in Bharmour Block (Kumar et al., 2022).

Bharmour block (comprising Bharmour tehsil and Holi sub-tehsil) is a remote and mountainous rural region of Chamba district in Himachal Pradesh. The longitudinal extent of the study area ranges between 76º21'15" and 76º53′09" E and the latitudinal extent ranges between $32^0$10'41"-$33^0$40′17" N (Figure 1). In the north and north-east, the study region shares boundaries with Churah tehsil and Lahaul-Spiti district. In the east, it shares boundary with the Lahaul-Spiti and Kangra districts. Kangra district shares boundary with Bharmour block in the south and south east. The Chamba tehsil demarcates boundary in the west (Figure 1).

There were 31 gram panchayats in Bharmour block as per the 2011 Census. There are 252 villages in the Bharmour block out of which six villages were reported as abandoned in 2011. The number of inhabited villages in the study area changes across Census years, increasing from 99 in 1991 to 102 in 2001 and then declining to 96 in 2011. These changes are mainly due to administrative factors such as village reclassification, merging or splitting of villages, and depopulation in remote hills of Bharmour. A total of 91 villages that were inhabited in all three census years have been considered for the present study.

Figure-1



Source: Administrative Atlas Census of India, 2011. p. 148

The study reveals that six villages, namely D.P.F. Bharmani, D.P.F. Suai, Dhar Fit File, Dhar Heg, Dhar Ser and R.F. Sawin, were reported as abandoned between 2001 and 2011. The apparent desertion of villages can largely be attributed to census-related issues and migration processes. In the case of four villages, the discrepancy appears to arise from errors in census enumeration, as these villages were incorrectly recorded as inhabited in the 2001 Census. It has been confirmed in the study that these settlements are primarily seasonal pasture grounds used by local shepherds and cattle rearers during the summer months, rather than permanently inhabited villages. In addition, two villages experienced out-migration due to difficult terrain, harsh climatic conditions, and limited availability of basic resources such as water and electricity. However, the 2011 Census enumerated these villages under the uninhabited category.

As per the Census of India (2011), Bharmour block spreads over an area of 1818.37 sq. km and has a population of 39,108 persons. It covers about 27.88 per cent of the total geographical area and 7.53 per cent of total population of Chamba district. Bharmour block is a tribal block inhabited by the Gaddi community and about 83 per cent of the total population belongs to this community as per the 2011 Census. The Gaddis were notified as the Scheduled Tribes vide the Constitution (Scheduled Tribes) Order (Amendment) Act, 1991, which came into effect in 2002. The Gaddis are semi-nomadic pastoralists engaged in sheep and goat rearing in the Kangra and Chamba districts of Himachal Pradesh, practicing seasonal migration in search of grazing lands (Biswas & Rao, 2016).

The Gaddis predominantly inhabit the interior regions of Chamba district, particularly the Ravi valley, which is characterized by the most rugged terrain in the Western Himalayas. Owing to its geographical remoteness and persistent developmental backwardness, Chamba district has been designated as a tribal area by the Government of India (Simmy, 2021). The Gaddi community has been engaged in pastoralism since its migration from the plains to the Himalayan region of Himachal Pradesh. The specific tracks of land in the forests where the Gaddi settled their herd were called the 'ban' or the 'dhars'. The shepherd had to pay a revenue tax for use of the grazing lands (Saberwal, 1996).

Database and Methodology

Since backwardness has many different dimensions, no one variable can adequately capture its complexity. Backwardness has already been evaluated at the state and sub-district levels by numerous committees. The Planning Commission Study Group for the Fourth Plan, the National Committee established by the National Development Council in 1968, and the Raghurajan Committee established by the Ministry of Finance in 2013 are prominent examples (Bakshi et al., 2015). All these expert groups assessed backwardness at the state and sub-state levels using a wide range of criteria. However, there is still

no consensus regarding the most appropriate variables for measuring backwardness.

This study uses publicly available secondary census data and does not involve human subjects, therefore, no ethical approval was required. The secondary data relating to rural socio-economic development were collected from District Census Handbooks, Directorate of Census Operations, Directorate of Economics and Statistics and Department of Health and Family welfare, Shimla, for the years of 1991, 2001 and 2011. The regional disparities in the levels of socio-economic development have been assessed at the village level in the study area.

The trend and pattern of socio-economic development in the study area have been examined with respect to 15 indicators namely sex ratio (X_1); child sex ratio (X_2); literacy rate (X_3); female literacy rate (X_4); male literacy rate (X_5); work participation rate (X_6);female work participation rate (X_7);male work participation rate (X_8);main cultivators (percentage of main cultivators to total main workers) (X_9); net sown area (X_{10}); number of elementary schools/500 persons, secondary schools/1000 persons, and colleges/1000 persons (X_{11}); number of dispensaries, primary health sub-centres/3000 persons, primary health centres/20,000 persons, community health centre/80,000 and hospitals/1,00,000 persons (X_{12}); road facility (X_{13}); piped water supply (X_{14}); electrification (X_{15}). The population thresholds for health infrastructure used in this study are derived from the official rural health infrastructure norms prescribed by the Government of India for hilly and tribal regions. As per these norms, a sub-centre is designed to serve a population of 3,000 persons, a primary health centre caters to 20,000 persons, and a community health centre is intended to cover 80,000 persons.

Composite Development Index

A composite development index has been formulated to assess the overall level of socio-economic development by integrating multiple indicators into a single standardized metric. The index was constructed using principal component analysis (PCA), a multivariate technique that reduces dimensionality and determines weights for each indicator based on the proportion of variance explained by the principal components.

Standardization

All selected socio-economic indicators, expressed in percentage form, were first standardized using Z-scores to ensure comparability and to remove the effect of differing measurement units (OECD, 2008; Mazziotta and Pareto, 2017). The Z-score for each indicator was calculated as:

$$Z = \frac{X - Mean}{\sigma}$$

Where; Z represents the Z-score,

X denotes the observed value,

Mean represents the mean value of variables,

σ represents the standard deviation from the mean value

Principal Component Analysis - Based Weighting

Principal Component Analysis was applied to the standardized data using the correlation matrix. The composite index was computed using the component score coefficient matrix. The first principal component (PC1), explaining the maximum variance, was used as the composite development index. The first principal component is often used as the best composite index (Booysen, 2002; Mishra 2007; Somarriba and Trapero, 2008). The composite development index (CDI) for each village was computed as a weighted sum of standardized variables using factor loadings derived from PCA:

$$CDIi = \sum_{j=1}^{n} wj \times zij$$

Where:

$CDIi$ = Composite Development Index for village i

wj = weight (factor loading or component score coefficient) of variable j

zij = standardized values of variable j for village i

n = number of variables

Higher positive scores indicate higher levels of development, while negative scores indicate lower levels. The composite scores were classified into the following five categories:

Development Category	**Composite PCA Scores**
Very High	More Than +3.00
High	1.00 to +3.00
Moderate	-1.00 to +1.00
Low	-3.00 to -1.00
Very Low	Less Than -3.00

Moran's I (Global Spatial Autocorrelation)

Although the study is framed as a regional analysis, an exploratory measure of spatial autocorrelation (Moran's I) was used to examine whether the regional distribution exhibits any geographical clustering. Global spatial autocorrelation in socio-economic development was examined using Moran's I statistic following the formulation originally proposed by P.A.P. Moran (1950) and widely applied in spatial socio-economic studies by Luc Anselin (1988, 1995). The statistic was operationalized using the spatial autocorrelation (Moran's I) tool available in ArcGIS, which computes Moran's I based on a user-defined spatial weights matrix. Moran's I is expressed as:

$$I = (n / \sum i \sum j\, wij) \times [\, (\sum i \sum j\, wij\, (xi - \bar{x})(xj - \bar{x})) / (\sum i\, (xi - \bar{x})^2) \,]$$

Where:

n represents the number of spatial units,

xi and *xj* denote the observed values of the socio-economic indicator in spatial units *i* and *j*,

$\bar{x}$ is the mean of the variable,

wij refers to the spatial weights defining neighbourhood relationships (contiguity-based)

The value of Moran's I ranges from -1 to +1, with positive values indicating spatial clustering of similar values, negative values indicating spatial dispersion, and values close to zero suggesting spatial randomness. Statistical significance was assessed in Arc GIS using the standardized z-score and associated p-value to test the null hypothesis of spatial randomness.

Furthermore, to find out regional variations at the level of individual indicator, the coefficient of variation was calculated by using following formula:

$$\text{C.V.} = \frac{\sigma}{\text{Mean}} \text{X}100$$

Where; C.V. means co-efficient of variation

σ represents the standard deviation from the mean value

Mean denotes the mean value of variables

Choropleth technique was used to prepare the maps illustrating the spatio-temporal variations in the level of development during the study period. All maps were vectorised in ArcGIS, and the cartographic work was carried out using a GIS platform.

Results and Discussion

Areas of Very High Socio-Economic Development **-** Table 1 and Figure 2 indicate that 9 villages registered very high levels of socio-economic development in 1991. The analysis further reveals that approximately 7.17 per cent of the total population fell under this high-development category during the same period. Table 1 shows that the proportion of such villages increased to 15.38 per cent of the total inhibted villages in 2001. Figure 3 reveals that these villages constituted 13.76 per cent of total population of the study area. The study further reveals that slightly more than one-fourth (29.69%) of the total inhabited villages experienced very high levels of socio-economic development in the Bharmour block over the subsequent decade. Thus, there was an improvement of about 10 per cent points in the share of the villages in this category during the study period.

Approximately 35 per cent of the total population was classified under the category of very high levels of socio-economic development in 2011. These villages are predominantly concentrated in the central part of the Bharmour block, with a few isolated settlements located in the north-western and south eastern regions (Figure 4)Availability of basic learning institutions, improved literacy conditions among both males and females, higher work participation rates for both genders, a favorable sex ratio including child sex ratio, and the provision of essential amenities such as piped water supply and electrification have contributed to very high socio-economic development in these areas of Bharmour during the study period.

Table 1
Bharmour Block: Levels of Socio-Economic Development

Census Year	Composite Development Index					Inhabited Villages
	Less Than -3.00	-3.00 to -1.00	-1.00 to +1.00	1.00 to + 3.00	More Than +3.00	
1991	13 (14.29)	22 (24.17)	23 (25.27)	24 (26.37)	9 (9.89)	91 (100.00)
2001	12 (13.18)	9 (9.89)	32 (35.16)	24 (26.37)	14 (15.38)	91 (100.00)
2011	9 (9.89)	8 (8.79)	22 (24.17)	25 (27.47)	27 (29.69)	91 (100.00)

Figures in parentheses show the per cent to total inhabited villages
Source: Computed by Authors based on census data

Areas of High Socio-Economic Development-The villages having a Composite Development Index (CDI) value between +1 and +3 have been classified as areas

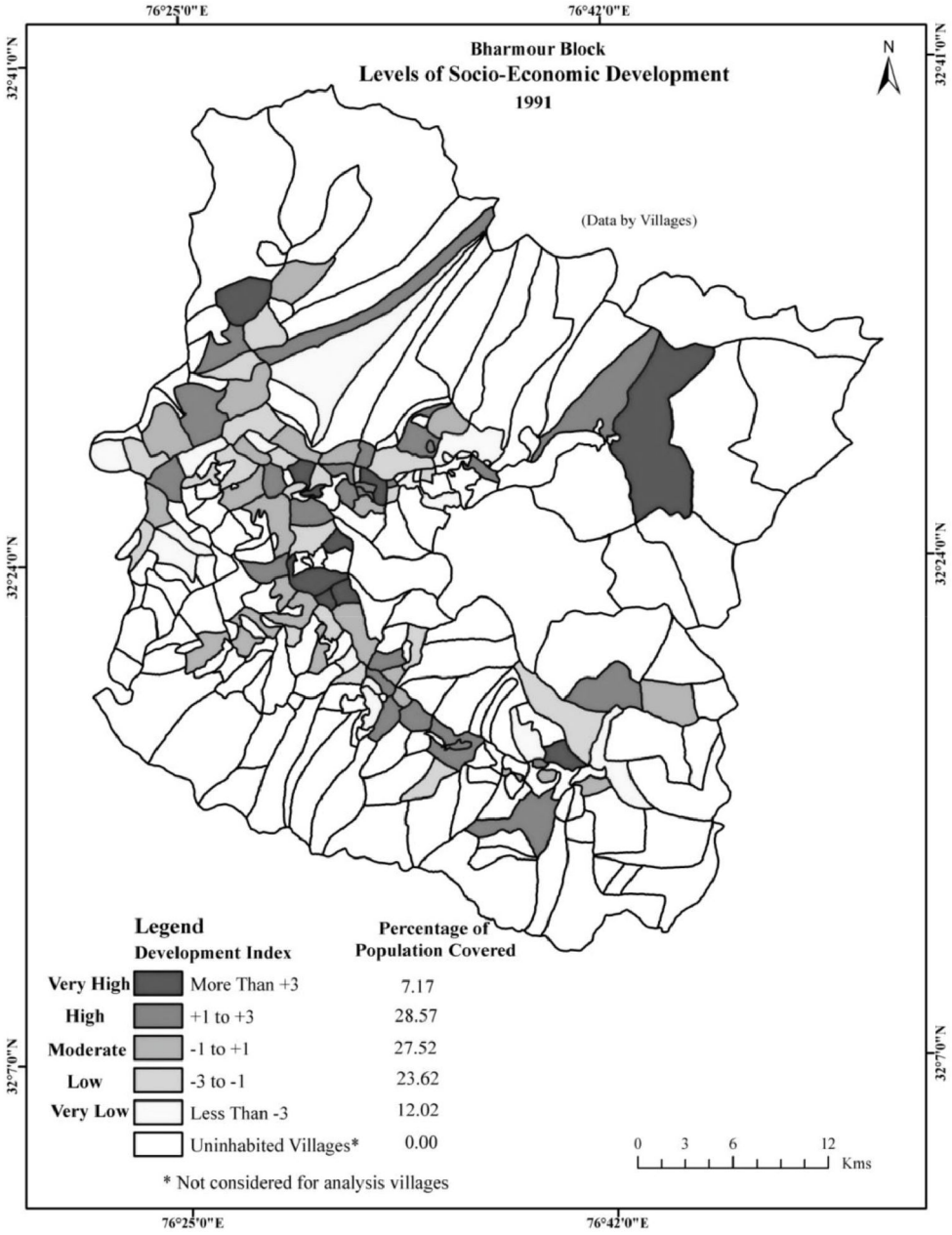
with high socio-economic development. Approximately 26.37 per cent of the total inhabited villages in Bharmour Block, accounting for 28.57 per cent of the total population, experienced high levels of socio-economic development in 1991 (Table 1 and Figure 2). These villages were predominantly located in the mid-western and central parts of the block.

The proportion of such villages remained unchanged at 26.37 per cent of the total inhabited villages in 2001, exhibiting a similar regional distribution pattern, primarily concentrated in the mid-western and central parts of the study area (Figure 3). The analysis reveals that approximately 20 per cent of the total inhabited villages, encompassing 22.89 per cent of the total population, exhibited high levels of socio-economic development in Bharmour Block in 2011 (Table 1 and Figure 4). These villages are predominantly concentrated in the central and mid-western parts of Bharmour Block (Figure 4).

Improvements in the infrastructure of education represented solely by the availability of educational institutions and healthcare facilities, enhanced road connectivity, a relatively favourable sex ratio, higher literacy rates and work participation levels, along with the provision of piped water supply and electrification, were identified as key factors contributing to the high levels of socio-economic development in the study area.

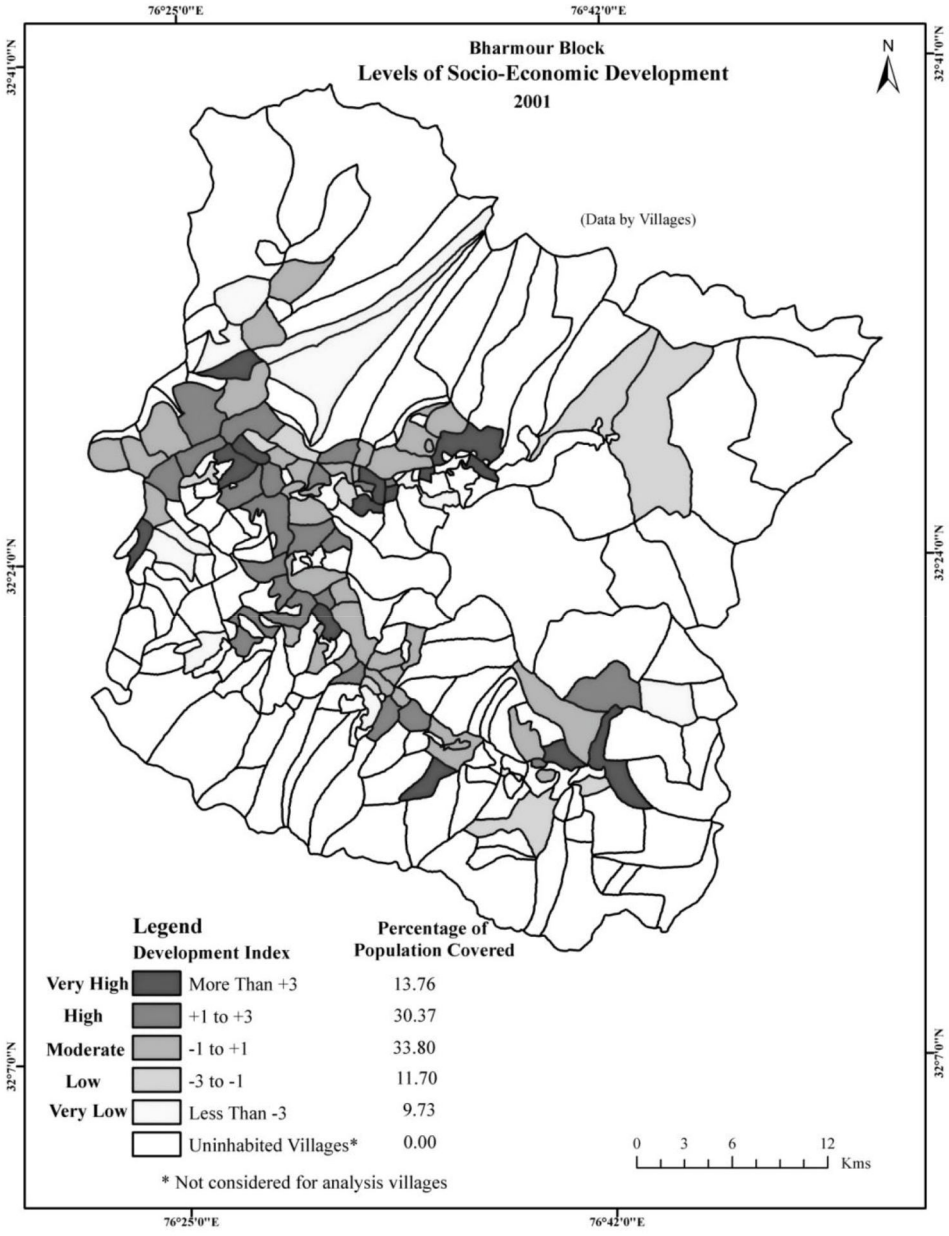
Areas of Moderate Socio-Economic Development- The study reveals that slightly over one-fourth (25.27%) of the total inhabited villages exhibited a moderate level of socio-economic development, as indicated by Composite Development Index ranging between −1 and +1, in 1991 (Table 1). Figue2 further illustrates that villages falling within this moderate category were regionally distributed across nearly the entire Bharmour block. Approximately 27.52 per cent of the total population experienced a moderate level of socio-economic development in 1991, as depicted in Figure 2. In 2001, the share of villages falling under the moderate category of socio-economic development rose to 35.16 per cent. The findings further indicate that 33.80 per cent of the total population in the Bharmour block experienced a moderate level of socio-economic development (Figure 3). As illustrated in Figure 3 such areas were predominantly located in the mid-western and central parts of the study region. Table 1 and Figure 4 indicate that the proportion of villages exhibiting moderate levels of socio-economic development declined to approximately 24.17 per cent of the total inhabited villages in 2011, accounting for about 30.69 per cent of the total population. These villages were predominantly located in the mid-western and central regions, along with a few isolated settlements in the south-eastern part of the Bharmour block (Figure 4). The levels of socio-economic development during the study period were influenced by factors such as the availability of basic educational infrastructure, the status of women in society, and the proportion of the working population.

Figure-2



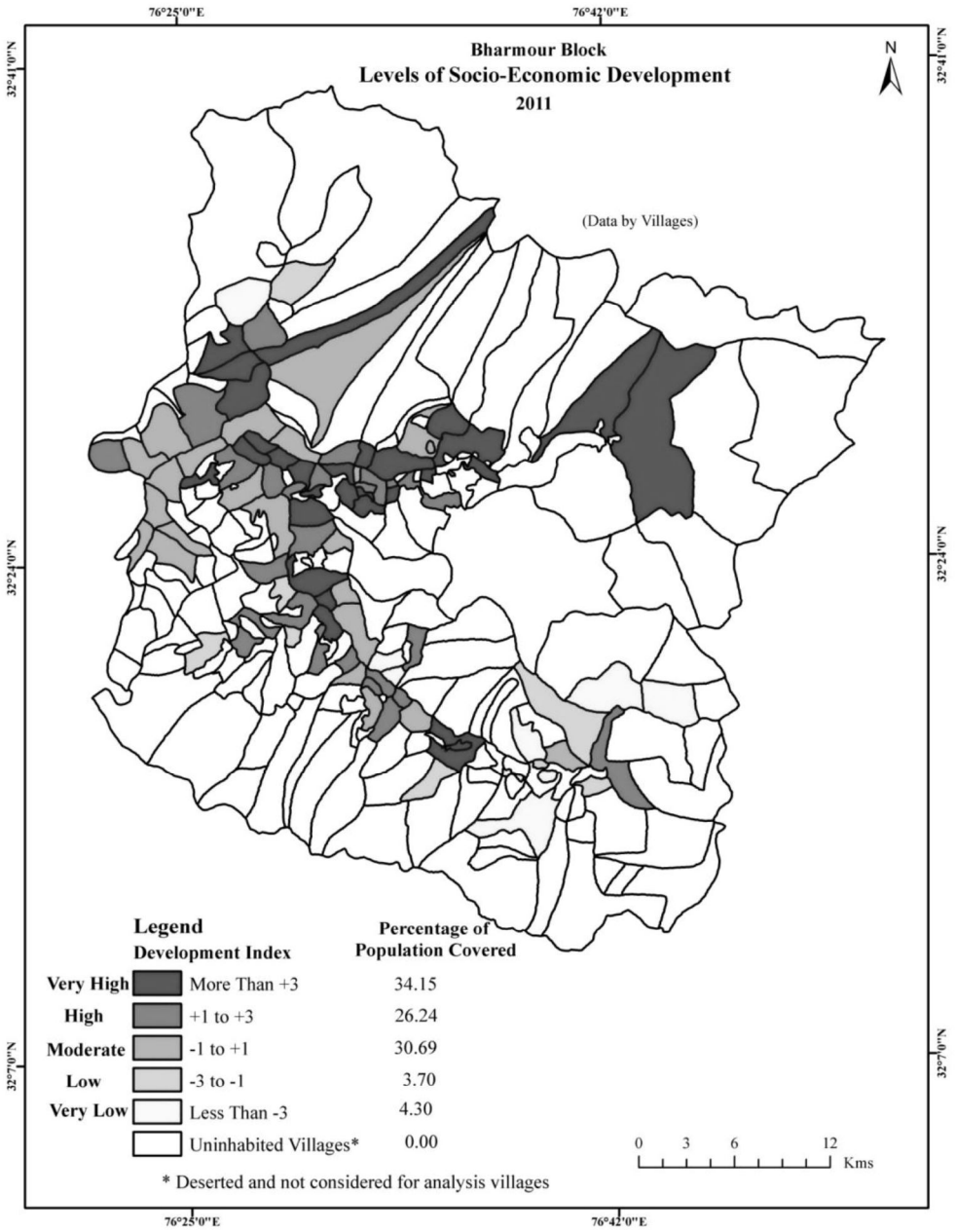
Source: Composed by Authors based on Census data

Figure-3



Source: Composed by Authors based on Census data

Figure-4



Source: Composed by Authors based on Census data

Areas of Low Socio-Economic Development **-** Table 1 and Figure 2 reveal that 24.17 per cent of the total inhabited villages in Bharmour block, representing 23.93 per cent of the total population, experienced low levels of socio-economic development in 1991. As depicted in Figure 2, these villages were dispersed across the mid-western and central parts of the study area, with a few scattered occurrences in the south-eastern region.

The study indicates a significant decline in the proportion of such villages, which decreased to 9.89 per cent of the total inhabited villages in 2001. It further reveals that these villages accounted for 11.70 per cent of the total population of the study area. The study further reveals a substantial decline in the number of villages exhibiting low levels of socio-economic development, which reduced to only eight in the Bharmour block during the 2011 Census year. This decline reflects a marked improvement in the overall socio-economic conditions of the region over the study period. The analysis further indicates that a very small proportion of the population, accounting for merely 3.70 per cent, was categorized under this low development group in 2011 (Figure 4). The low levels of socio-economic development in these areas of Bharmour may be attributed to a combination of factors, including weak educational attainment marked by low literacy levels due to inadequate educational infrastructure, poor road connectivity, persistent gender disparities arising from a patriarchal social framework, and limited agricultural development.

Areas of Very Low Socio-Economic Development -The analysis indicates that 13 villages, accounting for 14.29 per cent of the total inhabited villages, experienced very low levels of socio-economic development in 1991. These villages comprised 12.02 per cent of the total population of the study area. Further, Figure 3 reveals that 13.18 per cent of the total inhabited villages, representing 9.73 per cent of the total population, were categorized under the very low level of socio-economic development in the Bharmour block. The study reveals that 9.89 per cent of the total inhabited villages, accounting for 4.30 per cent of the total population, recorded very low levels of socio-economic development in the Bharmour block in 2011 (Table 1 and Figure 4). The persistence of such low development levels may be attributed to several factors, including inadequate educational facilities, low participation of females in economic activities, pronounced gender disparities, economic backwardness, and insufficient access to transportation and piped water supply.

Spatial Autocorrelation (Moran's I) Analysis

The spatial autocorrelation analysis using Moran's I for the 1991 dataset yields a Moran's Index of 0.045, with a z-score of 1.29 and a p-value of 0.195. The near-zero Moran's I value indicates a very weak positive spatial association. As the z-score falls within the critical range of -1.96 to +1.96 and the p-value exceeds the 0.05 significance level, the result is statistically insignificant. Therefore, the

spatial distribution during this period can be characterized as random, reflecting an absence of a structured regional pattern and suggesting uneven and unorganized development in the Bharmour block.

For the year 2001, the spatial autocorrelation analysis of socio-economic development in Bharmour block yields a Moran's Index of -0.009, with a z-score of -0.145 and a p-value of 0.884. The Moran's I value is nearly zero and slightly negative, indicating a negligible tendency toward spatial dispersion in the distribution of socio-economic development indicators. Furthermore, the z-score is very close to zero and the p-value is substantially higher than the 0.05 significance level, confirming that the result is statistically insignificant. Therefore, the regional pattern of socio-economic development in Bharmour block can be characterized as random, reflecting the absence of any systematic regional structure or clustering.

Table 2
Bharmour Block: Spatial Autocorrelation (Moran's I) of Development Pattern

Year	Moran's I	z-score	p-value	Pattern
1991	0.045	1.29	0.195	Random
2001	-0.009	-0.145	0.884	Random
2011	0.157	4.256	0.000021	Clustered

Source: Computed by the authors using Census data through ArcGIS

In contrast, the spatial autocorrelation analysis for 2011 reveals a Moran's Index of 0.157, accompanied by a high z-score of 4.256 and a very low p-value of 0.000021. The positive value of Moran's I indicates a clustered spatial pattern, while the z-score, being well above the critical threshold of 1.96, confirms that the pattern is statistically significant. The extremely low p-value further substantiates that the observed clustering is not a result of random chance. Therefore, the regional distribution of socio-economic development in 2011 demonstrates a significant clustered pattern, indicating the emergence of development hubs within the study area.

Trend of Disparities in Socio-economic Development Indicators

Given the pronounced diversity in physical settings and human environments across the villages of Bharmour block, the emergence of regional disparities in socio-economic development is inevitable. The study accordingly reveals marked regional disparities in socio-economic development within the study area.

Indicator-wise magnitude of disparities in socio-economic development in the years 1991, 2001, and 2011 was assessed in this section of the study by calculating the coefficient of variation (Table 3). A higher coefficient of variation indicates a greater level of disparity, and vice-versa. The sex ratio among the

villages of the Bharmour block exhibited a gradual increase over the study period. The coefficient of variation in the sex ratio was recorded at 12.08 per cent in 1991, which increased to 13.62 per cent in 2001 and further rose marginally to 15.19 per cent in 2011, indicating a gradual increase in inter-village disparities in the sex ratio over the study period. The increasing variation in sex ratio may be attributed to uneven socio-economic development and differential healthcare accessibility among villages in the Bharmour block. Male out-migration from remote Himalayan settlements in search of employment opportunities may also have altered the demographic structure, leading to inter-village disparities in sex ratio.

Table 3 indicates that the coefficient of variation in the child sex ratio was 54.16 per cent in 1991. It increased to 60.68 per cent in 2001, reflecting greater variability across villages. However, it declined to 38.70 per cent in 2011, indicating a reduction in disparities over time. This reflects improving child welfare conditions, increased awareness regarding gender equity, better access to healthcare and educational facilities, and the positive impact of government welfare programmes in the tribal region.

The analysis reveals that the coefficient of variation in literacy rate was recorded at 27.88 per cent in 1991 and declined substantially to 16.26 per cent in 2001, followed by a marginal decrease to 15.92 per cent in 2011 (Table 3), thereby indicating a steady reduction in inter-village disparities in literacy over the study period. The declining disparities in literacy rates reflect increasing educational accessibility and a more balanced distribution of educational opportunities among villages.

The study indicates that the coefficient of variation in female literacy was considerably high at 42.30 per cent in 1991, which declined sharply to 21.45 per cent in 2001 and further to 20.07 per cent in 2011. This trend suggests that regional disparities in female literacy reduced nearly two-fold over the study period, largely due to the expansion of educational facilities and improved accessibility to schools in remote villages.

Although regional disparities in male literacy also showed a declining trend, the extent of reduction was relatively less pronounced compared to that observed in female literacy. In 1991, the coefficient of variation in male literacy rate was 24.57 per cent, which declined to 16.83 per cent in 2001 and further to 16.08 per cent in 2011. The findings indicate that the reduction in disparities in male literacy was more pronounced during the period 1991-2001 compared to the subsequent decade.

The work participation rate among villages of the Bharmour block exhibited a declining trend in variability over the study period. The coefficient of variation stood at 29.28 per cent in 1991, which decreased to 26.45 per cent in

2001 and further to 20.38 per cent in 2011 (Table 3), indicating a gradual reduction in inter-village disparities in work participation. The declining disparity in work participation rate in the Bharmour block may be attributed to the expansion of livelihood opportunities, rural development programmes, and improved infrastructural accessibility across villages. Increasing participation of the rural population in economic activities and government employment schemes may also have contributed to reducing inter-village variations in workforce participation.

The coefficient of variation in female work participation rate was notably high at 52.01 per cent in 1991 and declined to nearly 47 per cent in 2011. This trend indicates a gradual reduction in regional disparities in female work participation over the study period. The declining disparity may be attributed to several factors, including an agrarian economy with greater female workforce participation, low income levels, early age at marriage, and a gradual shift towards the service sector. Table 3 indicates that the coefficient of variation in male work participation rate was 14.06 per cent in 1991. It increased to 17.95 per cent in 2001. A further rise to 19.24 per cent over the subsequent decade suggests a gradual widening of disparities in male work participation across villages.

Table 3
Bharmour Block: Coefficient of Variation among Socio-Economic Development Variables

Census Year	Coefficient of Variation (Per cent)														
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}
1991	12.08	54.11	27.88	42.30	24.57	29.28	52.01	14.06	24.88	DNA	70.63	167.06	183.59	33.31	202.50
2001	13.62	60.68	16.26	21.45	16.83	26.45	27.12	17.95	33.27	63.47	66.21	165.21	162.15	51.50	149.64
2011	15.19	38.70	15.92	20.07	16.08	20.38	46.93	19.24	121.07	85.50	63.94	163.87	96.75	29.02	26.71

Source: Computed by the Authors based on census data

DNA (Data not Available)

(X_1: Sex Ratio, X_2: Child Sex Ratio, X_3: Literacy Rate, X_4: Female Literacy Rate, X_5: Male Literacy Rate, X_6: Work Participation Rate, X_7: Female Work Participation Rate, X_8: Male Work Participation Rate, X_9: Main Cultivators, X_{10}: Net Sown Area, X_{11}: Educational Institutions, X_{12}: Health Institutions, X_{13}: Road Facility, X_{14}: Piped Water facility, X_{15}: Electrification)

Table 3 indicates that the coefficient of variation in main cultivators was approximately 25 per cent in 1991, which increased to 33.27 per cent in 2001 and rose sharply to 121.07 per cent in 2011. The findings suggest that disparities in the distribution of main cultivators, which were relatively low during 1991-2001, increased substantially over time. In the context of the tribal Bharmour block, this growing disparity may be attributed to fragmented and marginal landholdings, harsh climatic conditions with difficult terrain, and the gradual shift of a section

of the population towards non-agricultural livelihoods. The coefficient of variation of net sown area in Bharmour block was about 63.47 per cent in 2001, indicating considerable regional disparity in cultivated land distribution across villages. It increased sharply to around 85.50 per cent in 2011, showing a further rise in inequality and concentration of cultivation in limited favourable areas. This pattern highlights the strong influence of harsh topography and limited arable land, which continue to restrict uniform agricultural development in the region.

Regional disparities in the availability of educational institutions showed a gradual decline between 1991 and 2011, as the coefficient of variation reduced from 70.63 per cent to 63.94 per cent of a relatively high level of inequality suggests that educational infrastructure remains unevenly distributed across the study area. Therefore, the establishment of new schools in line with prescribed population norms should be prioritised by the state government to ensure more balanced regional development. Table 3 shows that the regional disparities in the availability of health institutions in Bharmour block remain very high, though a slight improvement is observed over time. The coefficient of variation decreased marginally from about 167 per cent in 1991 to 165.21 per cent in 2001 and 163.87 per cent in 2011. This indicates only a very slow reduction in regional inequality in access to health facilities. Overall, health infrastructure continues to be unevenly distributed, reflecting persistent accessibility challenges in the region. The high variation in health infrastructure in the Bharmour block may be attributed to the rugged topography, scattered settlements, poor road connectivity and remoteness of tribal villages.

Table 3 shows that the road facility in Bharmour block shows a declining regional disparity over time, falling from 183.59 per cent in 1991 to 162.15 per cent in 2001 and 96.75 per cent in 2011. This indicates that regional inequality in road connectivity has gradually reduced as infrastructure expanded into previously less accessible areas. However, the still-high coefficient of variation in 2011 reflects that significant regional disparity persists due to rugged terrain and scattered settlements, which continue to limit uniform regional accessibility. The coefficient of variation of piped water supply in Bharmour block shows notable regional variation over time. It increases from 33.31 per cent in 1991 to 51.50 per cent in 2001, indicating a rise in regional disparity and uneven expansion of piped water facilities during this period. However, it declines to 29.02 per cent in 2011, suggesting an improvement in regional equity as piped water supply became more widely distributed across settlements. Overall, the pattern reflects initially growing but later reducing regional disparities in access to piped water, though some unevenness still persists due to terrain constraints and settlement. The coefficient of variation of electrification in Bharmour block shows a strong declining regional disparity over time, falling from 202.50 per cent in 1991 to 149.64 per cent in 2001 and further to 26.71 per cent in 2011. This indicates that

regional inequality in access to electricity was extremely high in the initial period, with services concentrated in limited accessible areas. However, over time, electrification expanded more evenly across the block, leading to a substantial reduction in regional imbalance. By 2011, the low coefficient of variation reflects a much more uniform distribution of electrification, although earlier disparities were very pronounced.

Theoretical and Empirical Linkages

The findings of the present study correspond with several regional development theories and earlier empirical studies on socio-economic disparities in tribal and Himalayan regions. The observed variations in development indicators largely reflect differences in accessibility, infrastructural availability, and socio-economic conditions among villages.

The results indicate that higher levels of socio-economic development are concentrated in the central and relatively accessible parts of the study area, whereas peripheral and remote regions lag behind. This pattern is consistent with the Core-Periphery Theory (1966), which asserts that development tends to cluster in regions with better accessibility, infrastructure, and resource endowments. It also aligns with the cumulative causation framework proposed by Gunnar Myrdal, wherein initial advantages lead to self-reinforcing growth in certain regions, widening regional disparities over time.

Similar regional inequalities have been observed in earlier studies. For instance, Jeffrey D. Sachs (cited in Kahn, 2015) emphasized the role of geography and accessibility in influencing regional development outcomes.

The findings highlight a strong positive contribution of infrastructure-related variables, including road connectivity and availability of educational institutions, to socio-economic development. This supports classical and contemporary development perspectives that identify infrastructure as a key driver of regional growth. In particular, the arguments of Paul Krugman (1991) under the framework of New Economic Geography emphasize that improved connectivity reduces transport costs, enhances market access, and promotes spatial concentration of economic activities. Empirical evidence from studies such as Ghosh and De (2004), Koner et al., (2012) and Shameem and Rajeshwari (2023) also confirms that infrastructure development significantly improves regional economic performance and social outcomes.

The negative association between remoteness, difficult terrain, and socio-economic development reflects the constraints imposed by physical geography and accessibility. This finding is consistent with the concept of development geography, which emphasizes the role of environmental and locational factors in shaping regional development patterns. Similar arguments have been advanced by Jeffrey D. Sachs (2001), who highlighted the influence of geography, transport

accessibility, and physical constraints on economic growth and regional inequalities. Gallup et al., (1999) further argued that regions characterized by isolation, high transport costs, and difficult terrain often experience slower economic development and limited infrastructural expansion.

Discussion in the Context of Post-2011 Policy Developments

Although the analysis uses Census data only up to 2011, the findings remain relevant when seen in the context of later policy efforts. The observed differences in literacy and education levels highlight structural problems such as poor accessibility, lack of infrastructure, and socio-economic disadvantage that continue to affect the pace and direction of development in the rural and tribal Bharmour block.

In the post-2011 period, several national initiatives have tried to address these constraints. The consolidation of school education under Samagra Shiksha emphasised universal access, retention, and quality improvement, particularly in educationally backward and remote areas like Bharmour. The establishment of Eklavya Model Residential School in Bharmour in 2019 has significantly contributed to improving educational opportunities for tribal students. Similarly, the expansion of rural connectivity through programmes such as Pradhan Mantri Gram Sadak Yojana has mitigated distance-related difficulties especially for secondary and higher levels of education in Bharmour block.

Gender-based disparities observed in the study also resonate with the objectives of post-2011 interventions such as Beti Bachao Beti Padhao. This scheme has aimed to improve female educational participation and retention. In addition, wider access to digital technology through the Digital India and the focus on inclusive and flexible learning in the National Education Policy 2020 have created better opportunities to reduce regional and social inequalities in education in Bharmour. However, the persistence of disparities in recent studies suggests that policy intentions are not always effectively translated into real improvements on the ground, especially in remote and socio-culturally distinct regions.

Conclusions

The present study reveals pronounced and persistent regional disparities in socio-economic development across the villages of Bharmour block during the period 1991-2011. Although there has been a gradual improvement in overall levels of development, the benefits have been unevenly distributed, resulting in the co-existence of highly developed and severely underdeveloped villages within the same mountainous rural setting.

Villages exhibiting very high and high levels of socio-economic development have increased over time, reflecting positive impacts of higher

literacy rates, improved work participation, and better access to key infrastructure such as education, roads, piped water supply, and electrification. However, a significant proportion of villages continue to remain in the low and very low development categories, particularly in interior areas of the Bharmour block.

The analysis of Moran's I reveals a clear shift in the regional structure of socio-economic development in Bharmour block from 1991 to 2011. While 1991 and 2001 show random and statistically insignificant regional patterns, 2011 exhibits a significant clustered distribution, indicating the emergence of localized development concentration. This transition reflects increasing regional differentiation and the gradual formation of development centres within the study area.

The indicator-wise analysis using coefficients of variation highlights a mixed trend in disparities. Disparities in literacy, especially female literacy have declined substantially, indicating the effectiveness of educational expansion and gender-focused policy interventions. Similarly, inequalities in child sex ratio and overall literacy have narrowed over time. In contrast, disparities related to economic indicators such as main cultivators and net sown area have widened sharply, pointing to structural transformations in the rural economy, occupational shifts away from agriculture and increasing vulnerability of traditional livelihoods in the harsh Himalayan environment. Despite some reduction, disparities in the availability of educational and health infrastructure remain alarmingly high, underscoring the continuing neglect of remote and sparsely populated villages.

Overall, the study shows that although Bharmour block has made some progress in social and economic development, significant regional inequalities still exist in certain aspects. Reducing these disparities requires a more area-specific and inclusive development approach, with greater emphasis on improving education and health facilities, strengthening road connectivity, and promoting terrain-appropriate agricultural livelihoods suited to the region's difficult terrain and tribal socio-cultural setting.

Limitations of the Study

The present study is subject to a few limitations. The analysis is based on Census data spanning 1991-2011. In the absence of more recent Census data, contemporary socio-economic changes could not be incorporated into the study. Despite this constraint, the census continues to be the most reliable and detailed source of information for small-area analysis, especially in rural and tribal regions where other reliable data sources remain limited.

References

Anselin, L. (1988). *Spatial Econometrics: Methods and Models.* Springer. https://doi.org/10.1007/978-94-015-7799-1

Anselin, L. (1995). Local Indicators of Spatial Association - LISA. *Geographical Analysis, 27*(2), 93-115. https://doi.org/10.1111/j.1538-4632.1995.tb00338.x

Bakshi, S., Chawla, A., & Shah, M. (2015). Regional Disparities in India: A Moving Frontier. *Economic and Political Weekly, 50*(1), 44-52.

Banerjee, S. (1992). Disparities in Development of Socio-Economic Infrastructure in Rural Areas of Selected Districts of Uttar Pradesh. *Geographical Review of India, 54*(1), 31-45.

Biswas, M. J., & Rao, M. R. M. (2016). Socio-Economic Status of Gaddi Tribe in Himachal Pradesh: A Study. *International Journal of Advanced Research, 4*(8), 159-167.

Booysen, F. (2002). An Overview and Evaluation of Composite Indices of Development. *Social Indicators Research, 59*, 115-151. https://doi.org/10.1023/A:1016275505152

Census of India. (2011). *Primary Census Abstracts*. Registrar General of India, Ministry of Home Affairs, Government of India.

Chand, M., & Puri, V. K. (1983). Regional Imbalances and Inequalities in India. In *Regional Planning In India* (pp. 165-218). Allied Publishers.

Das, A. (1999). Socio-Economic Development in India: A Regional Analysis. *Development of Society, 28*(2), 313-345.

Das, J. (2018). Regional Disparity in the Level of Development in West Bengal: A Geographical Analysis. *Indian Journal of Regional Sciences, 1*(1), 53-63.

Das, S. K., & Barua, A. (1996). Regional Inequalities, Economic Growth and Liberalisation: A Study of The Indian Economy. *The Journal of Development Studies, 32*(3), 364-390.

Department of Economic and Social Affairs. (2013). *Report on the World Social Situation: Inequality Matters*. United Nations.

Deshpande, C. D. (1982). *India: A Regional Interpretation*. Indian Council of Social Science Research.

Dholakia, R. H. (2003). Regional Disparity in Economic Development in India. *The Journal of Income and Wealth, 25*, 115-128.

Ewetan, O. O., & Urhie, E. (2014). Insecurity and Socio-Economic Development in Nigeria. *Journal of Sustainable Development Studies, 5*(1), 40-63.

Gallup, J. L., Sachs, J. D. and Mellinger, A. D. (1999). Geography and Economic Development. CID Working Paper no. 1, 1-54. https://www.researchgate.net/publication/4730189_Geography_and_Economic_Development.

Ghosh, B and De, Prabir (2005). Investigating the Linkage between Infrastructure and Regional Development in India: Era of Planning to Globalisation. *Journal of Asian Economics, 15*, 1023-1050. https://www.researchgate.net/publication/223819828_Investigating_the_Linkage_Between_Infrastructure_and_Regional_Development_in_India_Era_of_Planning_to_Globalisation.

Kahn, M. E. (2015). A Review of the Age of Sustainable Development by Jeffrey Sachs. *Journal of Economic Literature, 53*(3), 654-666. https://www.aeaweb.org/articles?id=10.1257/jel.53.3.654.

Koner, J. Purandare, A and Dhume, A. (2012). An Empirical Study on Impact of Infrastructural Development on Social and Economic Growth in Indian States. *European Journal of Business and Management, 4*(17), 16-25. https://iiste.org/Journals/index.php/EJBM/article/view/3198/3248.

Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy, 99*(3), 483-499. https://pr.princeton.edu/pictures/g-k/krugman/krugman-increasing_returns_1991.pdf.

Kumar, N., & Rani, R. (2019). Regional Disparities in Social Development: Evidence from States and Union Territories of India. *South Asian Survey, 26*(1), 1-27.

Kumar, S., & Thakur, B. R. (2020). Infrastructural Development in Churah Tehsil of Himachal Pradesh: A Village-Level Analysis. *Transactions, 42*(2), 273-282.

Kumar, S., Kumar, S., & Singh, D. (2022). Levels of Disparity in Literacy in Bharmour Block of Himachal Pradesh: A Spatio-Temporal Analysis. *International Journal of Enhanced Research in Science, Technology & Engineering, 11*(8), 78-84.

Kurian, N. J. (2000). Widening Regional Disparities in India: Some Indicators. *Economic and Political Weekly, 35*(7), 538-550.

Kuznets, S. (1955). Economic Growth and Income Inequality. *The American Economic Review, 45*(1), 1-28.

Maiti, D., & Marjit, S. (2015). Regional Openness, Income Growth and Disparity During 1980–2009: Empirical Evidences from Major Indian states. *South Asia Economic Journal, 16*(1), 145-166.

Majumder, S. (2021). Spatial Pattern of Multidimensional Regional Disparities in the Level of Socio-Economic Development in West Bengal: A Geographical Analysis. *Geosfera Indonesia, 6*(3), 260-300.

Mazziotta, M., & Pareto, A. (2017). Synthesis of Indicators: The Composite Indicators approach. In F. Maggino (Ed.), *Complexity in society: From indicators construction to their synthesis* (pp. 159-191). Springer.

Mishra, S. K. (2007). A Comparative Study of Various Inclusive Indices and the Index Constructed by the Principal Components Analysis. *MPRA Paper No. 3377.* https://ssrn.com/abstract=990831

Moran, P. A. P. (1950). Notes on Continuous Stochastic Phenomena. *Biometrika, 37*(1-2), 17-23. http://www.stat.ucla.edu/~nchristo/statistics_c173_c273/moran_paper.pdf

Nair, K. R. G. (1982). *Regional Experience in a Developing Economy*. Wiley Eastern.

Nayak, K. (2014). Female Infanticide and Patriarchal Attitude: Declining Sex Ratio in India. *Journal of Education and Social Policy, 1*(1), 49-54.

Organisation for Economic Co-operation and Development. (2008). *Handbook on constructing composite indicators: Methodology and user guide.* OECD Publishing.

Rai, S. C., & Bhatia, V. K. (2004). Dimensions of Regional Disparities in Socio-Economic Development of Assam. *Indian Journal of Agricultural Statistics, 57*, 178-190.

Raj, N., & Thakur, B. R. (2020). Spatial Inequalities in Social Development among Northwest Indian States. *Journal of Human Ecology, 72*(1-3), 1-12.

Rajalakshmi, K. (2013). Growing Regional Disparities in India's Development. *International Journal of Educational Research and Technology, 3*, 47-55.

Saberwal, V. K. (1996). Pastoral Politics: Gaddi Grazing, Degradation, And Biodiversity Conservation in Himachal Pradesh, India. *Conservation Biology, 10*(3), 741-749.

Sachs, J. D. (2001). *Tropical Underdevelopment.* NBER Working Paper No. w8119, https://ssrn.com/abstract=259426.

Sahol, K. S., & Kaur, S. (2006). Regional Disparities in Agricultural Modernization in Punjab: 1970 to 1999. *Punjab Geographer, 1*, 63-72.

Shameem, S and Rajeshwari, M. (2023).An Empirical Study of Infrastructure and Economic Development in the Union Territory of Jammu and Kashmir. *Millennial Asia, 16*(1), 129-150.

Sharma, P. K. (2017). Spatial Variation in the Level of Development in Western Rajasthan. *Transactions, Journal of the Institute of Indian Geographers, 2*, 253-270.

Simmy. (2019). Pastoralists of the Himalayas: Gaddis of Bharmour tribal region in Himachal Pradesh. *South Asian Anthropologist, 19*(2), 99-107.

Singh, P. V. (2014). Socio-Geographical Phenomena of Women's Literacy in India. *Scholarly Research Journal for Interdisciplinary Studies, 2*(15), 2279-2285.

Somarriba, N., & Pena, B. (2008). Synthetic Indicators of Quality of Life in Europe. *Social Indicators Research, 94*(1), 115-133. https://doi.org/10.1007/s11205-008-9352-z

Williamson, J. G. (1965). Regional Inequality and the Process of National Development: A Description of the Patterns. *Economic Development and Cultural Change, 13*(4, Pt. 2), 1-84.

World Bank. (1991). *World Development Report 1991: The Challenge of Development.* Oxford University Press.

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TRENDS AND SOCIO-DEMOGRAPHIC CORRELATES OF OBESITY, HYPERTENSION AND ELEVATED BLOOD GLUCOSE IN PUNJAB: EVIDENCE FROM NFHS-4 AND NFHS-5

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Abstract: Non-communicable diseases (NCDs) have become a significant public health problem in India, causing significant morbidity, mortality, and placing a considerable burden on the health system. This study examines the trends and socio-demographic correlates of three major NCD indicators, obesity, hypertension, and elevated blood glucose levels, in Punjab using data from two rounds of National Family Health Surveys (NFHS-4, 2015-16 and NFHS-5, 2019-21). The analysis is based on secondary data covering all 22 districts of Punjab and includes information on anthropometric and biomarker measurements of adults aged 15-49 years. The study examines temporal changes in prevalence and explores variations across districts, regions, and selected socio-economic characteristics.

The findings reveal a substantial increase in the prevalence of overweight and obesity, hypertension, and elevated blood glucose levels between the two survey rounds. Punjab consistently reports higher levels of obesity and hypertension compared with Haryana and the national average. Overweight and obesity are particularly high among women, with the proportion of women having BMI ≥25 rising to over two-fifths of the adult female population. The rate of hypertension also increased considerably among both men and women, with significant age differences and higher rates among older adults, rural populations, and those with lower educational attainment. Similarly, the proportion of individuals with elevated blood glucose levels nearly doubled during the study period, indicating a growing risk of elevated blood glucose (diabetes). The analysis further demonstrates significant district-and region-level differences in the distribution of NCD risk factors.

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The study emphasizes the importance of strengthening preventive strategies, early screening, and targeted public health interventions to tackle the increasing burden of NCDs in Punjab. The long-term health and economic impacts of NCDs can be minimized by strengthening awareness, promoting healthy lifestyles, and improving early detection through national programmes.

Introduction

Non-communicable diseases (NCDs), commonly referred to as chronic diseases, are not transmitted from person to person and arise primarily due to environmental, physiological, genetic, and behavioural factors. These conditions usually develop slowly and often remain asymptomatic in their early stages. The growing burden of NCDs has serious implications for individuals, families, communities, and health systems, as their management typically requires long-term or lifelong care. Consequently, the prevention and control of NCDs have become a major global health and development priority.

According to the World Health Organization (WHO), NCDs include cardiovascular diseases, cancers, chronic respiratory diseases, diabetes, and several other chronic conditions such as obesity and chronic kidney disease. Collectively, these diseases account for nearly 74 per cent of global deaths, with cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes responsible for more than 80 per cent of premature NCD deaths. A large proportion of this burden occurs in low- and middle-income countries, which account for more than three-quarters of global NCD deaths and nearly 86 per cent of the estimated 17 million premature deaths occurring before the age of 70 years.

India is currently undergoing a major epidemiological transition characterised by a rising burden of non-communicable diseases. NCDs have now surpassed communicable diseases such as tuberculosis, HIV/AIDS, and vector-borne diseases as the leading causes of mortality and morbidity in the country. According to WHO estimates, NCDs accounted for over 6 million deaths in India in 2019, with cardiovascular diseases alone responsible for approximately 2.56 million deaths. Overall, nearly one in four Indians is at risk of dying from an NCD before reaching the age of 70 years.

Recognizing this growing public health challenge, the Ministry of Health and Family Welfare, Government of India launched the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) in 2010. The programme aims to strengthen prevention, early diagnosis, treatment, and management of major NCDs across the country. Despite these efforts, the burden of NCDs continues to rise. The share of NCDs in India's total disease burden increased from 30 per cent in 1990 to 55 per cent in 2016, while the proportion of deaths due to NCDs rose from 37 per cent to 61 per cent during the same period.

Globally, NCDs accounted for approximately 42 million deaths in 2019, of which India contributed nearly 4.1 million deaths (14.5%). Within the WHO South-East Asia Region, India accounts for nearly two-thirds of NCD-related deaths. It is also estimated that NCDs and mental health conditions may lead to economic losses of nearly $4.58 trillion in India by 2030 (Shrivastava et al., 2023).

Although the epidemiological transition towards NCDs began in the early 2000s, the pattern and magnitude of this transition vary considerably across Indian states due to differences in socio-economic development, lifestyle patterns, and demographic structures. Punjab represents a particularly important case in this context, as the state has experienced rapid demographic change, increasing urbanisation, and shifts in dietary and lifestyle patterns that may influence the prevalence of chronic diseases. Despite the growing concern regarding NCDs in the state, evidence on the trends and socio-demographic correlates of major risk factors remains limited.

Review of Literature

A large body of literature has documented the increasing global prevalence of major non-communicable diseases (NCDs), particularly hypertension, diabetes, and obesity. Hypertension, a leading risk factor for cardiovascular diseases, has become highly prevalent across both developed and developing countries. Ray et al. (2015) reported that nearly 40 per cent of adults aged 25 years and above were affected by high blood pressure in 2008. Globally, the number of individuals living with hypertension rose from 594 million in 1975 to 1.13 billion in 2015, and it currently affects around 1.3 billion adults aged 30-79 years. Cardiovascular diseases linked to hypertension account for approximately 17.9 million deaths annually worldwide (WHO, 2022).

Diabetes represents another rapidly expanding public health challenge. According to the World Health Organization, around 422 million people globally are living with diabetes, with the majority residing in low and middle-income countries. The disease is responsible for nearly 1.5 million deaths each year. Type 2 diabetes accounts for more than 95 per cent of all cases. The International Diabetes Federation (2021) estimates that 10.5 per cent of adults aged 20-79 years have diabetes, many of whom remain undiagnosed. This number is projected to increase to approximately 783 million by 2045, reflecting a rise of about 46 per cent.

Overweight and obesity have also emerged as critical public health concerns worldwide. Excess body weight significantly increases the risk of various NCDs, including cardiovascular diseases, diabetes, and certain cancers. The World Health Organization reports that global obesity prevalence nearly tripled between 1975 and 2016, with about 13 per cent of the adult population classified as obese by 2016. Zatonska et al. (2021) further emphasized that

obesity has become one of the most significant health challenges affecting populations across both developed and developing regions.

Historically, hypertension, diabetes, and obesity were considered diseases of affluence. However, recent evidence indicates that their prevalence is rapidly increasing in developing countries and is increasingly affecting lower socio-economic groups. Thakur et al. (2016) found that NCD risk factors are widespread and almost uniformly prevalent among the adult population in Punjab. Similarly, Wang et al. (2020) observed that NCDs account for nearly 70 per cent of deaths in developing countries, with a substantial proportion occurring before the age of 70 years.

In the Indian context, several studies have highlighted significant regional disparities in the prevalence and determinants of NCDs. Ramalingam et al. (2022) noted that the epidemiological transition towards NCDs has occurred unevenly across states, underscoring the need for region-specific analyses to better understand spatial patterns and socio-economic determinants.

Recent research has also examined the role of socio-economic and demographic factors in shaping NCD outcomes. Kundu, Goli, and James (2025), using data from the Longitudinal Ageing Study in India (LASI) 2017-18, identified substantial gender differences in the relationship between education and NCD prevalence. Among men, higher educational attainment was associated with increased prevalence, whereas among women, the relationship followed an inverted U-shaped pattern. The study further highlighted the role of factors such as marital status, employment, residence, and economic conditions in explaining these disparities.

Focusing on older populations, Harikumar and Sreena (2025) reported a high prevalence of chronic conditions, including diabetes, asthma, angina, chronic lung disease, stroke, and depression, among individuals aged 60 years and above. The study also found significant associations between behavioural risk factors, particularly tobacco and alcohol use, and multiple NCD outcomes, emphasizing the importance of addressing modifiable lifestyle behaviours.

Despite the growing body of evidence, gaps remain in understanding regional patterns of NCD risk factors in India. Ramamoorthy et al. (2022) highlighted that while NCD risk factors show considerable regional variation alongside a rising burden, these differences have not been systematically analysed, pointing to the need for more region-specific evidence.

Finally, behavioural risk factors play a central role in the rising burden of NCDs. Balsarkar (2022) identified physical inactivity, unhealthy diets, tobacco use, and harmful alcohol consumption as the primary contributors. Unhealthy diets are characterized by low intake of fruits, vegetables, and whole grains, along with high consumption of salt and fats. Additionally, tobacco use, both

smoking and smokeless forms, as well as exposure to second hand smoke, significantly increases the risk of NCDs.

While the existing literature provides valuable insights into the prevalence, determinants, and consequences of NCDs, relatively limited evidence is available on the changing patterns of major NCD risk factors in Punjab using recent large-scale representative datasets. Moreover, few studies have examined district-level and regional variations in obesity, hypertension, and elevated blood glucose levels within the state. The present study seeks to address this gap by analysing trends and socio-demographic differentials in key NCD risk factors using data from successive rounds of the National Family Health Survey.

Objectives

Against this backdrop, the present paper examines the trends and socio-demographic correlates of three major NCD risk factors, hypertension, elevated blood glucose, and obesity, in Punjab using data from recent rounds of the National Family Health Survey (NFHS). By analysing changes over time and variations across population groups, the study aims to provide evidence that can inform policies and interventions for the prevention and control of NCDs in the state.

Data and Methods

The present study is based on secondary data from the NFHS-5 conducted under the aegis of the Ministry of Health and Family Welfare, Government of India and implemented by the International Institute for Population Sciences (IIPS), Mumbai. NFHS-5 is a nationally representative household survey that provides comprehensive information on population health, nutrition, and non-communicable disease (NCD) indicators. To examine temporal changes, the findings from NFHS-5 are compared with those from NFHS-4.

In Punjab, NFHS-5 was conducted across all 22 districts in two phases: January-March 2020 and December 2020-March 2021. The survey collected information from 18,824 households, 21,771 women aged 15-49 years, and 3,296 men aged 15-54 years. In comparison, NFHS-4 covered 16,449 households, 19,484 women, and 3,027 men in the state.

The analysis examines variations in the prevalence of selected NCD risk factors, obesity, hypertension, and elevated blood glucose levels, among men and women across key socio-economic and demographic characteristics, including age, place of residence, marital status, education, religion, and caste. The operational definitions of obesity/overweight, hypertension, elevated blood glucose would be:

Obesity/Overweight**:** Individuals with Body Mass Index (BMI) ≥ 25 kg/m^2.

Hypertension: As per NFHS definition "Individuals were classified as hypertensive if their average systolic blood pressure was ≥140 mmHg and/or average diastolic blood pressure was ≥90 mmHg, or if they were currently taking antihypertensive medication."

Elevated Blood Glucose: Random blood glucose level above the threshold specified in NFHS or self-reported diabetes status, as applicable.

To assess the overall NCD burden at the district and regional levels, a composite score was constructed. Districts were ranked separately for men and women in ascending order based on the prevalence of obesity, hypertension, and elevated blood glucose. The ranks for the three indicators were summed and averaged to generate a composite score for each district. Based on these scores, districts were classified and compared to identify spatial patterns and regional disparities in NCD prevalence within the state. It may be noted that the analysis is primarily descriptive in nature and is intended to examine temporal trends and socio-demographic differentials in selected NCD risk factors rather than establish causal relationships.

Results and Discussion

Obesity

Obesity refers to the excessive accumulation of body fat that adversely affects health and substantially increases the risk of non-communicable diseases (NCDs). Its occurrence is shaped by a complex interaction of genetic susceptibility, unhealthy dietary practices, sedentary lifestyles, psychological stress, and hormonal factors. Excess body weight has been consistently linked with a wide range of adverse health outcomes, including cardiovascular diseases, hypertension, diabetes, osteoarthritis, sleep disorders, certain cancers, respiratory complications, and gallstone formation (Ministry of Health and Family Welfare, Government of India).

In epidemiological studies, adult nutritional status is commonly assessed using Body Mass Index (BMI), calculated as body weight in kilograms divided by the square of height in metres (kg/m²). BMI provides a widely accepted indicator for classifying individuals into nutritional categories: underweight (BMI <18.5), normal weight (18.5–24.9), overweight (25.0–29.9), and obese (≥30.0) (NFHS-5, Punjab). As a standardized measure, BMI enables comparative assessment of overweight and obesity across populations and over time.

The results presented in Table 1 reveal a clear and sustained shift from undernutrition towards excess body weight in Punjab. Among women, the prevalence of overweight increased from 21.1 per cent in 1998-99 to 26.6 per cent in 2019-21, while obesity rose more sharply from 9.1 per cent to 14.2 per cent. Consequently, the proportion of women with BMI ≥25 increased from 30.2 per cent to 40.8 per cent, indicating that nearly two-fifths of adult women in the

state now fall into the overweight or obese category. Although similar upward trends are observed in Haryana and at the national level, the magnitude of increase remains distinctly higher in Punjab, suggesting a more advanced stage of nutritional transition.

A comparable, though relatively moderate, pattern is observed among men. In Punjab, the proportion classified as overweight increased from 18.2 per cent in 2005-06 to 24.0 per cent in 2019-21, while obesity more than doubled from 4.0 per cent to 8.3 per cent. As a result, the share of men with BMI ≥25 rose from 22.2 per cent to 32.3 per cent during this period. Despite this increase, the prevalence of excess body weight among men remains lower than among women, reflecting persistent gender differentials in nutritional outcomes. Overall, the findings indicate a rapid and widening burden of overweight and obesity in Punjab, positioning the state above both Haryana and the national average and underscoring the growing importance of lifestyle-related risk factors in shaping the emerging NCD profile.

Table-1
Nutritional Status of Women and Men Age 15-49 in Punjab, Haryana and India, 1998-99 to 2019-21

Years	Women in Punjab			Punjab	Haryana	India	Men in Punjab			Punjab	Haryana	India
	<18.5	25.0 - 29.9	>30	>25	>25	>25	<18.5	25.0 - 29.9	>30	>25	>25	>25
1998-99	16.9	21.1	9.1	30.2	16.6	10.6	-	-	-	-	-	-
2005-06	18.9	20.8	9.1	29.9	17.4	12.6	20.6	18.2	4.0	22.2	10.8	9.3
2015-16	11.7	22.2	9.2	31.4	21.0	20.7	10.9	22.8	5.1	27.8	20.0	18.9
2019-21	12.7	26.6	14.2	40.8	33.1	24	12.5	24.0	8.3	32.3	28.3	22.9

Source: NFHS-2, NFHS-3, NFHS-4, NFHS-5 for Punjab, Haryana and India.

Obesity among women

Table 2 indicates a pronounced increase in overweight and obesity across most socio-demographic groups over time. At the state level, the prevalence of overweight among women increased from 22.1 per cent in 2015-16 to 26.7 per cent in 2019-21, while obesity rose more sharply from 9.2 per cent to 14.2 per cent, reflecting a substantial rise in excess body weight.

Age emerges as a strong determinant of BMI. The prevalence of overweight and obesity increases sharply with age, reaching 61.1 per cent among women aged 40-49 years in 2019-21, compared with only 8.2 per cent among adolescents aged 15-19 years. Marital status also shows a clear association, with currently married women exhibiting a markedly higher prevalence of excess body weight (50.3%) than never-married women (13.4%), suggesting the influence of life-course and behavioural factors.

Table-2
Distribution of Women with Specific BMI Levels by Background Characteristics in Punjab, 2015-16 and 2019-21

Background characteristics	2019-21					2015-16				
	Thin	Normal	Over-weight	Obese	No. of women	Thin	Normal	Over-weight	Obese	No. of women
Age										
15 -19	38.5	53.3	5.5	2.7	2645	36.1	59.4	3.9	0.6	2568
20 -29	16.8	56.8	20.1	6.3	5598	14.5	67.2	13.5	4.8	5998
30 -39	5.5	42.6	33.8	18.1	6020	4.8	55.1	28.4	11.7	5359
40 -49	3.0	35.9	36.5	24.6	4922	2.4	34.2	46.5	16.9	4537
Marital status										
Never married	31.1	55.5	9.9	3.5	4971	26.6	65.7	6.1	1.6	4977
Currently married	6.3	43.4	32.5	17.8	13412	6.2	53.9	27.9	12.0	12820
Widowed/ divorced/ separated/ deserted	5.6	42.8	31.9	19.7	803	6.5	49.9	32.1	11.5	665
Residence										
Urban	11.9	43.8	28.4	15.9	6958	9.0	58.6	22.8	9.6	7298
Rural	13.1	48.1	25.6	13.2	12227	13.5	55.9	21.7	8.9	11163
Schooling (Years completed)										
No schooling	8.4	47.1	30.2	14.3	2967	7.5	56.3	26.7	9.5	3153
<5 years	8.0	43.4	30.3	18.3	397	9.2	54.6	27.4	8.8	310
5-9 years	13.5	46.1	26.3	14.1	5216	14.2	52.4	22.9	10.5	4856
10-11 years	15.2	44.4	24.6	15.8	3867	14.2	52.5	23.8	9.5	3820
12 or more years	12.7	48.1	26.2	13.0	6737	10.5	63.6	18.1	7.8	6323
Religion										
Hindu	12.6	45.7	26.6	15.1	7251	10.8	57.9	22.4	8.9	6599
Christian	14.0	50.3	21.0	14.7	324	12.0	60.7	20.0	7.3	315
Sikh	12.6	46.9	26.9	13.6	11358	12.0	56.5	22.2	9.3	11263
Other	16.7	47.8	21.3	14.2	252	18.3	51.5	19.2	11.0	285
Caste/tribe										
SC	15.1	48.7	24.5	11.7	8968	14.2	58.4	20.3	7.1	7059
ST	15.8	44.6	24.6	15.0	92	10.7	71.7	8.0	9.6	33
OBC	12.2	44.3	28.0	15.5	2896	11.8	57.4	21.5	9.3	3619
Other	9.9	44.6	28.7	16.8	7229	9.4	55.4	24.2	11.0	7745
Total	12.7	46.4	26.7	14.2	19285	11.7	57.0	22.1	9.2	18462

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), India, 2019-21, Punjab* and IIPS and ICF. 2017. *NFHS-4, India, 2015-16: Punjab.* Mumbai: IIPS.

Urban-rural differences are relatively modest but still evident, with urban women reporting slightly higher levels of overweight and obesity (44.3%) than rural women (38.8%). Educational attainment shows a less consistent pattern, as excess body weight remains substantial across all educational groups, indicating that the obesity burden is not confined to a particular educational stratum. Differences across caste and religious groups are also visible, with comparatively higher prevalence among women belonging to other caste categories (45.5%) and Other Backward Classes (43.5%). Overall, the results suggest that the rising burden of overweight and obesity among women in Punjab is broad-based and strongly structured by age, marital status, and socio-economic characteristics.

Pervelance of Overweight and Obesity among Men

Table 3 presents the distribution of men by BMI categories across selected background characteristics in Punjab. Similar to women, the findings reveal a growing prevalence of excess body weight over time, although the increase is relatively moderate. At the state level, the proportion of overweight men increased slightly from 22.7 per cent in 2015-16 to 23.9 per cent in 2019-21, while obesity rose more noticeably from 5.1 per cent to 8.3 per cent, indicating a gradual but consistent rise in obesity among men.

Age shows a strong association with BMI. The prevalence of overweight and obesity increases markedly with age, reaching 48.1 per cent among men aged 40-49 years in 2019-21, compared with only 8.5 per cent among adolescents aged 15-19 years. Marital status also exhibits a clear gradient, with currently married men showing substantially higher levels of excess body weight (43.2%) compared with never-married men (19.3%).

Table-3
Distribution of Men with Specific Body Mass Index Levels by Background Characteristics in Punjab, 2015-16 and 2019-21

Background characteristics	2019-21					2015-16				
	Thin	Normal	Over-weight	Obese	Number of men	Thin	Normal	Over-weight	Obese	Number of men
Age										
15 -19	34.2	57.3	6.7	1.8	452	31.7	60.5	6.8	1.0	443
20 -29	11.1	63.7	19.4	5.8	890	10.8	66.7	19.1	3.4	1057
30 -39	7.3	48.9	31.8	12.0	756	5.4	59.8	28.0	6.8	866
40 -49	3.8	48.1	35.2	12.9	523	4.1	54.7	32.8	8.4	629
Marital status										
Never married	20.3	60.4	15.4	3.9	1183	20.3	65.5	13	1.2	1219
Currently married	6.0	50.8	31.0	12.2	1392	4.4	57.9	29.8	7.9	1717
Widowed/ divorced/ separated/ deserted	8.1	58.4	28.8	4.7	46	8.5	68.6	18.8	4.1	58
Residence										
Urban	11.2	53.6	25.7	9.5	1074	8.8	59.1	26.7	5.4	1204
Rural	13.5	56.3	22.7	7.5	1547	12.3	52.7	30.1	4.9	1789
Schooling (Years completed)										
No schooling	14.2	61.3	20.6	3.9	221	11.2	67.6	18.2	3.0	318
<5 years	10.2	53.2	23.9	12.7	88	20.8	64.9	10.5	3.8	69
5-9 years	16.9	55.0	21.5	6.6	762	16.0	59.8	21.2	3.0	811
10-11 years	15.1	55.0	21.9	8.0	569	9.3	60.3	22.6	7.8	725
12 or more years	7.5	54.3	27.8	10.4	981	7.5	60.8	26.2	5.5	1070
Religion										
Hindu	13.5	53.2	24.2	9.1	1018	10.3	60.9	24.3	4.5	1143
Christian	25.0	44.7	23.9	6.4	45	19.3	56.8	23.9	0.0	78
Sikh	11.5	57.4	23.6	7.5	1521	10.1	61.7	22.3	5.9	1687
Other	14.3	32.8	32.0	20.9	37	28.3	60.3	10.1	1.3	86
Caste/tribe										
SC	15.2	59.7	19.2	5.9	1234	13.5	64.5	18.8	3.2	1101
OBC	12.2	53.5	22.4	11.9	372	12.7	62.1	21.1	4.1	649
General	9.4	50.1	30.5	9.9	1016	7.7	57.8	27.2	7.3	1239
Total	**12.5**	**55.3**	**23.9**	**8.3**	**2621**	**10.9**	**61.3**	**22.7**	**5.1**	**2994**

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), India, 2019-21, Punjab* and IIPS and ICF. 2017. *NFHS-4, India, 2015-16: Punjab*. Mumbai: IIPS.

Urban-rural differences are present but relatively moderate. Urban men report higher levels of overweight and obesity (35.2%) than their rural counterparts (30.2%), reflecting lifestyle and occupational differences associated with urban living. Educational attainment reveals a clearer socio-economic gradient than among women, with men having 12 or more years of schooling showing higher prevalence of excess body weight (38.2%). Variations across caste and religious groups are also evident, with relatively higher prevalence among general caste men (40.4%) and Other Backward Classes (34.3%). The findings highlight a steady rise in overweight and obesity among men in Punjab, with clear associations with age, marital status, urban residence, and socio-economic position, although the magnitude of the problem remains lower than that observed among women.

Hypertension

Accurate measurement of blood pressure (BP) is essential for the reliable diagnosis of hypertension. Clinical guidelines recommend multiple BP readings because reliance on a single measurement may lead to overestimation. The International Society of Hypertension and the European Society of Cardiology recommend the use of repeated measurements and averaging for clinical assessment (Shivashankar et al., 2021). The first reading is often excluded to minimise the influence of the "white coat effect," whereby anxiety during measurement temporarily elevates BP levels. In both NFHS-4 and NFHS-5, eligible men and women were offered BP measurement using an automated digital monitor. Three readings were taken whenever possible. If only one reading was available, it was treated as the final value; when two readings were recorded, the second reading was used; and when three readings were available, the average of the second and third measurements was considered. Hypertension was classified according to WHO guidelines based on systolic and diastolic blood pressure levels.

Table 4 shows a substantial increase in hypertension prevalence between 2015-16 and 2019-21 across Punjab, Haryana, and India. Among men, prevalence increased from 22.6 per cent to 37.7 per cent in Punjab, from 19.3 per cent to 25.1 per cent in Haryana, and from 14.8 per cent to 24.0 per cent at the national level. A similar upward trend is observed among women, with prevalence rising from 15.1 per cent to 31.2 per cent in Punjab, from 13.3 per cent to 21.0 per cent in Haryana, and from 11.0 per cent to 21.3 per cent in India.

Across both survey rounds, Punjab consistently recorded higher prevalence than Haryana and the national average. Although hypertension remains more common among men, the relative increase among women, particularly in Punjab, suggests a rapidly expanding burden of cardiovascular risk in the state. Overall, the findings point to a significant escalation of hypertension across the region during the study period.

Table-4
Hypertension among Women and Men in Selected States of Punjab, Haryana and India, 2015-16 and 2019-21

Year	2019-21 (15 and over)			2015-16 (15-49)		
	Punjab	**Haryana**	**India**	**Punjab**	**Haryana**	**India**
Men	37.7	25.1	24.0	22.6	19.3	14.8
Women	31.2	21.0	21.3	15.1	13.3	11.0

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), 2019-21, Mumbai, IIPS*, and IIPS and ICF. 2017.*NFHS-4, 2015-16: India*. Mumbai: IIPS.

Note: 1- A woman or man is classified as having hypertension if he/she has blood pressure levels ≥140 mmHg or ≥90 mmHg at the time of the survey, or she is currently taking antihypertensive medication to control blood pressure.

Hypertension Levels among Women

Table 5 shows that the prevalence of hypertension increased from 13.2 per cent in 2015-16 to 16.6 per cent in 2019-21, accompanied by a decline in the proportion of women with normal blood pressure. A pronounced age gradient is evident, with hypertension rising sharply from 3.9 per cent among women aged 15-19 years to 37.7 per cent among those aged 45-49 years in 2019-21, a pattern consistent with the earlier survey round.

Table-5
Distribution of Women with Hypertension Levels by Background Characteristics in Punjab, 2015-16 and 2019-21

Background characteristics	2019-21					2015-16				
	Number of women	Prevalence of hyper-tension	Normal	Pre-hyper-tensive	Hyper-tensive	Number of women	Prevalence of hyper-tension	Normal	Pre-hyper-tensive	Hyper-tensive
Age										
15 -19	2689	4.6	69.8	26.3	3.9	2595	3.1	74.8	22.8	2.4
20 -24	2778	6.8	61.3	33.3	5.4	3186	5.7	64.2	31.0	4.8
25 - 29	3268	8.5	55.3	37.4	7.3	3458	9.1	54.6	37.7	7.7
30 -34	3168	16.6	43.3	42.1	14.6	2879	13.0	43.9	44.5	11.6
35 -39	2979	23.8	32.4	46.4	21.2	2653	20.8	32.8	48.4	18.8
40 -44	2411	35.1	23.1	45.3	31.6	2383	28.0	26.8	48.3	24.9
45 -49	2498	42.0	18.3	44.0	37.7	2168	34.1	22.8	47.4	29.8
Residence										
Urban	7158	17.8	46.2	38.4	15.4	7635	13.6	49.3	38.7	12.0
Rural	12634	19.3	43.0	39.7	17.3	11687	16.0	46.0	40.0	14.0
Schooling (Years completed)										
No schooling	3041	29.3	32.5	41.4	26.1	3253	21.9	36.2	44.9	18.9
<5 years	409	31.1	32.3	42.3	25.4	317	19.9	39.1	43.7	17.2
5-9 years	6357	21.8	41.3	39.1	19.6	5107	17.4	46.2	38.5	15.3
10-11 years	3965	17.7	44.1	40.1	15.8	3974	14.6	49.7	37.3	13.0
12 or more years	7021	17.2	51.5	38.0	10.5	6670	10.1	52.5	38.7	8.8
Religion										
Hindu	7483	17.1	45.4	39.3	15.3	6901	14.0	49.5	38.2	12.3
Sikh	11705	19.7	43.5	39.1	17.4	11791	15.7	46.0	40.2	13.8
Other	605	21.3	41.7	39.8	18.6	629	15.5	4.64	40.1	13.4
Caste/tribe										
SC	9288	18.3	45.9	37.9	16.2	7443	14.8	49.4	37.3	13.3
ST	99	15.7	53.4	30.9	15.7	36.0	14.5	56.1	37.0	6.9
OBC	2981	18.7	42.8	40.0	17.2	3790	15.0	49.8	37.2	13.0
Other	7033	19.2	42.6	40.7	16.7	8046	15.3	44.1	42.6	13.3
Don't know	391	24.5	37.7	40.8	21.5	-	-	-	-	-
Total	**19792**	**18.8**	**44.2**	**39.2**	**16.6**	**19322**	**15.1**	**47.3**	**39.5**	**13.2**

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), India, 2019-21, Punjab* and IIPS and ICF. 2017. *NFHS-4, India, 2015-16: Punjab*. Mumbai: IIPS.

Place of residence shows modest variation, with rural women reporting slightly higher prevalence (17.3%) than urban women (15.4%) in 2019-21. Educational attainment demonstrates a clear inverse association with hypertension. Women with no schooling recorded substantially higher prevalence (26.1%) compared with those having 12 or more years of education (10.5%), highlighting the role of socio-economic disadvantage in shaping cardiovascular risk. Differences by religion indicate relatively higher prevalence among Sikh women compared with Hindu women, while variations across caste groups are comparatively modest, though women belonging to "other" caste categories and OBCs exhibit slightly higher prevalence. Thus, hypertension among women in Punjab has increased over time and remains strongly structured by age, educational attainment, and rural residence.

Hypertension Levels among Men

Table 6 displayed a noticeable increase in hypertension prevalence from 21.8 per cent in 2015-16 to 25.8 per cent in 2019-21, accompanied by a decline in the proportion of men with normal blood pressure.

Table-6
Distribution of Men with Hypertension Levels by Background Characteristics in Punjab, 2015-16 and 2019-21

Background characteristics	2019-21					2015-16				
	Number of men	Prevalence of hyper-tension	Normal	Pre-hyper-tensive	Hyper-tensive	Number of men	Prevalence of hyper-tension	Normal	Pre-hyper-tensive	Hyper-tensive
Age										
15 -19	452	8.1	45.6	46.7	7.7	445	5.4	53.2	41.4	5.4
20 -24	438	14.3	29.1	57.6	13.3	513	12.6	33.1	55.3	11.6
25 - 29	451	20.9	18.2	60.8	21.0	546	16.7	26.4	27.1	46.5
30 -34	441	31.3	19.7	49.5	30.8	475	26.3	13.5	60.6	25.9
35 -39	310	35.9	11.2	54.6	34.2	391	31.9	16.8	51.7	31.5
40 -44	273	45.8	6.0	21.5	72.5	324	36.2	13.9	51.0	35.1
45 -49	253	53.5	6.6	41.5	51.9	306	42.5	12.4	48.1	39.5
Residence										
Urban	1071	26.1	25.1	50.0	24.9	1205	20.7	24.2	56.0	19.8
Rural	1546	27.4	19.5	54.0	26.5	1795	23.8	26.3	50.5	23.2
Schooling (Years completed)										
No schooling	222	34.4	15.1	51.0	33.9	318	24.6	23.7	52.8	23.5
<5 years	89	37.8	24.5	37.7	37.8	69.0	38.2	27.9	37.7	34.4
5-9 years	760	25.8	25.4	49.7	24.9	817	21.9	28.8	49.8	21.4
10-11 years	566	25.4	20.4	55.4	24.2	726	24.1	23.8	52.3	23.9
12 or more years	979	25.9	21.1	54.3	24.6	1070	20.5	24.4	56.3	19.3
Religion										
Hindu	1016	26.4	21.4	53.5	25.1	1144	21.8	25.2	54.1	20.7
Sikh	1520	27.3	21.9	51.6	26.5	1687	24.0	23.7	52.9	23.4
Other	80	24.0	23.7	52.3	24.0	168	14.1	44.9	41.4	13.7
Caste/tribe										
SC	1233	25.1	22.7	53.4	23.9	1102	21.1	27.8	51.6	20.6
OBC	373	25.9	19.2	55.8	25.0	654	22.3	28.0	50.6	21.4
Other	967	29.7	21.5	49.6	28.9	1237	24.1	21.6	55.1	23.3
Total	2617	26.9	21.8	52.4	25.8	2999	22.6	25.5	52.7	21.8

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), India, 2019-21, Punjab* and IIPS and ICF. 2017. *NFHS-4, India, 2015-16: Punjab.* Mumbai: IIPS.

A strong age gradient is observed, with hypertension increasing from 7.7 per cent among men aged 15-19 years to 51.9 per cent among those aged 45-49 years in 2019-21. Rural-urban differences are relatively modest but persistent,

with rural men reporting slightly higher prevalence (26.5%) than urban men (24.9%). Educational differentials are also evident: men with no schooling exhibit higher prevalence (33.9%) compared with those having 12 or more years of education (24.6%). Differences by religion and caste are comparatively limited, although Sikh men and those belonging to the "other" caste category record somewhat higher prevalence levels.

Thus, the findings indicate a growing burden of hypertension among men in Punjab, strongly associated with advancing age and, to a lesser extent, lower educational attainment and rural residence, reflecting the widening influence of socio-economic and lifestyle factors on cardiovascular risk.

Random blood glucose

Random blood glucose testing measures the concentration of glucose circulating in the bloodstream at any given time and is commonly used as a screening indicator for diabetes and related metabolic disorders. Biomarker-based measurement of blood glucose was first introduced in the NFHS-4 and continued in NFHS-5, where capillary blood samples were collected from eligible men and women aged 15 years and above using portable testing devices.

Based on NFHS classification, individuals with random blood glucose ≤140 mg/dl are considered to have normal glucose levels, those with 141–160 mg/dl are categorized as having high glucose levels, and those with >160 mg/dl are considered to have very high glucose levels. During NFHS-5, respondents with random blood glucose above 200 mg/dl were provided with referral slips for further medical evaluation at a health facility.

Table-7
Percentage of Men and Women Having Blood Glucose Levels >140mg/dl by Selected States of Punjab, Haryana and India, 2015-16 and 2019-21

Year	2019-21 (15 and over)			2015-16 (15-49)		
	Punjab	**Haryana**	**India**	**Punjab**	**Haryana**	**India**
Men	13.2	12.6	14.4	6.7	6.1	8.0
Women	13.8	11.1	12.4	6.0	4.8	5.8

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), 2019-21, Mumbai, IIPS*, and IIPS and ICF. 2017. *NFHS-4, 2015-16: India*. Mumbai: IIPS.

Table 7 indicates a notable rise in the proportion of individuals with elevated blood glucose levels between 2015-16 and 2019-21 in Punjab, Haryana, and India. Among men, the prevalence of blood glucose levels above 140 mg/dl increased from 6.7 per cent to 13.2 per cent in Punjab and from 6.1 per cent to 12.6 per cent in Haryana, while the national prevalence rose from 8.0 per cent to 14.4 per cent. A similar trend is observed among women, with prevalence rising from 6.0 per cent to 13.8 per cent in Punjab and from 4.8 per cent to 11.1 per cent in Haryana, while at the national level it increased from 5.8 per cent to 13.8 per cent. Overall, the results point to a substantial and widespread increase in

elevated blood glucose levels across both sexes, signalling a growing burden of diabetes risk in the region.

Random Blood Glucose Levels among Women

Table 8 presents the distribution of women by blood glucose levels across selected background characteristics in Punjab for NFHS-4 (2015-16) and NFHS-5 (2019-21).

Table-8
Distribution of Women with Levels of Glucose by Background Characteristics in Punjab, 2015-16 and 2019-21

Background characteristics	2019-21				2015-16			
		Level of Glucose				Level of Glucose		
	Number of women	Normal	High	Very high	Number of women	Normal	High	Very high
Age								
15 -19	2657	98.0	1.4	0.6	2594	98.4	1.1	0.5
20 -24	2739	97.6	1.5	0.9	3185	98.1	1.3	0.6
25 - 29	3227	97.0	2.1	0.9	3449	97.5	2.0	0.6
30 -34	3115	94.7	3.4	1.0	2877	94.7	3.2	2.1
35 -39	2880	90.8	3.8	5.4	2651	92.8	4.5	2.7
40 -44	2318	87.0	5.6	7.3	2381	88.0	6.2	5.8
45 -49	2393	81.9	7.0	11.1	2171	84.0	7.4	8.6
Residence								
Urban	6975	93.3	3.1	3.6	7630	94.4	3.1	2.5
Rural	12354	92.6	3.6	3.8	11689	93.7	3.6	2.7
Schooling (Years completed)								
No schooling	2935	88.3	5.2	6.4	1252	90.0	5.5	4.5
<5 years	396	88.6	4.6	6.7	317	93.0	2.4	4.6
5-9 years	5224	92.9	3.2	3.9	5107	93.8	3.1	3.0
10-11 years	3870	93.0	3.2	3.8	3970	93.9	3.6	2.4
12 or more years	6903	95.5	2.5	1.9	6662	96.0	2.5	1.5
Religion								
Hindu	7292	93.2	3.3	3.5	6897	93.8	3.4	2.8
Sikh	11458	92.8	3.4	3.8	11782	94.0	3.5	2.6
Other	579	90.7	4.7	4.5	629	95.0	2.9	2.1
Caste/tribe								
SC	9081	93.1	3.2	3.6	7439	93.8	3.3	2.9
ST	99	97.6	0.5	1.9	36	96.3	3.0	0.7
OBC	2912	92.7	3.4	3.8	3787	94.3	3.1	2.6
Other	7237	92.6	3.6	3.8	8041	93.9	3.7	2.5
Total	19329	92.9	3.4	3.7	19308	93.9	3.4	2.6

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), India, 2019-21, Punjab* and IIPS and ICF. 2017. *NFHS-4, India, 2015-16: Punjab*. Mumbai: IIPS.

It can be observed from Table 8 that the proportion of women with normal glucose levels declined over time slightly from 93.9 per cent to 92.9 per cent, while the share with very high glucose levels increased from 2.6 per cent to 3.7 per cent, indicating a gradual deterioration in glycaemic status.

A pronounced age difference is evident. The prevalence of very high glucose levels rises sharply from 0.6 per cent among women aged 15-19 years to 11.1 per cent among those aged 45-49 years in 2019-21, highlighting the strong influence of ageing on metabolic risk. Differences by place of residence are relatively modest, although rural women exhibit slightly higher proportions of elevated glucose levels than their urban counterparts. Educational attainment shows an inverse association, with women having no schooling reporting higher prevalence of very high glucose levels compared with those having 12 or more years of education, suggesting the role of socio-economic disadvantage in shaping diabetes risk. Variations across religion and caste groups are relatively limited, though Sikh women and those belonging to OBC and "other" caste categories record marginally higher proportions of elevated glucose levels. Thus, the findings suggest that glucose abnormalities among women in Punjab increase with age and are more prevalent among socio-economically disadvantaged groups.

Random Blood Glucose Levels among Men

Table-9
Distribution of Men with Levels of Glucose by Background Characteristics in Punjab, 2015-16 and 2019-21

Background characteristics	2019-21				2015-16			
	Level of Glucose				Level of Glucose			
	Number of men	Normal	High	Very high	Number of men	Normal	High	Very high
Age								
15 -19	449	97.6	1.4	1.0	445	97.4	1.5	1.1
20 -24	435	97.5	1.7	0.8	511	95.8	2.8	1.4
25 - 29	449	96.5	1.9	1.6	546	97.0	1.9	1.1
30 -34	438	91.7	4.6	3.7	475	93.4	4.6	2.0
35 -39	302	86.7	9.1	4.2	387	89.5	5.0	5.5
40 -44	268	82.9	6.5	10.6	320	88.2	6.5	5.4
45 -49	238	81.4	8.2	10.4	306	86.8	6.1	7.1
Residence								
Urban	1059	92.0	4.0	4.1	1203	93.2	3.5	3.3
Rural	1519	92.2	4.3	3.6	1787	93.4	3.9	2.7
Schooling (years completed)								
No schooling	215	91.8	4.3	3.9	318	90.3	7.5	2.2
<5 years	88	93.6	4.6	1.8	69	97.1	0.9	2.0
5-9 years	757	88.7	6.0	5.3	810	94.1	2.4	3.5
10-11 years	551	90.1	5.0	5.0	725	91.0	4.4	4.6
12 or more years	968	92.9	3.9	3.2	1068	95.0	3.4	1.6
Religion								
Hindu	1000	91.2	5.0	3.8	1142	93.6	3.6	2.8
Christian	44	92.8	1.1	6.0	78	97.3	2.7	0.0
Sikh	1499	92.6	3.7	3.7	1680	92.7	4.1	3.2
Other	35	97.5	0.0	2.5	90	98.7	0.0	1.3
Caste/tribe								
SC	1216	93.0	4.2	2.8	1094	93.0	4.0	3.0
OBC	365	92.2	2.7	5.1	654	94.6	1.9	3.4
Other	986	91.1	4.5	4.4	1236	92.8	4.5	2.6
Total	2578	92.1	4.1	3.8	2990	93.3	3.8	2.9

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), India, 2019-21, Punjab* and IIPS and ICF. 2017. *NFHS-4, India, 2015-16: Punjab*. Mumbai: IIPS.

The results in Table 9 show a slight deterioration in glycaemic status over time. The proportion of men with normal glucose levels declined from 93.3 per cent in 2015-16 to 92.1 per cent in 2019-21, while the share with very high glucose levels increased from 2.9 per cent to 3.8 per cent.

The data shows an age-related increase in the prevalence of very high glucose levels among men. In 2019-21, the proportion rises markedly from around 1.0 per cent in the 15-19 age group to over 10 per cent among those aged 40-49 years, highlighting age as a key determinant. Differences between rural and urban areas are relatively minor, though rural men exhibit slightly higher prevalence. An inverse, though modest, relationship is observed with education, as men with higher educational attainment tend to report lower levels of very high glucose. Disparities across religious and caste groups are not substantial; however, somewhat higher proportions are noted among men from OBC and "other" caste categories. Taken together, these patterns indicate a gradual rise in glucose-related health risks among men in Punjab, with age playing a central role.

Spatial Patterns of NCD Risk Factors

Among Women

Table 10 presents the district-wise ranking of non-communicable disease (NCD) risk factors among women in Punjab based on a composite score constructed from three indicators, overweight/obesity, hypertension (including pre-hypertension), and elevated blood glucose levels, for the period 2019-21. The results reveal considerable spatial variation in the distribution of these risk factors across districts.

Jalandhar ranks highest in terms of the overall NCD burden among women, followed by Rupnagar and Amritsar. Jalandhar's leading position reflects consistently high prevalence across the three indicators, particularly overweight/obesity and elevated glucose levels. Rupnagar ranks second primarily due to the highest prevalence of high and very high glucose levels among women, while Amritsar ranks third, driven largely by the highest prevalence of hypertension and pre-hypertension. Districts such as Patiala, SAS Nagar, and Kapurthala also record relatively high composite scores, indicating the clustering of multiple NCD risk factors.

In contrast, districts including Fazilka, Mansa, Sangrur, and Muktsar occupy lower ranks in the composite score, reflecting comparatively lower prevalence of the selected indicators. Overall, the district-level ranking highlights substantial geographical heterogeneity in the distribution of major NCD risk factors among women in Punjab, suggesting the need for geographically differentiated public health strategies.

Regional patterns further reinforce these spatial disparities. The Doaba region reports the highest prevalence of obesity among women (16.1%), followed

by Majha (14.6%) and Malwa (13.4%). In contrast, thinness remains relatively higher in Malwa (13.8%) compared with Majha (10.7%) and Doaba (11.2%), indicating persistent nutritional disparities across regions. Similar regional variation is observed in hypertension, with Majha recording the highest proportion of hypertensive women (19.2%), followed by Doaba (17.7%) and Malwa (15.3%). Malwa shows the highest share of women with normal blood pressure, whereas Majha reports a larger proportion in the pre-hypertensive category. Regional differences in random blood glucose levels are comparatively modest. Malwa and Doaba record similar proportions of women with very high glucose levels (3.8% each), slightly higher than Majha (3.5%), although the majority of women across regions continue to fall within the normal range.

Table-10
Districts Ranked on the Basis of Prevalence of Selected NCDs among Women in Punjab, 2019-21

Districts	Over-weight/ obese	Rank	Hyper-tension/ pre-hyper-tension	Rank	Very high/ high glucose	Rank	Composite score on rankings of three NCDS	Average rank of three NCDS
Jalandhar	48.3	2	53.8	12	8.4	6	6.7	1
Rupnagar	45.6	4	50.4	17	10.6	1	7.3	2
Amritsar	42.4	8	65.5	1	6.7	15	8.0	3
Patiala	42.9	6	49.4	18	9.9	2	8.7	4
SAS Nagar	49.1	1	46.8	22	8.5	4	9.0	5
Kapurthala	42.5	7	55.2	11	7.2	9	9.0	5
SBS Nagar	41.9	9	64.6	2	6.4	17	9.3	7
Fatehgarh Sahib	48.2	3	47.4	21	8.5	4	9.3	7
Ludhiana	45.3	5	51.0	16	7.5	8	9.7	9
Gurdaspur	41.5	10	63.9	3	5.5	19	10.7	10
Barnala	37.6	18	60.9	5	6.9	12	11.7	11
Pathankot	40.2	12	60.5	6	6.1	18	12.0	12
Faridkot	39.5	13	48.0	20	8.8	3	12.0	12
Hoshiarpur	40.8	11	63.4	4	4.7	22	12.3	14
Tarn Taran	39.0	15	58.9	8	6.7	15	12.7	15
Firozpur	39.2	14	53.3	13	6.9	12	13.0	16
Moga	33.1	19	56.1	10	6.9	12	13.7	17
Bathinda	37.7	17	51.7	15	7.2	9	13.7	17
Muktsar	30.7	22	52.1	14	7.2	9	15.0	19
Sangrur	37.8	16	58.6	9	5.0	21	15.3	20
Mansa	33.0	20	59.4	7	5.5	19	15.3	20
Fazilka	31.4	21	49.2	19	7.6	7	15.7	22

Source: Calculated by the author.
Note: Lower composite score indicates higher burden.

Among Men

The composite ranking of districts for men similarly reveals marked spatial variation in the distribution of NCD risk factors. Fatehgarh Sahib and Gurdaspur jointly rank first, indicating the highest overall burden of combined risk factors, followed by Pathankot and Rupnagar (Table 11). The high ranking of these districts reflects relatively elevated prevalence across multiple indicators. For instance, Gurdaspur sand Sangrur record particularly high levels of hypertension

and pre-hypertension, while districts such as Bathinda and Faridkot exhibit higher proportions of elevated blood glucose levels.

Districts including Kapurthala, Amritsar, and Barnala also record relatively high composite scores, suggesting a substantial clustering of NCD risk factors. In contrast, Jalandhar, Moga, Tarn Taran, and SBS Nagar occupy lower ranks in the composite score, reflecting comparatively lower prevalence across the selected indicators. These findings highlight significant inter-district disparities in the distribution of NCD risk factors among men in Punjab, underscoring the importance of geographically targeted prevention strategies.

Table-11
Districts Ranked on the Basis of Prevalence of Selected NCDs among Men in Punjab, 2019-21

Districts	Over-weight/ obese	Ranking	Hyper-tension/ pre-hyper-tension	Ranking	Very high/ high glucose	Ranking	Composite score on rankings of three NCDS	Average rank of three NCDS
Fatehgarh Sahib	40.9	3	78.1	13	12.7	3	6.3	1
Gurdaspur	40.7	4	85.6	1	6.6	14	6.3	1
Pathankot	42.3	1	83.6	3	5.9	17	7.0	3
Rupnagar	41.0	2	76.9	16	10.0	5	7.7	4
Kapurthala	38.4	5	80.1	9	8.2	10	8.0	5
Amritsar	36.9	6	83.3	5	7.0	13	8.0	5
Sangrur	32.5	13	85.3	2	7.1	12	9.0	7
Barnala	34.9	9	83.6	3	6.2	15	9.0	7
SAS Nagar	36.9	6	65.0	22	11.9	4	10.7	9
Firozpur	36.2	8	77.3	15	7.3	11	11.3	10
Faridkot	33.4	11	71.1	21	12.8	2	11.3	10
Fazilka	27.3	17	79.2	12	9.6	7	12.0	12
Ludhiana	33.1	12	74.1	18	9.1	8	12.7	13
Hoshiarpur	33.9	10	79.9	10	5.0	19	13.0	14
Patiala	29.8	15	72.3	20	10.0	5	13.3	15
Bathinda	22.3	21	73.0	19	13.1	1	13.7	16
Mansa	26.5	18	81.5	7	6.0	16	13.7	16
Muktsar	25.0	19	75.3	17	9.0	9	15.0	18
SBS Nagar	25.0	19	82.1	6	3.8	21	15.3	19
Tarn Taran	29.0	16	79.5	11	4.1	20	15.7	20
Moga	20.0	22	81.5	7	5.4	18	15.7	20
Jalandhar	32.4	14	77.6	14	3.2	22	16.7	22

Source: Calculated by the author.
Note: Lower composite score indicates higher burden.

Regional analysis also reveals clear spatial differences in nutritional status and cardiovascular risk. The Majha region records the highest proportion of overweight men (30.0%), while Doaba reports the highest prevalence of obesity (9.6%). Thinness remains relatively more prevalent in Malwa, indicating regional disparities in men's nutritional outcomes. Hypertension patterns also vary across regions, with Majha recording the highest prevalence of hypertensive men (31.9%), followed by Malwa (26.9%) and Doaba (23.7%). In contrast, Doaba shows a relatively higher share of men with normal blood pressure, although a large proportion across regions falls within the pre-hypertensive category, indicating a sizeable population at risk of developing hypertension.

Regional variation in random blood glucose levels is comparatively modest. Malwa reports the highest proportion of men with very high glucose levels (4.5%), followed by Majha (2.7%) and Doaba (2.2%), while Doaba records the highest proportion with normal glucose levels (95.1%). Overall, although most men continue to exhibit normal glucose levels, the presence of elevated levels in several districts suggests emerging regional disparities in metabolic risk across Punjab.

Table-12
Gender Gap Index (GGI) based on Composite Rank Differences, Punjab, 2019-21

Name of districts	Women Rank	Men Rank	Rank Difference (W–M)	GGI (Standardized Score)	Interpretation
Jalandhar	1	22	-21	2.54	Very high female disadvantage
Fazilka	22	12	10	1.07	High female disadvantage
Sangrur	20	7	13	1.47	Very high female disadvantage
Gurdaspur	10	1	9	0.94	Moderate female disadvantage
Pathankot	12	3	9	0.94	Moderate female disadvantage
Fatehgarh Sahib	7	1	6	0.54	Moderate female disadvantage
Firozpur	16	10	6	0.54	Moderate female disadvantage
Barnala	11	7	4	0.27	Mild female disadvantage
Mansa	20	16	4	0.27	Mild female disadvantage
Faridkot	12	10	2	0.01	Near parity
Bathinda	17	16	1	−0.13	Near parity
Muktsar	19	18	1	−0.13	Near parity
Kapurthala	5	5	0	−0.26	Near parity
Hoshiarpur	14	14	0	−0.26	Near parity
Rupnagar	2	4	−2	−0.53	Moderate male disadvantage
Amritsar	3	5	−2	−0.53	Moderate male disadvantage
Moga	17	20	−3	−0.66	Moderate male disadvantage
SAS Nagar	5	9	−4	−0.79	Moderate male disadvantage
Ludhiana	9	13	−4	−0.79	Moderate male disadvantage
Tarn Taran	15	20	−5	−0.93	Moderate male disadvantage
Patiala	4	15	−11	−1.73	Very high male disadvantage
SBS Nagar	7	19	−12	−1.86	Very high male disadvantage

Source: Computed by the author

GGI (Gender Gap Index) is computed using standardized z-scores:

$$GGI = (X-\mu) / \sigma$$

where X is the rank difference (Women - Men), μ is the mean difference, and σ is the standard deviation.

Positive GGI = Higher NCD burden among women

Negative GGI = Higher NCD burden among men

Values near zero = Gender parity

A comparison of regional patterns among men and women indicates that Majha and Doaba generally exhibit a higher burden of obesity and hypertension, whereas Malwa displays a mixed profile characterized by relatively higher levels

of thinness alongside increasing metabolic risks. These findings underscore the need for geographically targeted and gender-sensitive NCD prevention strategies that account for the distinct risk profiles of different districts and regions within Punjab.

Gender inequality in Punjab is not the same across all districts and varies in both level and direction (Table 12). A few districts, such as Jalandhar, Sangrur, and Fazilka, fall in the category of high female disadvantage**,** meaning women in these areas face much higher health risks compared to men.

Some districts, including Gurdaspur, Pathankot, Fatehgarh Sahib, and Firozpur, show moderate female disadvantage**,** where women are still worse off than men, but the gap is smaller. At the same time, several districts fall within the near parity category**,** such as Barnala, Mansa, and Bathinda, where the difference between men and women is minimal. This suggests a relatively balanced situation in terms of NCD risk factors.

In contrast districts such as Ludhiana, Amritsar, and Tarn Taran, show moderate male disadvantage, indicating that men have higher levels of health risks than women in these areas. A few districts, such as Patiala and SBS Nagar, even show high male disadvantage**,** where men are significantly worse off.

It is evident that gender inequality in Punjab is not uniform. Both women and men face disadvantages in different districts. This highlights the importance of targeted, district-specific policies that address the needs of each gender based on local conditions, rather than using a single approach for all regions.

Discussion

The findings of this study indicate a clear and consistent rise in the prevalence of major NCD risk factors, obesity, hypertension, and elevated blood glucose levels, in Punjab between NFHS-4 (2015-16) and NFHS-5 (2019-21). The increasing prevalence across both men and women reflects the ongoing epidemiological and nutritional transition in the state, characterised by a gradual shift from communicable diseases and undernutrition towards chronic conditions associated with changing lifestyles and demographic ageing. The patterns observed in Punjab are consistent with broader trends reported across many parts of India, although the magnitude of the increase appears particularly pronounced in the state.

A key finding of the analysis is the rapid increase in overweight and obesity, with Punjab reporting substantially higher levels compared with Haryana and the national average. The rise in excess body weight is particularly evident among older age groups, currently married individuals, and urban residents, suggesting the strong influence of lifestyle and socio-economic factors. Changes in dietary behaviour, increased consumption of calorie-dense foods, declining levels of physical activity, and more sedentary occupations are likely to be

important drivers of this trend. Given the well-established association between obesity and metabolic disorders, the rising prevalence of excess body weight represents an important precursor to the growing burden of other NCDs in the state.

The study also documents a substantial increase in hypertension prevalence, with Punjab consistently recording higher levels than both Haryana and the national average. A strong age gradient is evident, with the prevalence increasing sharply among older adults. Educational differentials suggest that individuals with lower levels of schooling experience relatively higher risk, which may reflect differences in health awareness, preventive practices, and access to healthcare services. The slightly higher prevalence observed in rural areas further indicates that hypertension is no longer confined to urban populations but is increasingly widespread across rural communities as well.

Similarly, the proportion of individuals with elevated blood glucose levels has increased between the two survey rounds, indicating a rising risk of diabetes in the population. Although most respondents continue to fall within the normal glucose range, the growing share of individuals with high and very high glucose levels signals a gradual deterioration in metabolic health. As with obesity and hypertension, age emerges as a major determinant, while educational and socio-economic disparities remain evident.

The study further highlights significant spatial disparities in the distribution of NCD risk factors across districts and regions of Punjab. Districts such as Jalandhar, Rupnagar, Amritsar, Fatehgarh Sahib, and Gurdaspur exhibit relatively higher composite levels of NCD risk factors. These spatial patterns may reflect variations in socio-economic development, urbanisation, dietary practices, occupational structures, and access to health services across districts. The clustering of multiple risk factors in certain areas underscores the importance of incorporating geographically targeted public health interventions in state-level NCD control strategies.

The overall findings suggest that the burden of NCDs in Punjab is not only increasing but also unevenly distributed across socio-demographic groups and geographic areas. Addressing this growing challenge will require a comprehensive public health response that emphasises preventive strategies, early detection, behavioural risk reduction, and improved management of chronic conditions through strengthened primary healthcare systems.

Conclusions

The study examined how obesity, hypertension, and elevated blood glucose levels, which constitute three major non-communicable disease indicators, are changing and how they are related to socio-demographic factors in Punjab through data from two rounds of NFHS-4 (2015-16) and NFHS-5 (2019-21)

surveys. The findings indicate that the prevalence of these conditions has increased in a consistent and marked manner over time, indicating a rapidly changing NCD burden in the state.

The analysis demonstrates that Punjab continues to report higher levels of overweight, obesity and hypertension compared to Haryana and the national average. Changes in dietary, sedentary lifestyle, and wider socio-economic transformation have contributed to an increase in excess body weight among both men and women, with women being particularly affected. The number of adults classified as either pre-hypertensive or hypertensive has increased significantly between the two survey sounds, suggesting a large population at risk of future cardiovascular complications. The state's diabetes risk is on the rise due to an increase in the proportion of individuals with elevated blood glucose levels across both sexes.

These NCD indicators are strongly related to several socio-demographic characteristics. The prevalence of obesity, hypertension, and elevated glucose levels rapidly increases in older age groups, making age one of the most important determinants. The role of socio-economic conditions and lifestyle behaviours in shaping health outcomes is highlighted by associations between other factors such as marital status, education, place of residence, and caste.

The analysis also reveals significant spatial disparities across districts and regions of Punjab. Certain districts consistently show a higher level of multiple NCD risk factors, which suggests that there are localized clusters of vulnerability. Gender disparities in Punjab also vary considerably across districts, with both women and men experiencing disadvantages in different regional contexts. This variation highlights the necessity for context-specific and geographically targeted interventions**.**

NCDs in Punjab require urgent strengthening of preventive and control strategies. Early detection and management can be achieved through the expansion of population-based screening, promotion of healthy dietary practices and physical activity, and improved awareness of risk factors. In order to prevent the rising burden of NCDs and improve long-term population health outcomes in the state, it is crucial to strengthen existing initiatives to control obesity, diabetes, cardio vascular diseases and stroke, as well as region-specific public health strategies.

References

Balsarkar, G. (2022). Non-communicable diseases: Agenda for today’s gynaecologist in India. *The Journal of Obstetrics and Gynaecology of India*, 72(6), 467-469. https://doi.org/10.1007/s13224-022-01733-9

Harikumar R, Sreena T.V. (2025): Prevalence of non-communicable disease and their life style risk factors among elderly in India: an analysis of WHO SAGE data. Int J Community Med Public Health 2025;12:2108-12.

International Diabetes Federation. (2021). *IDF diabetes atlas* (10th ed.). https://diabetesatlas.org/atlas/tenth-edition/.

International Institute for Population Sciences (IIPS) & ICF. (2017). *National Family Health Survey (NFHS-4), 2015-16: India.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ICF. (2017). *National Family Health Survey (NFHS-4), 2015-16: Haryana.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ICF. (2017). *National Family Health Survey (NFHS-4), 2015-16: Punjab.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ICF. (2021). *National Family Health Survey (NFHS-5), 2019-21: India.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ICF. (2021). *National Family Health Survey (NFHS-5), 2019-21: Haryana.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ICF. (2021). *National Family Health Survey (NFHS-5), 2019-21: Punjab.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & Macro International. (2007). *National Family Health Survey (NFHS-3), 2005-06: India.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & Macro International. (2008). *National Family Health Survey (NFHS-3), 2005-06: Haryana.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & Macro International. (2008). *National Family Health Survey (NFHS-3), 2005-06: Punjab.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ORC Macro. (2000). *National Family Health Survey (NFHS-2), 1998-99: India.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ORC Macro. (2001). *National Family Health Survey (NFHS-2), 1998-99: Haryana.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) & ORC Macro. (2001). *National Family Health Survey (NFHS-2), 1998-99: Punjab.* Mumbai: IIPS.

Kundu, Jhumki, Srinivas Goli and K. S. James (2025): Education and non-communicable diseases in India: an exploration of gendered heterogeneous relationships, *International Health* 2025; 17 : 168-178.

Ministry of Health and Family Welfare. (n.d.). *National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).* Government of India. https://www.mohfw.gov.in/.

Ramalingam, A., Raju, M., Ganeshkumar, P., Yadav, R., Tanwar, S., Sakthivel, M., et al. (2022). Building noncommunicable disease workforce capacity through field

epidemiology training programs: Experience from India, 2018-2021. *Preventing Chronic Disease*, 19. https://doi.org/10.5888/pcd19.220208.

Ramamoorthy, T., Leburu, S., Kulothungan, V., & Mathur, P. (2022). Regional estimates of non-communicable disease risk factors among adults in India: Results from the national noncommunicable disease monitoring survey. *BMC Public Health*, 22, 1069. https://doi.org/10.1186/s12889-022-13466-5.

Ray, S., & Jamdade, V. (2015). Knowledge regarding hypertension and its risk factors among people residing in urban slums. *Asian Academic Research Journal of Multidisciplinary*, 1(29).

Shivashankar, R., Sharma, B., Moran, A. E., & Pathni, A. K. (2021). Validation of a practical approach to blood pressure measurement: Secondary analysis of data from a nationally representative survey in India. *Global Heart*, 16(1), 87. https://doi.org/10.5334/gh.1085.

Shrivastava, R., Rawal, T., Kataria, I., Mehrotra, R., Bassi, S., & Arora, M. (2023). Accelerating policy response to curb non-communicable diseases: An imperative to mitigate the dual public health crises of NCDs and COVID-19 in India. *The Lancet Regional Health - Southeast Asia*, 10. https://doi.org/10.1016/j.lansea.2022.100132.

Thakur, J. S., Jeet, G., Pal, A., Singh, S., Singh, A., Deepti, S. S., et al. (2016). Profile of risk factors for non-communicable diseases in Punjab, Northern India: Results of a state-wide STEPS survey. *PLoS ONE*, 11(7), e0157705. https://doi.org/10.1371/journal.pone.0157705

Wang, Y., & Wang, J. (2020). Modelling and prediction of global non-communicable diseases. *BMC Public Health*, 20, 822. https://doi.org/10.1186/s12889-020-08890-4.

World Health Organization. (2022). *Invisible numbers: The true extent of noncommunicable diseases and what to do about them.* Geneva: WHO.

Zatońska, K., Psikus, P., Basiak-Rasała, A., Stępnicka, Z., Gaweł-Dąbrowska, D., Wołyniec, M., et al. (2021). Obesity and selected non-communicable diseases in the PURE Poland cohort study. *International Journal of Environmental Research and Public Health*, 18(5). https://doi.org/10.3390/ijerph18052701

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UNDERSTANDING ROAD RAGE: PSYCHOLOGICAL CORRELATES OF DRIVING ANGER ACROSS AGE AND GENDER

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Abstract: Driving anger, aggression, and locus of control are important psychological factors associated with unsafe driving behaviour. These tendencies may be influenced by various factors such as age, time pressure, risk-taking tendencies, and preference for speed. Research indicates that males between the ages of 30-59 years are among the most frequent road users and report higher instances of road rage. Aggressive drivers are also more likely to commit traffic violations. The present study examined age and gender differences in driving anger, aggression, and locus of control. A purposive sampling method was used to select 120 licensed drivers: 60 young adults (19-26 years) and 60 middle-aged adults (30-40 years), with equal representation of males and females in each group. Participants were administered the Driving Anger Scale (Deffenbacher et al., 1996), the Aggression Questionnaire (Buss & Perry, 1992), and the Locus of Control Scale (Levenson, 1972). A self-developed questionnaire was also used to assess driving skills and awareness of traffic rules. Significant age differences were observed. Adults aged 30-40 years scored significantly higher on driving anger and all dimensions of aggression (anger, physical aggression, hostility, and verbal aggression), as well as on the "powerful others" dimension of locus of control. In contrast, younger adults (19-26 years) reported stronger beliefs in internal control. Significant gender differences were also found, particularly in driving anger among females in the age group of 19-26 years.

Introduction

Road rage is not merely a popular term in present-day India but a serious reality that claims hundreds of lives every day. It represents one of the major expressions of driving anger. Anger, aggressive driving, and the expression of anger while driving are three critical components involved in road accidents and traffic incidents. In 2005, road accidents in India resulted in approximately 1 million deaths, 2.5 million hospitalisations, 8-9 million minor injuries, and an estimated 3 per cent loss to the national GDP (Gururaj, 2008). According to WHO (2018),

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road traffic accidents are the sixth leading cause of death, hospitalisation, and disability among young and middle-aged individuals in India. Furthermore, the National Centre for Health Statistics (2019a, 2019b) reports that motor vehicle collisions are the leading cause of death among individuals aged 15-24 years. Poor driving outcomes among young drivers have been linked to limited experience and incomplete cognitive development (Stavrinos, Pope, Shen, & Schwebel, 2018).

Driving anger has emerged as a significant concern in society. Lonczak, Neighbors, and Donovan (2006) clarified that "angry driving" refers to the experience of anger while driving and distinguished it from aggressive driving. Aggressive driving involves specific behaviours, such as swearing, confronting other drivers, or chasing them, which may or may not stem from anger. In extreme situations, aggressive driving may escalate into road rage. It can also include reckless behaviours such as jumping red lights or over-speeding.

Empirical evidence demonstrates a clear relationship between driving anger and aggression, particularly trait anger (Deffenbacher et al., 1994). However, although experiencing anger while driving is common, the expression of aggressive behaviour is comparatively less frequent (Parker, Lajunen, & Summala, 2002). The enactment of anger depends on the interaction of personality and situational factors, one of which is locus of control (LOC).

Locus of control refers to whether individuals attribute outcomes to internal factors (such as personal effort and ability) or external factors (such as powerful others or chance). Driving-specific LOC has been identified as a significant predictor of motor vehicle accidents (Guastello & Guastello, 1986). Drivers with an external LOC are more likely to be involved in accidents because they may take fewer precautions than those with an internal LOC (Montag & Comrey, 1987). External control beliefs may reduce a driver's sense of responsibility for outcomes. In contrast, drivers with an internal LOC are more likely to behave responsibly, believing that outcomes depend on their skills and efforts (Rudin-Brown & Parker, 2004; Walker, Stanton, & Young, 2008). Nevertheless, excessive internal LOC may also encourage risky driving due to overconfidence in one's abilities (Arthur & Doverspike, 1992).

Research suggests that age and gender interact with personality traits to influence driving anger. Higher levels of anger and aggression have often been reported among younger male drivers, whereas age has shown less impact among females. Women with greater driving experience tend to report lower levels of anger (Lajunen & Parker, 2001). Novaco (1989) found that younger drivers reported and exhibited higher aggression, particularly males between the age group of 17-35 years. Similar findings have been reported in other studies (Wickens et al., 2011; Sullman et al., 2013; Haje & Symbaluk, 2014; Sullman, Stephens, & Yong, 2014).

However, findings on age and gender differences remain inconsistent. Some studies report no significant sex or age differences in aggressive driving tendencies (Deffenbacher, Kemper, & Richards, 2007; Moore & Dahlen, 2008; Villieux & Delhomme, 2010), while others suggest only small effect sizes (Sârbescu, Stanojevic´, & Jovanovic´, 2014).

Additionally, differences have been observed in the triggers and expressions of driving anger. Sullman et al., (2014) found that women reported more anger in traffic situations. Dahlen and Ragan (2004) suggested that women may exhibit higher verbal aggression than men. However, women are also reported to regulate and express driving anger more adaptively (Deffenbacher et al., 2014). In contrast, Sullman (2015) reported no gender differences in verbal aggressive expression. Overall, gender differences in driving anger appear to depend on the form of anger expression.

Objectives: The study intends to:

- Compare young drivers (19-26 years) and middle-aged drivers (30-40 years) on driving anger, aggression, and locus of control; and
  Examine gender differences in driving anger, aggression, and locus of control.

Hypotheses

Based on an in-depth review of existing literature, the following hypotheses are proposed:

H1: Students (19-26 years) will score significantly higher than working adults (30-40 years) on:

- Driving anger
- Aggression (anger, physical aggression, hostility, and verbal aggression)
- Locus of control (power, chance, and internal dimensions)

H2: Males will score significantly higher than females on:

- Driving anger
- Aggression (anger, physical aggression, hostility, and verbal aggression)
- Locus of control (power, chance, and internal dimensions)

Methodology

Design and Participants

The present study employed a cross-sectional comparative design to examine differences in driving anger, aggression, and locus of control across age and gender groups.

A total of 120 adults possessing a valid driving license participated in the study after providing informed consent. The sample consisted of 60 males and 60 females. Participants were selected using purposive sampling based on the following inclusion criteria: (a) a minimum of one year of driving experience, (b) non-professional driving status, (c) residence in urban areas of Chandigarh and belonging to middle-class families, and (d) literacy in English with the ability to read and write.

The sample comprised two age groups: young drivers (students) aged 19-26 years and middle-aged drivers (working adults) aged 30-40 years.

Measures

The primary objective of the study was to investigate the association between driving anger, aggression, and locus of control across age and gender. Participants completed a battery of standardized questionnaires described below:

Driving Anger Scale: The Driving Anger Scale (Deffenbacher et al., 1996) consists of 14 items assessing the intensity of anger experienced in various driving situations. Responses are rated on a 5-point Likert scale, with higher scores indicating greater levels of driving anger.

Buss-Perry Aggression Questionnaire: The Buss and Perry Aggression Questionnaire (1992) includes 29 items measuring four dimensions of aggression:

- Physical Aggression and Verbal Aggression, representing the behavioral or motor components of aggression;
- Anger, reflecting the emotional or affective component;
- Hostility, representing the cognitive component characterized by feelings of ill will and perceived injustice.

Higher scores indicate greater levels of aggression across the respective dimensions.

Locus of Control Scale: Locus of control was assessed using Levenson's (1972) scale, which measures three dimensions: Internal control (I), Powerful Others (P), and Chance (C). These dimensions reflect the extent to which individuals attribute outcomes to personal control, influential others, or external chance factors.

Procedure

The questionnaires were administered individually in a standardized sequence. Participants were provided with clear instructions prior to completing the measures. Scoring was conducted in accordance with the guidelines outlined in the respective test manuals.

Results

The data were analysed using a 2 (age: young vs middle-aged) × 2 (gender: male vs female) analysis of variance (ANOVA) and Pearsons correlation coefficient (r) analysis. Table 1 presents the means, standard deviations, and results of the 2 × 2 ANOVA examining the main interaction effects of age and gender on driving anger, aggression, and locus of control. Further, as shown in Tables 2, correlation analyses revealed significant associations among the study variables.

Table-1
Means, Standard Deviations and 2(Age) x 2 (Gender) ANOVA for Driving Anger, Aggression and Locus of Control (N = 120)

Source	df	Mean Sum of Squares								
		Driving Anger	Anger	Physical Aggression	Hostility	Verbal Aggression	Total Aggression	P	C	I
Age	1	625.62	1725.21	1606.00	2201.63	500.21	25520.83	403.33	6.08	2210.21
Gender	1	218.70	190.00	667.40	270.00	147.41	3853.33	145.20	88.41	63.08
Age x Gender	1	589.633	180.07	304.00	258.13	273.01	3477.63	116.03	11.41	54.68
Error	116	10919.73	3257.03	5829.36	3800.60	2613.30	30088.06	2957.13	2809.1	3664.63
		F-Value								
Source	df	Driving Anger	Anger	Physical Aggression	Hostility	Verbal Aggression	Total Aggression	P	C	I
Age		6.64*	61.44**	31.96**	67.20**	22.20**	98.39**	15.82**	.251	69.96**
Gender		2.32	6.77**	13.28**	8.24**	6.54*	14.86**	5.70*	3.65	1.99
Age x Gender		6.26*	6.41*	6.05*	7.88**	12.12**	13.41**	4.55*	.47	1.73

Note: Dimensions of Locus of Control: P = Powerful Others, C = Chance, I = Internal
** p < .01
* p < .05

Driving Anger

The results of the two-way ANOVA indicated a significant main effect of age on driving anger, F (1, 116) = 6.646, p < .05. Examination of the mean scores revealed that working adults aged 30-40 years (M = 46.73) reported higher levels of driving anger compared to participants aged 19-26 years (M = 42.17). These findings are consistent with Hoggan and Dollard (2007), who reported a relationship between driving anger, occupational stress, and emotional well-being among employees.

In addition, the interaction effect of age and gender was found to be significant, F (1, 116) = 6.264, p < .05. Inspection of the mean scores indicated that males in the age group of 30-40 year (M = 47.60) reported higher levels of driving anger than females of the same age group (M = 45.87).

Anger: The results of the two-way ANOVA revealed a significant main effect of age on anger, F (1, 116) = 61.444, p < .01. Examination of the mean scores

indicated that middle-aged drivers (30-40 years) reported significantly higher scores on anger (M = 26.72) than young drivers (19–26 years).

A significant main effect of gender was also observed, F (1, 116) = 6.76, $p < .05$. The mean scores showed that males reported higher levels of anger than females in both age groups. In the age group of 30-40 year, males obtained a mean score of 29.20 compared to 24.23 for females. Similarly, in the age group of 19-26 year, males (M = 19.16) scored slightly higher than females (M = 19.10).

Furthermore, the interaction effect of age and gender was found to be significant, F (1, 116) = 6.41, $p < .05$. Inspection of the mean scores indicated that males in the age group of 30-40 years reported the highest levels of anger (M = 29.20) compared to females of the same age group (M = 24.23).

These findings are consistent with prior research indicating that anger is a significant concern in workplace settings and is associated with negative outcomes such as reduced productivity, increased absenteeism, impaired work relationships, and various health problems including anxiety, stress, depression, hypertension, and cardiovascular disease (Gibson & Barsade, 1999). Additionally, previous studies have reported that males tend to experience higher levels of state anger compared to females (Forgays et al., 1997).

Physical Aggression: The results of the two-way ANOVA indicated a significant main effect of age on physical aggression, F (1, 116) = 31.96, $p < .01$. Examination of the mean scores revealed that participants in the age group of 30-40 years (M = 27.62) reported higher levels of physical aggression compared to those in the age group of 19-26 years (M = 20.30).

A significant main effect of gender was also observed, F (1, 116) = 13.28, $p < .01$. The mean scores demonstrated that males reported higher levels of physical aggression than females in both age groups. In the 30- 40 years age group, males (M = 31.57) scored higher than females (M = 23.67). Similarly, in the 19-26 years age group, males (M = 21.07) obtained higher mean scores than females (M = 19.53).

Furthermore, the interaction effect of age and gender was significant, F (1, 116) = 6.05, $p < .05$. Inspection of the mean scores indicated that males in both age groups reported higher physical aggression compared to their female counterparts, with the highest levels observed among males aged 30-40 years (M = 31.57).

These findings are consistent with previous research suggesting that males are more likely to express aggression through physical forms, whereas females tend to exhibit more indirect or non-physical forms of aggression (White & Kowalski, 1994).

Hostility: The results of the two-way ANOVA indicated a significant main effect of age on hostility, F (1, 116) = 67.20, $p < .01$. Examination of the mean scores revealed that participants in the 30-40 years age group (M = 27.90) reported higher levels of hostility compared to those in the 19-26 year age group (M = 19.33).

A significant main effect of gender was also observed, F (1, 116) = 8.24, $p < .01$. The mean scores indicated that males reported higher levels of hostility than females in both age groups. In the 30-40 years age group, males (M = 30.87) scored higher than females (M = 24.93). Similarly, in the 19-26 years age group, males (M = 19.37) reported marginally higher hostility than females (M = 19.30).

Furthermore, the interaction effect of age and gender was found to be significant, F(1, 116) = 7.88, $p < .01$. Inspection of the mean scores showed that males in both age groups exhibited higher hostility than females, with the highest levels observed among males aged 30-40 years (M = 30.87).

Verbal Aggression: The results of the two-way ANOVA indicated a significant main effect of age on verbal aggression, F (1, 116) = 22.20, $p < .01$. Examination of the mean scores revealed that participants in the 30-40 years age group (M = 19.52) reported higher levels of verbal aggression compared to those in the 19-26 years age group (M = 15.43).

A significant main effect of gender was also observed, F (1, 116) = 6.54, $p < .05$. The mean scores indicated that males reported higher levels of verbal aggression than females in the 30-40 years age group (M = 22.13 vs. 16.90). However, in the 19-26 years age group, verbal aggression was marginally higher among females (M = 15.83) compared to males (M = 15.03).

Furthermore, the interaction effect of age and gender was significant, F (1, 116) = 12.12, $p < .01$. Inspection of the mean scores revealed that males in the 30-40 years age group exhibited higher verbal aggression than females of the same age group, whereas among the younger participants (19-26 years), females reported slightly higher verbal aggression than males.

These findings are partially consistent with earlier research suggesting gender differences in the expression of aggression, with boys demonstrating greater physical aggression and girls exhibiting higher levels of verbal hostility (Kalliopuska, 1992).

Total Aggression: The ANOVA revealed a significant main effect of age, F (1, 116) = 98.39, $p < .01$. A perusal of the mean scores shows that workers in the 30-40 years age group reported higher total aggression compared to the younger age group (19-26 years) (Mean = 103.22 vs. 74.05).

The main effect of gender also emerged as significant, F (1, 116) = 14.86, $p < .01$. The mean scores of males on total aggression were higher than those of

females in both age groups. In the 30-40 year age group, males (Mean = 114.27) scored higher than females (Mean = 92.17). Similarly, in the 19-26 years age group, males (Mean = 74.33) scored marginally higher than females (Mean = 73.76).

A significant two-way interaction effect of age × gender emerged, F (1, 116) = 13.41, $p < .01$. The mean scores reveal that males in the 30-40 years age group were higher than females (Mean = 114.27 vs. 92.17). Students in the 19-26 years age group reported lower mean scores than workers in the 30-40 years age group, while within the younger group, males (Mean = 74.33) scored slightly higher than females (Mean = 73.77). The findings are in line with Novaco (1991), who reported that aggression scores were highest for males between 17-35 years of age.

Correlations: As shown in Table 2, several significant correlations were observed among the study variables for the two age groups. Driving anger among working adults (30-40 years) was significantly positively correlated with total aggression (r = .47, p <0.05)) and its sub-traits: anger (r = .34, p <0.01), hostility (r = .31, p <0.05), and physical aggression (r = .39, p <0.01). These results support Beirness (1993), noting that hostile and aggressive personality traits negatively influence driving behavior.

Similarly, driving anger was negatively correlated to the Power subscale of locus of control for both students (r = -.34, p <0.01) and working individuals (r = -.31, p <0.05). The findings reveal that those high on driving anger would not let the desires of others overpower them. However, Montag and Comrey (1987) found that those high on externality exhibit a lack of caution and that externality correlates positively with fatal accident involvement.

Table-2
Correlation results of drivers on Driving Anger, Aggression and Locus of Control Across Age

Correlation Matrix (Students: Age 19-26 Years and Working individuals: Age 30-40 years)

	DA	A	PHY AGG	HOST	VER AGG	TOT AGG	P	C	I
DA	1.00	.21	-.05	.15	.07	.16	-.34**	-.04	.03
A	.34**	1.00	.47**	.22	.42**	.77**	-.08	-.20	.09
P AGG	.39**	.51**	1.00	-.12	.38**	.66**	.04	-.07	-.11
HOST	.31*	.48**	.44**	1.00	-.01	.44**	-.07	-.27*	.15
VER AGG	.07	.36**	.18	.14	1.00	.67**	-.01	-.16	-.09
TOT AGG	.47*	.82**	.76**	.60**	.53**	1.00	-.08	-.03	-.00
P	-.31*	.05	-.09	-.14	.14	-.04	1.00	.17	-.21
C	-.01	.08	-.18	.04	.17	-.022	.52**	1.00	-.12
I	.089	-.30*	-.39	.05	.02	-.23	-.15	-.03	1.00

Note: DA=Driving anger, A=Anger, Phy Agg=Physical aggression, Host=Hostility, Ver Agg=Verbal aggression, To Agg=Total aggression, P=Powerful other, C=Chance factor, I=Internal

** p < .01 * p < .05

The results further demonstrate distinct correlation patterns among the variables for males and females. Driving anger was not significantly related to aggression or its sub-traits, nor to locus of control, among either male or female students (19-26 years).

Driving anger was significantly related to physical aggression ($r = .40$, $p < 0.05$) and total aggression ($r = .41$, $p < 0.05$) among males (30-40 years). Among middle-aged female drivers (30-40 years), driving anger was significantly related to anger ($r = .46$, $p < 0.05$), physical aggression ($r = .39$, $p < 0.05$), hostility ($r = .62$, $p < 0.01$), and total aggression ($r = .61$, $p < 0.01$).

The superwoman squeeze is clearly reflected in these findings, suggesting that working women experience increased demands in terms of time, attention, and energy, which may act as contributing factors toward higher expressions of anger and aggression.

Discussion and Conclusion

The purpose of the present research was to examine the relationships among age, gender, locus of control, aggression, and driving anger. Given the differences in accident statistics between men and women across age groups, and the relationships among driving anger, aggression, and locus of control reported in the literature, age and gender differences in the experience of driving anger were hypothesised.

First, it was hypothesised that youngsters would score higher on driving anger, aggression, and locus of control compared to adults. Contrary to expectations, adults (30-40 years) were found to score higher on the variables under study than youngsters. This may be attributed to the influence of situational variables in the manifestation of driving anger and aggression. The correlational findings provide further insight: a negative correlation was observed between the Power factor of LOC and driving anger among youngsters ($r = -.34$), whereas among adults, driving anger was negatively correlated with the Chance factor of LOC ($r = -.31$).

Interestingly, significant age differences were found along the Powerful Others dimension of LOC ($F = 15.82$). This was supported by a positive correlation between the Power and Control factors of LOC among adults, while no such relationship was observed for the younger age group. These findings suggest that adults acknowledge their sense of power and experience in driving situations, although chance factors continue to play a role. This may partly explain why adults scored higher on driving anger and aggression compared to the younger sample.

Hoggan and Dollard (2007) support the relationship between driving anger, work stress, and emotional well-being among employees. Matthews (2002)

also reported that interactions between driving and non-driving variables influence behaviour behind the wheel. Additionally, cultural context may act as a confounding variable. Since the majority of prior research has been conducted in Western societies, findings may differ in the Indian context. Further research is needed to better understand the role of non-driving factors in driving anger.

The second hypothesis examined gender differences across the study variables. The results are consistent with previous research suggesting that males tend to score higher on driving anger and aggression than females. Significant gender differences were observed for driving anger, all dimensions of aggression, and the Powerful Others dimension of LOC.

Males have been reported to experience higher levels of state anger compared to females (Forgays et al., 1997). White and Kowalski (1994) noted that male express aggression more often in physical forms, whereas females are more likely to exhibit non-physical forms of aggression. Similarly, Kalliopuska (1992) reported that boys demonstrate greater physical aggression, while girls express more verbal hostility. In recent times also research by Padgett et al., (2020) supports similar findings. The present findings also support this pattern within the Indian context.

Finally, significant interaction effects of age and gender were observed across all variables, indicating that neither age nor gender should be examined in isolation when studying driving anger. Both factors jointly influence how anger experienced while driving is manifested.

In conclusion, the study provides further evidence that male drivers exhibit higher levels of driving anger compared to females. Although the influence of locus of control varies across the literature, the present findings contribute to understanding how perceptions of control while driving impact the experience and expression of anger on the road.

Implications

The present study revealed that students in the ages of 19-26 year obtained higher mean scores than working adults (30-40 years) on the Internal dimension of locus of control. This indicates that students tend to hold stronger beliefs in personal control (e.g., “When I make plans, I am almost certain to make them work”). This is one of the most important findings of the study, as it suggests that the younger generation possesses a sense of internal control that can be positively directed. Since individuals with an internal locus of control believe they can influence outcomes through their own efforts, this provides an opportunity for intervention and behavioural change. Society can therefore work toward preventing issues such as driving anger by channelling this internal orientation into constructive attitudes and responsible driving practices.

The study also contributes to the limited body of research on driving anger in the Indian context. However, for a more comprehensive understanding of the phenomenon, future research should examine the variables under study in conjunction with driving styles. Indian roads are characterised by unique and complex traffic conditions, with multiple dynamic factors operating simultaneously. As a result, the driving styles of Indian drivers may differ significantly from those observed in Western societies. Since driving style plays a crucial role in the manifestation of driving anger and aggressive driving, incorporating this dimension into future research would enhance contextual understanding.

Furthermore, aggressive cognitions are often acquired through early experiences and socialization. Parents can therefore serve as important role models, as they significantly influence children's future driving behaviour. By promoting awareness of road risks and developing safe driving skills, parents can help shape responsible driving habits. Every driver must recognise that roads are shared spaces, including pedestrians and other vulnerable users. Adherence to speed limits should stem from empathy (consideration for others' comfort), equity (fairness in interactions with other drivers), and rationality (objective evaluation of driving situations).

Additionally, effective time management can substantially reduce anger and aggressive outbursts while driving. Low stress tolerance and a tendency toward aggressive orientation should be addressed through stress management techniques for all drivers. Such preventive and corrective measures may contribute to safer roads and healthier driving behaviour.

References

Arthur, W., & Doverspike, D. (1992). Locus of control and auditory selective attention as predictors of driving accident involvement: A comparative longitudinal investigation. *Journal of Safety Research, 23*(2), 73-80.

Beirness, D. J. (1993). Do we really drive as we live? The role of personality factors in road crashes. *Alcohol, Drugs & Driving*.

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology, 63*(3), 452-459.

Dahlen, E. R., & Ragan, K. M. (2004). Validation of the propensity for angry driving scale. *Journal of Safety Research, 35*(5), 557-563.

Deffenbacher, J. L., Alcazar-Olan, R., Kocur, J., & Richards, T. (2014). A test of the state-trait model of anger with middle-aged drivers. In M. G. Penrod & S. N. Paulk (Eds.), *Psychology of anger*. Nova Science Publishers.

Deffenbacher, J. L., Kemper, C. C., & Richards, T. L. (2007). The driving anger expression inventory: A validity study with community college student drivers. *Journal of Psychopathology and Behavioral Assessment, 29*(4), 220-230.

Deffenbacher, J. L., Oetting, E. R., & Lynch, R. S., (1994). Development of a Driving Anger Scale. Psychological Reports, *74*(1), 83-91. doi: 10.2466/pro.1994.74.1.83.

Deffenbacher, J. L., Lynch, R. S., Oetting, E. R., & Swaim, R. C. (2002). The Driving Anger Expression Inventory: A measure of how people express their anger on the road. *Behaviour Research and Therapy, 40*(6), 717-737.

Deffenbacher, J. L., Oetting, E. R., Lynch, R. S., & Morris, C.D. (1996). The expression of anger and its consequences. Behaviour Research and Therapy, *Volume 34, Issue 7, July 1996, Page 575-590. http://d*oi.org/10.1016/0005-7967(96)00018-6.

Forgays, D. G., Forgays, D. K., & Spielberger, C. D. (1997). Factor structure of the State-Trait Anger Expression Inventory. *Journal of Personality Assessment, 69*(3), 497-507.

Gibson, D. E., & Barsade, S. G. (1999, August). The experience of anger at work: Lessons from the chronically angry. Paper presented at the *Academy of Management Annual Meeting*, Chicago, IL.

Guastello, S. J., & Guastello, D. D. (1986). The relation between the locus of control construct and involvement in traffic accidents. *The Journal of Psychology, 120*(3), 293-297.

Gururaj, G. (2008). Road traffic deaths, injuries and disabilities in India: Current scenario. *National Medical Journal of India, 21*(1), 14-20.

Haje, B. E., & Symbaluk, D. G. (2014). Personal and social determinants of aggressive and dangerous driving. *Canadian Journal of Family and Youth, 6*(1), 59-88.

Herrero-Fernández, D. (2011). Psychometric adaptation of the Driving Anger Expression Inventory in a Spanish sample: Differences by age and gender. *Transportation Research Part F: Traffic Psychology and Behaviour, 14*(4), 324-329.

Hoggan, B. L., & Dollard, M. F. (2007). Effort-reward imbalance at work and driving anger in an Australian community sample: Is there a link between work stress and road rage? *Accident Analysis & Prevention, 39*(6), 1286-1295.

Holland, C., Geraghty, J., & Shah, K. (2010). Differential moderating effect of locus of control on effect of driving experience in young male and female drivers. *Personality and Individual Differences, 48*(7), 821-826.

Kalliopuska, M. (1992). Hostility of asocial youth as measured by the TAT and Rorschach. *Perceptual and Motor Skills, 74*(2), 563-566.

Laflamme, L. (1998). *Social inequality in injury risks: Knowledge accumulated and plans for the future.* Karolinska Institutet.

Lajunen, T., & Parker, D. (2001). Are aggressive people aggressive drivers? A study of the relationship between self-reported general aggressiveness, driver anger and aggressive driving. *Accident Analysis & Prevention, 33*(2), 243-255.

Levenson, H. (1972). Distinctions within the concept of internal-external control: Development of a new scale. In *Proceedings of the Annual Convention of the American Psychological Association.* American Psychological Association.

Lonczak, H. S., Neighbors, C., & Donovan, D. M. (2007). Predicting risky and angry driving as a function of gender. *Accident Analysis & Prevention, 39*(3), 536-545.

Matthews, G. (2002). Towards a transactional ergonomics for driver stress and fatigue. Theoretical Issues in Ergonomics Science 3(2):195-211. DOI:10.1080/14639220210124120

Millar, M. (2007). The influence of public self-consciousness and anger on aggressive driving. *Personality and Individual Differences, 43*(8), 2116-2126.

Montag, I., & Comrey, A. L. (1987). Internality and externality as correlates of involvement in fatal driving accidents. *Journal of Applied Psychology, 72*(3), 339-343.

Moore, M., & Dahlen, E. R. (2008). Forgiveness and consideration of future consequences in aggressive driving. *Accident Analysis & Prevention, 40*(5), 1661-1666.

Novaco, R. W. (1991). Aggression on roadways. *Advances in Psychology, 76*, 253-326.

Peden, M. (2004). *World report on road traffic injury prevention*. World Health Organization.

Padgett, J.K., Tremblay, P.F., Carducci, B.J., Nave, C.S., Fabio, A.D., Saklofske, D., & Stough, C.K.K (2020). Gender Differences in Aggression. DOI:10.1002/9781118970843.ch206

Parker, D., Lajunen, T., & Summala, H. (2000). Anger and aggression among drivers in three European Countries. Accident Analysis and Prevention, 34(2), 229-235. https://doi.org/10.1016/S0001-4575(01)00018-5.

Rhodes, N., & Pivik, K. (2011). Age and gender differences in risky driving: The roles of positive affect and risk perception. *Accident Analysis & Prevention, 43*(3), 923-931.

Richards, T. L., Deffenbacher, J. L., & Rosen, L. A. (2002). Driving anger and other driving-related behaviors in high and low ADHD symptom college students. *Journal of Attention Disorders, 6*(1), 25-38.

Rudin-Brown, C.M., & Parker, H.A. (2004). Behavioural adaptation to adaptive cruise control (ACC): implications for preventive strategies, Transportation Research Part F: Traffic Psychology and Behaviour, Volume 7, Issue 2, 2004, Pages 59-76, ISSN 1369-8478, https://doi.org/10.1016/j.trf.2004.02.001.

Stavrinos, D., Pope, C. N., Shen, J., & Schwebel, D. C. (2018). Distracted walking, bicycling, and driving: Systematic review and meta-analysis of mobile technology and youth crash risk. *Child Development, 89*(1), 118-128. https://doi.org/10.1111/cdev.12827

Sârbescu, P., Stanojević, P., & Jovanović, D. (2014). A cross-cultural analysis of aggressive driving: Evidence from Serbia and Romania. *Transportation Research Part F: Traffic Psychology and Behaviour, 24*, 210-217.

Shaily, M., Rohit, V., & Balhara, Y. P. S. (2004). *Integrated Disease Surveillance Project: Project implementation plan 2004-09*. Ministry of Health and Family Welfare, Government of India.

Sullman, M. J. (2015). The expression of anger on the road. *Safety Science, 72*, 153-159.

Sullman, M. J., Stephens, A. N., & Yong, M. (2014). Driving anger in Malaysia. *Accident Analysis & Prevention, 71*, 1-9.

Sullman, M. J., Stephens, A. N., & Kuzu, D. (2013). The expression of anger amongst Turkish taxi drivers. *Accident Analysis & Prevention, 56*, 42-50.

Villieux, A., & Delhomme, P. (2010). Driving anger and its expressions: Further evidence of validity and reliability for the Driving Anger Expression Inventory French adaptation. *Journal of Safety Research, 41*(5), 417-422.

Walker, G. H., Stanton, N. A., & Young, M. S. (2008). Feedback and driver situation awareness (SA): A comparison of SA measures and contexts. *Transportation Research Part F: Traffic Psychology and Behaviour, 11*(4), 282-299.

White, J. W., & Kowalski, R. M. (1994). Deconstructing the myth of the nonaggressive woman. Psychology of Women Quarterly, 18, 487–508.

Wickens, C. M., Mann, R. E., Stoduto, G., Lalomiteanu, A., & Smart, R. G. (2011). Age group differences in self-reported aggressive driving perpetration and victimization. *Transportation Research Part F: Traffic Psychology and Behaviour, 14*, 400-412.

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Editorial Note

This issue of Man & Development brings together five papers that examine representation, integration, and identity at scales ranging from the international to the intimately local,from geopolitics and electoral politics to housing, ageing, and the gendered experience of everyday space.

Scheduled Caste representation in the Punjab Legislative Assembly is traced across thirteen elections (1967-2022), by Gurpreet Singh Brar, finding that while SC legislators' numerical share broadly mirrors their population share, they have rarely won from general constituencies and remain peripheral to ministerial and organisational leadership, a reminder that descriptive representation does not by itself secure substantive political voice.

China's Regional Economic Cooperation with Central Asia is examined through a dual-perspective SWOT analysis of the Belt and Road Initiative and the Shanghai Cooperation Organisation, by Punit Gaur, arguing that historic Silk Road ties and resource wealth are counterbalanced by debt risk, cultural barriers and limited institutional efficacy, concluding that sustainable cooperation depends on transparency and sensitivity to local political and cultural dynamics.

Neighbourhood adjustment in six rehabilitated housing colonies of Chandigarh is studied through a survey of 351 households, by Rehiana and Bindu Duggal. Although most residents report satisfactory adjustment, many continue to experience discrimination and spatial exclusion, showing that rehabilitation shaped mainly by physical relocation, without attention to everyday social integration, leaves earlier patterns of urban marginality largely intact.

The prevalence and determinants of positive self-rated health among adults aged 45 and above are analysed using LASI Wave 1 data, by Shriprasad H, finding that urban residence, younger age and higher education raise the odds of positive self-rated health, while older age, being Muslim, and belonging to the

richest wealth quintile lower it, pointing to the need for socio-economically targeted healthy-ageing strategies.

A study of women's perceptions of space in Jaunsar-Bawar, Uttarakhand, draws on feminist geography and intersectionality to show that women's understanding of domestic, agricultural, ritual, and civic space is built cumulatively through labour, memory and social relationship rather than fixed by custom alone,challenging homogenised portrayals of rural Himalayan women and calling for gender-responsive planning attentive to this diversity.

Together, these papers flow through the macro-politics of regional cooperation and electoral representation to the lived, everyday geographies of housing, health, and gendered space, sharing a common concern with how formal structures of inclusion, political, spatial, or institutional, translate, or fail to translate, into substantive belonging and well-being.

Editor

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PREVALENCE AND DETERMINANTS OF POSITIVE SELF-RATED HEALTH AMONG ADULTS IN INDIA: EVIDENCE FROM LASI WAVE 1

Shriprasad H[1]

Abstract: Self-rated health (SRH) is an important indicator of overall health and well-being and is widely used in population health research. This study examines the prevalence and determinants of positive self-rated health among adults aged 45 years and above in India using data from the Longitudinal Ageing Study in India (LASI) Wave 1 (2017-18). The analysis is based on 66,606 respondents. Descriptive statistics, chi-square tests, and binary logistic regression were employed after accounting for the complex survey design and sampling weights. Overall, 88.9 per cent socio-economic of respondents reported positive self-rated health. Urban residence, younger age, higher educational attainment, religion, caste, and wealth quintile were significantly associated with positive self-rated health. Urban residents, respondents with higher education, and Scheduled Tribes were more likely to report positive self-rated health, whereas older adults, Muslims, and those in the richest wealth quintile had lower odds after adjustment. The findings underscore the importance of addressing socio-economic disparities through targeted policies and health promotion strategies to foster healthy ageing and improve well-being among older adults in India.

Keywords: Self-rated health, Healthy ageing, Older adults, LASI, Socio-economic determinants, and India.

Introduction

Self-rated health (SRH) has emerged as a simple yet comprehensive measure for assessing an individual's overall health status in public health and epidemiological research. Rather than focusing solely on diagnosed illnesses, SRH reflects how people perceive their own health by integrating physical

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functioning, psychological well-being, social circumstances, and the presence of chronic health conditions. Numerous longitudinal studies have demonstrated that self-rated health is a strong predictor of subsequent morbidity, functional decline, healthcare utilization, and mortality, making it a valuable indicator for monitoring population health and evaluating health inequalities (Idler & Benyamini, 1997). Owing to its reliability, validity, and ease of measurement, SRH has been incorporated into several national and international health surveys.

India is currently undergoing profound demographic and epidemiological changes characterized by increasing life expectancy, population ageing, rapid urbanization, and a rising burden of non-communicable diseases. These transitions have shifted public health priorities beyond survival towards improving the quality of life and overall well-being of the population. While objective indicators such as disease prevalence and mortality remain important, they do not fully capture how individuals perceive their health. Self-rated health complements these measures by providing insight into an individual's overall perception of health, which often influences health-related behaviours, healthcare utilization, and future health outcomes. Individuals reporting good, very good, or excellent health are generally considered to have positive self-rated health, reflecting a favourable perception of their physical and mental well-being despite differences in objective health conditions.

Evidence from previous studies indicates that self-rated health is shaped by a combination of demographic, socio-economic, and health-related factors. Advancing age has consistently been associated with declining health perceptions because of the increased likelihood of chronic illnesses, disability, and reduced functional capacity (Idler & Benyamini, 1997). Gender differences have also been widely documented, with women frequently reporting poorer health than men owing to biological, social, and economic disadvantages. Educational attainment and household economic status are recognised as important social determinants of health, as individuals with higher education and greater financial resources generally have better access to healthcare, improved health literacy, and healthier living conditions (Subramanian et al., 2009). Similarly, employment status, marital status, and place of residence have been shown to influence self-rated health through differences in income security, social support, and access to healthcare services.

Studies conducted in India have reported marked socio-economic disparities in self-rated health. Poor health perception is more common among older adults, individuals with limited education, economically disadvantaged households, widowed persons, and those living with chronic diseases or functional limitations. In contrast, higher educational attainment, better economic status, and continued participation in economic activities are associated with more favourable health assessments (Maurya & Muhammad, 2022; Kumar et al.,

2022). Nevertheless, most Indian studies have primarily examined poor self-rated health or concentrated exclusively on the older population. Comparatively fewer investigations have focused on the determinants of positive self-rated health, which represents an equally important dimension for understanding healthy ageing and promoting well-being.

The Longitudinal Ageing Study in India (LASI) Wave 1 offers nationally representative data on adults aged 45 years and above and provides comprehensive information on demographic, socio-economic, and health-related characteristics. This nationally representative dataset presents an opportunity to examine the prevalence of positive self-rated health and to identify the factors associated with favourable health perceptions among middle-aged and older adults in India.

Self-rated health (SRH): Self-rated health was assessed using the LASI Wave 1 question: "In general, would you say your health is excellent, very good, good, fair, or poor?" For the present analysis, the responses were dichotomized into positive self-rated health (excellent, very good, and good) and poor self-rated health (fair and poor). This categorization was adopted to distinguish respondents reporting generally favourable health from those perceiving their health as suboptimal, and is consistent with the approach commonly used in epidemiological and population health studies to facilitate binary logistic regression and comparison with previous research. Such evidence is essential for designing policies that promote healthy ageing, reduce health inequalities, and improve the overall quality of life of the ageing population. With this backdrop, the current study has the following objectives.

Objectives of the Study

- To estimate the prevalence of positive self-rated health among adults aged 45 years and above in India and examine its distribution across selected socio-demographic and socio-economic characteristics.
- To identify the socio-demographic and socio-economic determinants of positive self-rated health among adults aged 45 years and above using binary logistic regression analysis based on LASI Wave 1 data.

Methodology

Data Source

This study utilized data from the first wave of the Longitudinal Ageing Study in India (LASI Wave 1), conducted during 2017-18. LASI is a nationally representative survey of individuals aged 45 years and above and their spouses, irrespective of age. The survey employed a multistage stratified area probability sampling design covering all states and union territories of India. It collects comprehensive information on demographic characteristics, socio-economic

conditions, health status, health care utilization, family structure, and social well-being. The present analysis included respondents aged 45 years and above with complete information on the variables used in the study, yielding a final analytical sample of 66,606 individuals. Data were analyzed using Stata version 16.1. To account for the complex survey design of LASI, all analyses incorporated sampling weights, primary sampling units (PSUs), and stratification using the svy commands, ensuring nationally representative estimates and valid standard errors.

Outcome Variable

The outcome variable was self-rated health (SRH), assessed using the LASI Wave 1 question: "In general, would you say your health is very good, good, fair, poor, or very poor?" Responses were originally recorded on a five-point ordinal scale: very good, good, fair, poor, and very poor. For the present analysis, the variable was dichotomized to facilitate binary logistic regression and to distinguish respondents with positive and negative perceptions of their health. Respondents reporting very good or good health were classified as having positive self-rated health (coded as 1), whereas those reporting fair, poor, or very poor health were classified as having negative self-rated health (coded as 0).

Explanatory Variables

The explanatory variables included selected socio-demographic and socio-economic characteristics that have been shown to influence health among older adults. These included place of residence (rural/urban), age group (45-59 and 60 years and above), marital status (currently married and currently unmarried), educational attainment (no education, primary, secondary, and higher), working status (currently working and not working), religion (Hindu, Muslim, and others), caste (Scheduled Castes, Scheduled Tribes, Other Backward Classes, and others), wealth quintile (poorest, poorer, middle, richer, and richest), living arrangement (living alone and living with others).

Analysis

Descriptive statistics were used to summarize the distribution of the study population according to selected background characteristics. The prevalence of positive self-rated health was estimated for each explanatory variable, and the chi-square test was used to examine bivariate associations between self-rated health and the selected independent variables. Binary logistic regression analysis was performed to identify factors associated with positive self-rated health. The results are presented as adjusted odds ratios (AORs) with 95 per cent confidence intervals (CIs). Sampling weights and the complex survey design of LASI were incorporated in all analyses to obtain nationally representative estimates. Statistical significance was assessed at the 5 per cent level, and all analyses were conducted using Stata.

Results

Background characteristics

Approximately two-thirds of the study participants resided in rural areas, while the remaining one-third lived in urban areas. The distribution of males and females was nearly equal. Around three-fourths of the respondents were currently married, and the majority belonged to the Hindu religion, followed by Muslims. Nearly half of the respondents had no formal education, whereas a smaller proportion had completed 10 or more years of schooling. Most participants lived with their spouse and children, while others lived alone, with a spouse only, with children only, or in other living arrangements. The distribution of respondents across wealth quintiles was relatively even, indicating representation across all economic strata.

Prevalence of positive self-rated health

Table 1 presents the prevalence of positive self-rated health among adults aged 45 years and above according to selected background characteristics.

Table-1
Prevalence of Positive Self-Rated Health among Adults Aged 45 Years and above by Selected Background Characteristics, India, LASI Wave1

Characteristics	Self-rated health		P Value
	Poor per cent	Positive self-rated health (per cent)	
Residence			<0.001
Rural	12.11	87.89	
Urban	8.88	91.12	
Age			<0.001
45-59	7.2	92.8	
60+	15.02	84.98	
Marital status			<0.001
currently married	9.85	90.15	
widowed	15.27	84.73	
others	8.68	91.32	
Religion*			<0.001
Hindu	10.63	89.37	
Muslim	13.91	86.09	
Others	12.09	87.91	
Caste			<0.001
SC	13.2	86.8	
ST	8.29	91.71	
OBC	10.4	89.6	
None of them	11.65	88.35	

Characteristics	Self-rated health		P Value
	Poor per cent	Positive self-rated health (per cent)	
Education			<0.001
No education	12.82	87.18	
Those completed less than primary	12.93	87.07	
Those completed primary and middle school	10.11	89.89	
Secondary and more education completed	6.26	93.74	
Living Arrangement			<0.001
living alone	17.47	82.53	
living with spouse/other	11.53	88.47	
living with spouse and children	9.35	90.65	
living with children and others	13.94	86.06	
living with others only	13.89	86.11	
Wealth quintile			<0.001
Poorest	10.87	89.13	
Poorer	11.06	88.94	
Middle	11.33	88.67	
Richer	10.8	89.2	
Richest	11.43	88.57	
Total	**11.09**	**88.91**	

*Marital status others -Divorced, separated, deserted, live-in relationship and never married.
*Religion Others-Sikh, Buddhists, Jain, Jewish and Paris
95 per cent confidence intervals in brackets* p<0.05, ** p<0.01, *** p<0.001

Among adults aged 45 years and above, 88.91 per cent rated their health as good or excellent. The prevalence of positive self-rated health was higher in urban areas (91.12%) than in rural areas (87.89%). Adults aged 45-59 years were more likely to report positive health than those aged 60 years and above (92.80% vs. 84.98%). By marital status, the highest prevalence was observed among individuals in the 'others' category (91.32%), followed by those who were currently married (90.15%), whereas widowed adults reported the lowest prevalence (84.73%). Positive self-rated health also varied across religion, caste, educational attainment, living arrangement, and wealth quintile. In particular, respondents with secondary or more years of education had the highest prevalence (93.74%), while those living alone had the lowest prevalence (82.53%). The bivariate associations between positive self-rated health and each of the selected background characteristics were statistically significant ($p < 0.001$).

Factors Associated with Positive Self-Rated Health

The adjusted logistic regression analysis (Table 2) showed that, after controlling for all other variables included in the model, place of residence, age, religion,

caste, education, and wealth quintile were significantly associated with positive self-rated health among adults aged 45 years and above in India.

Table-2
Adjusted Odds Ratios from Binary Logistic Regression Analysis of Factors Associated with Positive Self-Rated Health among Adults Aged 45 Years and Above, India, LASI Wave 1

Residence	OR	CI
1 Rural	1	[1.00,1.00]
2 Urban	1.24***	[1.10,1.39]
Age Group		
45-59	1	[1.00,1.00]
60+	0.49***	[0.45,0.54]
Marital Status		
Currently married	1	[1.00,1.00]
Widowed	0.85	[0.62,1.16]
Others*	1.2	[0.81,1.78]
Religion		
Hindu	1	[1.00,1.00]
Muslim	0.72***	[0.64,0.82]
Others*	0.85	[0.69,1.04]
Caste		
SC	1	[1.00,1.00]
ST	1.72***	[1.45,2.03]
OBC	1.27***	[1.13,1.44]
None of them	1.09	[0.97,1.23]
Education		
No education	1	[1.00,1.00]
Those completed less than primary	0.92	[0.80,1.05]
Those completed primary and middle school	1.12	[0.99,1.26]
Secondary or more education completed	1.78***	[1.51,2.09]
Living arrangement		
living alone	1	[1.00,1.00]
living with spouse/other	1.21	[0.85,1.74]
living with spouse and children	1.25	[0.87,1.78]
living with children and others	1.23	[0.99,1.52]
living with others only	1.05	[0.80,1.38]
Wealth quintile		
1 Poorest	1	[1.00,1.00]
2 Poorer	0.98	[0.86,1.11]
3 Middle	0.93	[0.81,1.06]
4 Richer	0.96	[0.85,1.09]
5 Richest	0.82**	[0.71,0.94]

* Marital status others -Divorced, separated, deserted, live-in relationship and never married.
*Religion Others-Sikh, Buddhists, Jain, Jewish and Paris
95 per cent confidence intervals in brackets * p<0.05, ** p<0.01, *** p<0.001

Urban residents had higher odds of reporting positive self-rated health than rural residents (AOR=1.24; 95% CI: 1.10-1.39), whereas adults aged 60 years and above had significantly lower odds than those aged 45-59 years (AOR=0.49; 95% CI: 0.45-0.54). Compared with Hindus, Muslims had lower odds of reporting positive self-rated health (AOR=0.72; 95% CI: 0.64-0.82). Respondents belonging to Scheduled Tribes (AOR=1.72; 95% CI: 1.45-2.03) and Other Backward Classes (AOR=1.27; 95% CI: 1.13-1.44) had higher odds than Scheduled Castes. Individuals with secondary or more years of education had higher odds of reporting positive self-rated health than those with no formal education (AOR=1.78; 95% CI: 1.51-2.09). Among wealth categories, only respondents in the richest quintile had lower odds of positive self-rated health than those in the poorest quintile (AOR=0.82; 95% CI: 0.71-0.94). Marital status and living arrangement were not significantly associated with positive self-rated health after adjustment.

Conclusions

This study examined the prevalence and determinants of positive self-rated health among adults aged 45 years and above in India using nationally representative data from LASI Wave 1. Overall, nearly nine out of ten respondents reported positive self-rated health, indicating that the majority of older adults perceived their health as good or excellent. The descriptive analysis showed significant variations in positive self-rated health across socio-demographic and socio-economic characteristics. Higher prevalence was observed among urban residents, adults aged 45-59 years, individuals with higher educational attainment, and those living with their spouse and children, whereas lower prevalence was reported among older adults aged 60 years and above, widowed individuals, and those living alone. The statistically significant chi-square test results ($p < 0.001$) indicate that positive self-rated health differed across all selected background characteristics at the bivariate level.

The multivariable logistic regression analysis further demonstrated that several of these associations remained significant after adjusting for potential related factors. Urban residence, younger age (45-59 years), higher educational attainment, and belonging to Scheduled Tribes or Other Backward Classes were independently associated with greater odds of reporting positive self-rated health. In contrast, older adults aged 60 years and above, Muslims, and respondents in the richest wealth quintile were less likely to report positive self-rated health. Although marital status and living arrangement showed significant differences in the descriptive analysis, these associations were no longer statistically significant after adjustment, suggesting that their effects may be explained by other socio-demographic and socio-economic factors included in the model.

Among the wealth categories, only respondents in the richest quintile had significantly lower odds of reporting positive self-rated health compared with

those in the poorest quintile (AOR = 0.82; 95% CI: 0.71-0.94). This finding contrasts with the pattern observed in the unadjusted analysis and differs from the expected positive association between wealth and self-rated health. Although wealth is generally associated with better self-rated health, the inverse association observed after adjustment should be interpreted with caution, as it may reflect the influence of other covariates included in the multivariable model or the complex interrelationships among socio-economic factors. Further research is warranted to better understand this association in future.

The findings of the present study are consistent with previous research showing that self-rated health is strongly influenced by socio-economic position, educational attainment, and age. Earlier studies have reported that individuals with higher levels of education generally perceive their health more positively, while advancing age is associated with poorer self-rated health due to increasing functional limitations and chronic health conditions (Idler & Benyamini, 1997; Jylha, 2009). Similarly, studies from India have shown that socio-economic inequalities, place of residence, and educational attainment are important determinants of self-rated health among older adults, highlighting the role of social disadvantage in shaping health perceptions (Kumar et al., 2022).

The findings highlight that positive self-rated health among older adults is shaped by multiple social and economic factors. Policies aimed at promoting healthy ageing should give particular attention to rural residents, older age groups, individuals with lower educational attainment, and other socially disadvantaged groups. Strengthening access to health services, improving health literacy, and addressing socio-economic inequalities may contribute to better perceived health and overall well-being among India's ageing population. In addition, community-based interventions that encourage regular health screening, health promotion activities, and preventive care can improve both physical and perceived health among older adults. Targeted programmes that enhance social support, financial security, and opportunities for active ageing may further strengthen health outcomes in later life. Given the rapid demographic transition in India, integrating these measures into existing national programmes for older adults is essential to promote healthy and productive ageing. Future research using longitudinal data is also warranted to better understand the causal pathways linking socio-economic factors and self-rated health and to inform evidence-based policy interventions.

Limitations

The findings of this study should be interpreted in light of certain limitations. First, the analysis is based on cross-sectional data from LASI Wave 1; therefore, the observed associations cannot be interpreted as causal relationships. Longitudinal studies are needed to better understand the temporal relationships between socio-demographic factors and self-rated health. Second, self-rated

health is a subjective measure and may be influenced by individual perceptions, cultural norms, and reporting behaviour, which may vary across respondents. Consequently, individuals with similar objective health conditions may rate their health differently, potentially affecting the comparability of self-rated health across population groups.

References

Ellen L. Idler, & Yael Benyamini (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior, 38*(1), 21-37.

MarjaJylhä (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model**.** *Social Science & Medicine, 69*(3), 307-316.

Sanjay Kumar et al. (2022). Socio-economic inequalities in self-rated health among older adults in India: Evidence from the Longitudinal Ageing Study in India (LASI).

Idler, E. L., &Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior*, *38*(1), 21-37. https://doi.org/10.2307/2955359

Subramanian, S. V., Ackerson, L. K., Subramanyam, M. A., & Sivaramakrishnan, K. (2009). Health inequalities in India: The axes of stratification. *Brown Journal of World Affairs, 16*(2), 127-138.

Muhammad, T., & Maurya, P. (2023). Gender differences in the association between perceived income sufficiency and self-rated health among older adults: A population-based study in India. *Journal of Women & Aging, 35*(2), 168-182. https://doi.org/10.1080/08952841.2021.2002663

Saha, A., Rahaman, M., Mandal, B., Rahman, M. S., &Govil, D. (2022). Rural urban differences in self-rated health among older adults: Examining the role of marital status and living arrangements. *BMC Public Health, 22*, 2175. https://doi.org/10.1186/s12889-022-14569-9

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BEYOND SHELTER: NEIGHBOURHOOD ADJUSTMENT AND SOCIAL INTEGRATION IN REHABILITATED HOUSING COLONIES OF CHANDIGARH

Rehiana[1] and Bindu Duggal[2]

Abstract: Urban rehabilitation programmes aim not only to improve the housing conditions but also to promote social integration and community stability among relocated populations. However, relocation frequently restructures everyday social interactions and neighbourhood relations in complex ways. This paper examines the degree and nature of neighbourhood adjustment among residents of rehabilitated housing colonies constructed under the Small Flats Scheme in Chandigarh. Based on a primary field survey of 351 households across six rehabilitated colonies, namely, Ram Darbar, Sector 49, Sector 38 West, Dhanas, Mauli Jagran-II, and Maloya-I, the study explores experiences of social acceptance, conflict, and integration between colony residents and surrounding settlements.

The findings indicate that while a majority of residents report satisfactory adjustment, a significant proportion continue to experience discrimination, spatial restrictions, tensions related to sanitation and exclusion from community life. The social relations in rehabilitated colonies are more formalized and spatially negotiated compared to pre-rehabilitation neighbourhoods, indicating that they are not necessarily integrated. Drawing on sociological perspectives on social integration, urban marginality, and neighbourhood effects, the paper argues that post-rehabilitation adjustment is shaped less by cultural or lingual differences and more by everyday spatial practices and unequal in urban power relations. The study concludes that rehabilitation policies must move beyond

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narrow focus on physical housing provisions and incorporate the social dimension of urban resettlement.

Keywords: Urban rehabilitation; social integration; neighbourhood relations; resettlement colonies; Chandigarh; urban sociology

Introduction

One of the most transformative social processes of the modern world that has long occupied a central place in sociological inquiry is urbanisation. Cities are not only forms of physical concentration of people, but also intricate social systems, in which economic activities, the relations of power, the hierarchies of social relations, and the encounters of culture are intertwined. The reason why sociologists examine urbanisation is that it fundamentally transforms labour patterns, family life, social interactions, and access to resources and opportunities. Although cities are usually hailed as sources of economic development, innovation, and opportunity, they are also seen to generate and reproduce social inequalities, especially concerning housing, poverty, and social integration (Wirth, 1938; Castells, 1977).

Housing takes a very critical role in this urban dynamic. Sociologically, housing is not an enclosed physical residence, but a social institution that mediates the accessibility of security, dignity, neighbourhood relation, and citizenship in the city. Poor housing indicates the more deeply rooted structural inequalities within labour markets, planning regimes, and state policies. The development of slums and informal settlements is one of the most obvious pieces of evidences of these inequalities. UN-Habitat (2020) claims that the number of slum residents worldwide is approximately one billion, which illustrates the continued lack of correspondence between the rate of urbanization and the ability of governments to deliver inclusive and affordable housing. Sociologically, slums are not merely physical deprivation, but a socially constructed space, the outcome of poverty, their marginalization in formal housing markets, unstable employment, and unequal power relations.

The example of Chandigarh provides a rather interesting background for analysing these problems. Chandigarh, envisioned as the first planned city in post-Independence India, was supposed to be a place of modernity, order, and egalitarian urban living. The city was planned to accommodate a small number of people and was designed with well-defined residential, commercial, and institutional areas. In spite of this careful planning, slums arose as a result of rapid population growth, migration of labour, and lack of proper provisions for low-income earners in the initial master plan. This paradox is indicative of a larger sociological fact: even planned cities are not resistant to structural disparities within urban development processes.

In order to solve the slum problem, the Chandigarh Administration implemented several rehabilitation programmes, culminating in the Chandigarh

Small Flats Scheme-2006. Slum residents under this programme were moved into formal housing units with basic facilities in six rehabilitated colonies, namely, Ram Darbar, Sector 49, Sector 38 West, Dhanas, Mauli Jagran-II, and Maloya-I. After this scheme was put into practice, Chandigarh was declared a slum-free city. Although this represents a major milestone for policy, sociological investigation requires a closer look at what rehabilitation entails beyond the provision of shelter.

In this regard, the process of neighbourhood adjustment becomes a key indicator of the extent to which rehabilitation enables meaningful social integration. According to scholars like Wacquant (2008), spatial relocation has in most cases replicated territorial stigma, where the residents of rehabilitated colonies still feel symbolically excluded and distanced by the neighbouring neighbourhoods. The effects of such stigma may be visible in the daily discrimination, limited contact, and disputes over common urban spaces. Such experiences indicate that social exclusion is not easily eradicated by addressing the problem of housing, and this calls for a closer look at the issue of neighbourhood adjustment in settlements that have been rehabilitated.

It is on this theoretical and empirical background that the current study investigates neighbourhood adjustment and social integration in rehabilitated housing colonies in Chandigarh. The study focuses on daily social interactions, neighbourly relations, and experiences of being accepted or excluded following rehabilitation. The study examines whether rehabilitation has facilitated meaningful neighbourhood integration or whether new forms of social exclusion continue to persist. The paper contributes to wider discussions on urban rehabilitation by showing that it is not the extent of physical redevelopment that makes slum-free programs a success, but rather the quality of social life that they facilitate.

The paper is structured as follows. The next section outlines the objectives and methodological framework of the study, describing the field survey conducted in six rehabilitated colonies of Chandigarh. This is followed by a review of relevant literature on slum rehabilitation, neighbourhood relations, and social integration. The subsequent section presents the empirical findings on neighbourhood adjustment, conflict patterns, and the influence of residential duration. The discussion section interprets these findings through sociological theories of stigma, spatial negotiation, and social capital. The paper concludes by reflecting on the broader implications of housing-centred rehabilitation and proposes policy recommendations grounded in the empirical evidence.

Objectives of the Study

- To analyse the degree of neighbourhood adaptation among rehabilitated households and neighbouring settlements.

- To identify and classify the significant social and spatial tensions experienced by rehabilitated residents after resettlement.
- To examine neighbourhood adjustment in rehabilitated housing colonies through sociological perspectives on social integration, stigma, and urban inequality.
- To assess the extent to which slum rehabilitation has facilitated inclusive and sustainable neighbourhood relations within a planned urban setting.

Methodology

This study adopts an exploratory and descriptive research design aimed at identifying patterns of neighbourhood adjustment rather than establishing a causal relationship. The research is based on primary data collection through a household survey conducted in Chandigarh between February and November 2024. Data were gathered through face-to-face interviews conducted by the researcher using a semi-structured interview schedule developed in accordance with the research objectives. The schedule included both closed-ended questions to assess quantifiable indicators and open-ended questions to capture the multidimensional aspects of neighbourhood adjustment and conflict. The interview schedule was pretested in the field before finalisation.

A total of 351 households were interviewed across six rehabilitated housing colonies developed under the Small Flats Scheme: Ram Darbar, Sector 49, Sector 38 (West), Dhanas, Mauli Jagran-II, and Maloya-I. These colonies constitute the principal rehabilitated housing sites established under the Scheme in Chandigarh, as per the official information obtained from the Chandigarh Housing Board. A proportionate sample comprising approximately 2 per cent of households from each colony was drawn, and the total number of small flats and the corresponding sample selected from each rehabilitated colony are presented in Table 3.The list of households/dwelling units obtained from the Chandigarh Housing Board was used as the sampling frame, from which households were randomly selected from each colony. In cases of non-response or refusal, repeat visits were made to the selected households. If the household was not available or refused to participate, another eligible household was randomly selected to replace it and ensure the sample size.

The interview schedule recorded socio-economic attributes, residential patterns, neighbourhood interactions, and post-resettlement adjustment experiences. Both single-response and multiple-response questions were included to capture overlapping forms of tension and interaction within neighbourhood settings. Percentages for multiple-response items were calculated against the total number of respondents who reported adjustment-related problems (n = 151), allowing for category overlap. The completed schedules were checked for completeness and consistency before data entry and analysis.

Neighbourhood adjustment was assessed by asking respondents whether they experienced any problems in adjusting with people from neighbouring settlements. Respondents who reported adjustment problems were further asked an open-ended question to describe the nature of those problems. The responses were subsequently classified into thematic categories, such as shared space conflicts, discrimination and stigma, poor waste management, and other adjustment-related issues, which were then coded and analysed using frequencies and percentages.

For analytical purposes, neighbourhood adjustment was operationalised as the self-reported ability to coexist with neighbouring communities without persistent confrontation. Neighbourhood conflict was measured through reported experiences of discrimination, exclusion, stigma, and competition over shared spaces. Perceived acceptance and participation in common neighbourhood activities were used as indirect indicators of social integration.

The analysis relied primarily on descriptive statistics (frequencies, percentages and cross-tabulations) to summarise the survey findings. In addition, a Chi-square Test of Independence was applied to examine whether neighbourhood adjustment problems were significantly associated with the rehabilitated colony. Statistical significance was assessed at the 5 per cent level ($p < 0.05$).

Data were collected through direct field visits, and all respondents provided prior informed consent for participation in the study.

Literature Review

The process of urban rehabilitation, the dynamics of neighbourhoods, and social integration have been discussed extensively in the literature of urban sociology and planning, nevertheless, only a limited number of studies specifically address the issue of neighbourhood adjustment after rehabilitation into formal housing. The literature on slum rehabilitation has been broad based and covers urbanisation, housing policy, socio-spatial inequality, and lived experiences of the rehabilitated populations. However, most of the available literature primarily addresses the physical rehabilitation outcomes, housing provision, livelihood changes, and service delivery, with less attention given to the daily adaptation and social integration processes in the neighbourhoods after the relocation.

Slums are now being perceived as social spaces that are created by structural poverty, exclusion, and unequal urban development, and not as simple physical deprivation (Neuwirth, 2004). In India, the continued existence and growth of informal settlements has been facilitated by the rapid urbanisation process coupled with limited access to formal housing markets, especially in the areas where urban planning systems have not been effective in serving the low-

income migrant communities (Kundu, 2009; Bhan, 2016). Even though rehabilitation interventions are aimed at filling a housing shortfall, they tend to destabilize long-established social networks and informal support system, resulting in more commuting loads, livelihood insecurity, and community disconnection. These studies are able to account for the structural reasons and impact of rehabilitation, but offer relatively little explanation of how relocated households reengage with neighbourhood relations and sociability following relocation.

The social costs of slum relocation are always brought to the fore in Indian studies. As shown in Mumbai, Delhi, and Bangalore studies, Research from cities, resettlement often disintegrates neighbourhood-based social networks and disrupts livelihood arrangements that are embedded in informal settlements. Even though the Maharashtra Slum Rehabilitation Act (1995) and in-situ schemes under the Pradhan Mantri Awas Yojana are state-led policies to provide tenure security and better housing conditions, there is evidence that these programs do not adequately cover social and economic aspects, creating new challenges of exclusion and adaptation. Most of these studies are focused on large metropolitan cities, and their findings cannot be directly extrapolated to a planned city like Chandigarh, where the rehabilitation has been done under a different planning and institutional framework.

Empirical evidence also suggests that socio-physical liveability is a determinant factor in post-rehabilitation outcomes. The study of the rehabilitation housing in Mumbai indicates that such housing is adversely affected by the high density, inadequate open spaces, and poor design, which can result in the partial abandonment of the rehabilitated housing (Debnath et. al., 2019). Environment accessibility of amenities, socio-demographic factors have been found to be determinants of the post-rehabilitation experiences of the residents. However, the physical dimensions of the liveability of neighbourhoods and housing conditions have been studied primarily, while the social dimensions of neighbourhood acceptance, interaction, and adjustment are comparatively under-researched.

The other significant literature stream is dedicated to community building, identity, and mobilisation at the slum and rehabilitated levels. Research confirms that informal settlements tend to be highly socially cohesive and collective, and such factors can be destroyed during rehabilitation procedures (Chatterji, 2018; Negi, 2017). Although there are policy changes that reinvent the social identities instead of destroying them, rehabilitation usually undermines the settled neighbourhood solidarities. The few studies conducted in Chandigarh further indicate that whereas the housing situation has improved significantly as a result of rehabilitation, problems associated with livelihood, social adjustment, and community integration remain a persistent challenge. Moreover, these studies focus mostly on the aspects of housing and socio-economic conditions in the

rehabilitation process, and give comparatively little attention to the interaction between the rehabilitated colonies and their neighbourhoods.

Although there is a considerable body of work, relatively little attention has been given to neighbourhood adaptation and day-to-day social interactions after rehabilitation. The classical and new urban sociology emphasize neighbourhood relations as the main factors in processes of social integration, mutual support, and conflict in cities (Wirth, 1938; Castells, 1977). The social capital, social cohesion, and territorial stigma concepts are helpful in explaining the process of how rehabilitated residents negotiate the marginality and belonging in new residential environments.

On the whole, the available literature confirms the complexity and multidimensional nature of socio-spatial impacts of slum rehabilitation. However, most of the studies have concentrated on housing and infrastructure, livelihood, and policy outcomes, and have paid relatively less attention to the adjustment of the neighbourhood and everyday social interactions following rehabilitation. Furthermore, there is limited research on Chandigarh-specific rehabilitation, with only a few studies examining rehabilitation in the city. Hence, there is little empirical evidence on neighbourhood adjustment and social integration of the rehabilitated households in Chandigarh. The present study aims to fill this gap by analysing the notion of neighbourhood adjustment from a sociological point of view, namely from the perspectives of social integration, territorial stigma, and urban inequality, thus providing location-specific evidence on the social aspects of urban rehabilitation.

Findings

1. Socio-demographic Profile of Respondents

Table 1 indicates the socio-demographic profile of the 351 respondents from six rehabilitated housing colonies. The sample consisted of 65 per cent female and 35 per cent male respondents. The respondents were mainly of working age, with an estimated mean age of 37 years, with the major age groups being 20-30 (28.5%) years and 31-40 (28%) years. The majority of the respondents were Hindu (91%), while Muslims were 9 per cent and the Sikhs (0.3%) and Christians (0.3%) formed very small in proportion. In terms of caste, 44 per cent belonged to the General category, 34 per cent to Scheduled Castes (SCs), 21 per cent to Other Backward Classes (OBCs), and 1 per cent to Scheduled Tribes (STs). The respondents had relatively low education levels, with the husbands being better educated than the wives, and 41 per cent of the wives were illiterate, while 16 per cent of the husbands were illiterate. The estimated average monthly family income was ₹14,651 after rehabilitation.

Table-1
Socio-demographic Profile of the Respondents (N = 351)

Characteristic	Description
Sample size	351 respondents
Gender	Female (65.2%); Male (34.8%)
Mean age	37 years
Major age groups	20–30 years (28.5%); 31–40 years (28.0%)
Religion	Hindu (90.6%); Muslim (8.8%); Sikh (0.3%); Christian (0.3%)
Caste	General (44.2%); SC (33.9%); OBC (21.4%); ST (0.6%)
Educational profile	Husbands were generally better educated than wives; illiteracy was 16% among husbands and 41% among wives.
Average monthly family income	Before rehabilitation: ₹11,902; After rehabilitation: ₹14,651

Source: Field Survey, 2024

2. Neighbourhood Adjustment and Social Integration after Rehabilitation

The results show that families living in rehabilitated housing colonies experience different forms of neighbourhood adjustment after resettlement. A majority of the respondents (57%) in Table 2 indicated that no major issues occurred when they had to adapt to individuals from nearby settlements, which implies that there was a fundamental level of social accommodation and everyday co-existence. Nevertheless, the significant proportion of respondents who reported adjustment related problems (43%) suggests that while the rehabilitation has enabled most households to live in their communities as they normally would, it has not promoted social integration in all communities.

Table-2
Household-level Post-resettlement Adjustment with Neighbouring Settlement (N = 351)

Any problem in adjustment with people of neighbouring settlements?	Frequency	Percent
Yes	151	43.0
No	200	57.0

Source: Field Survey, 2024

Table 3 presents the colony-wise distribution of households reporting neighbourhood adjustment problems. Overall, 43 per cent of the surveyed households experienced adjustment problems with neighbouring settlements. The highest proportion was recorded in Maloya-I (47.5%) and Ram Darbar (45.5%),

and the lowest in Mauli Jagran-II (32%). The results showed the presence of neighbourhood adjustment problems in all rehabilitated colonies, with variations in their prevalence.

A Chi-square test of independence was conducted to examine the association between rehabilitated colony and neighbourhood adjustment problems. No statistically significant relationship was found between the rehabilitated colony and reporting of neighbourhood adjustment problems ($\chi^2 = 2.409$, df = 5, p = 0.790). Although the proportion of households reporting adjustment problems varied across the six rehabilitated colonies, these differences were not statistically significant.

Chi-square Test of Independence: $\chi^2 = 2.409$, df = 5, p = 0.790 (Not Significant).

Table-3
Colony-wise Distribution of Households Reporting Adjustment Problems

Rehabilitated Colony	Total Small Flats	Sample Selected (Approx. 2%)	Adjustment Problem (Yes)	No Adjustment Problem	Households Reporting Adjustment Problems (%)
Sector 38 West	1,120	22	9	13	40.9
Sector 49	1,024	20	8	12	40.0
Maloya-I	4,960	99	47	52	47.5
Dhanas	8,448	168	72	96	42.9
Mauli Jagran-II	1,568	31	10	21	32.3
Ram Darbar	576	11	5	6	45.5
Total	17,696	351	151	200	43.0

Note: Percentages were calculated using the total number of households surveyed in each rehabilitated colony as the denominator. The overall percentage (43.0%) was calculated using the total study sample (N = 351)
Source: Field Survey, 2024

To gain a clearer insight into the essence of these problems, the respondents who reported the presence of adjustment problems were asked about the particular issues that they had encountered.

Among those who reported adjustment issues, shared space conflicts were the most common complaint (67.5%) and mainly included roads, parking lots, open spaces, and shared facilities. These daily spatial negotiations became a significant conflict area in the congested rehabilitation setting. Discrimination and stigma (57%) and poor waste management (57%) emerged as the next most

frequently reported concerns, indicating that despite improved housing conditions, rehabilitated residents continue to experience social stigma while inadequate sanitation infrastructure also contributes to neighbourhood tensions.

The incidents of conflict associated with unregulated street vending (52%) also indicate tensions between informal livelihood practices and the formal urban norms of the neighbouring planned settlements. Other issues reported included interpersonal conflicts (28.5%), resistance to integration (26%), employment-related issues (23%), road encroachments (18.5%), exclusion from local events (17%), misinformation spread (12%), unauthorized construction (11%), and language barriers (9%). The results collectively indicate that "neighbourhood adjustment" is more than just a matter of interpersonal incompatibility; it is also a matter of the day-to-day, negotiated co-existence of shared urban space, unequal access to infrastructure, and social stigma. Therefore, the challenges faced following rehabilitation are more structural and spatial in nature than individual or cultural ones.

Table-4
Household-Reported Problems of Post-Resettlement Adjustment
(Multiple Responses, n = 151)

Adjustment Problems/causes	Frequency	Percent
Shared Space Conflicts	102	67.5
Discrimination and Stigma	86	57.0
Poor Waste Management	86	57.0
Unregulated Street Vendors	78	51.7
Interpersonal Conflicts	43	28.5
Resistance to Integration	39	25.8
Employment-Related Issues	35	23.2
Road Encroachments	28	18.5
Exclusion from Local Events	26	17.2
Misinformation Spread	18	11.9
Unauthorized Construction	16	10.6
Language Barrier	13	8.6

Source: Field Survey, 2024

Overall, the results suggest that neighbourhood adjustment in rehabilitated colonies goes beyond formal housing. Shared space conflicts, discrimination, sanitation issues, and livelihood issues continue to persist, indicating that rehabilitation does not eradicate socio-spatial inequalities. The findings support sociological arguments that physical development can be crucial

for successful rehabilitation; however, creating inclusive neighbourhood relations and minimising everyday forms of exclusion remain equally important.

Beyond the descriptive findings, an interpretive framework was developed to understand how neighbourhood adjustment may vary according to the length of residence in rehabilitated colonies. This framework is based on the synthesis of field observations, respondents' experiences, and relevant sociological literature.

Table-5
Interpretive Framework of Neighbourhood Adjustment According to Length of Residence

Residential Duration in Colony	**Adjustment Pattern**	**Dominant Issues**	**Interpretive Insight**
Shorter residence (<5 years)	Transitional adjustment	Shared space conflicts, vending tensions	Early years involve negotiation of formal urban norms and competition over shared spaces (Roy, 2005; Lefebvre, 1991).
Medium residence (5–10 years)	Moderate adjustment	Minor disputes, sanitation issues	Growing familiarity reduces overt conflict, though everyday tensions persist as residents continue to negotiate shared neighbourhood spaces.
Longer residence (10+ years)	Partial stabilisation	Persistent structural issues, occasional stigma	Routine interaction improves coexistence, but symbolic boundaries and infrastructural deficits continue to limit full integration (Putnam, 2000; Wacquant, 2008).

Note: This table presents an interpretive framework developed from field observations and relevant literature and is not directly statistically derived from the survey data.

Source: Developed by the author based on Field Survey (2024) and relevant literature.

The analytical framework presented in Table 5 suggests that households with shorter periods of residence (less than 5 years) may experience a transitional phase of adjustment characterised by conflicts over shared spaces and tensions related to informal economic activities. Among households with a medium duration of residence (5-10 years), conflicts become less visible, although sanitation-related and minor disputes continue, indicating moderate adjustment.

Households with longer residence periods (over 10 years) may experience partial stabilisation, characterised by routine interactions and improved coexistence; however, structural problems and symbolic stigma may continue to limit complete social integration.

The analytical framework indicates that neighbourhood adjustment is a process of continuous and dynamic change related to length of stay, the everyday interactions with space, and wider social contexts. Familiarity and co-existence can be achieved with longer living, but structural inequalities, territorial stigma, and infrastructural problems may still hinder complete social integration among neighbourhood communities.

Discussion

The findings reveal that everyday negotiations over shared spaces and social perceptions play a more decisive role in shaping neighbourhood adjustment in rehabilitated housing colonies than cultural or linguistic differences. Although a majority of residents reported satisfactory adaptation, the substantial minority experienced conflict, highlighting the unequal social outcomes of rehabilitation. The results of the Chi square analysis also revealed that there was no significant difference between the six rehabilitated colonies in their adjustment problems, suggesting that neighbourhood adjustment problems are broadly similar across the rehabilitated colonies. The provision of formal housing alone is insufficient to dismantle symbolic hierarchies embedded in urban social relations.

Conflict over shared infrastructure, such as roads, parking areas, and common facilities, reveals that post- resettlement access to urban space remains a central site of contention. These tensions are not merely logistical, they reflect deeper struggles over recognition, legitimacy, and belongings (Lefebvre, 1991). Even though rehabilitated colonies are physically integrated into the urban landscape, they do not function as socially neutral spaces. Infrastructural deficiencies and divergent spatial practices continue to shape unequal interaction.

Opportunities and tensions related to sanitation and uncontrolled street vending indicate institutional governance deficiencies rather than failures at the individual level. From a Durkheimian perspective, such tensions reflect a lack of normative integration, as the absence of clearly defined and collectively accepted rules governing shared spaces undermines social cohesion (Durkheim,1984).

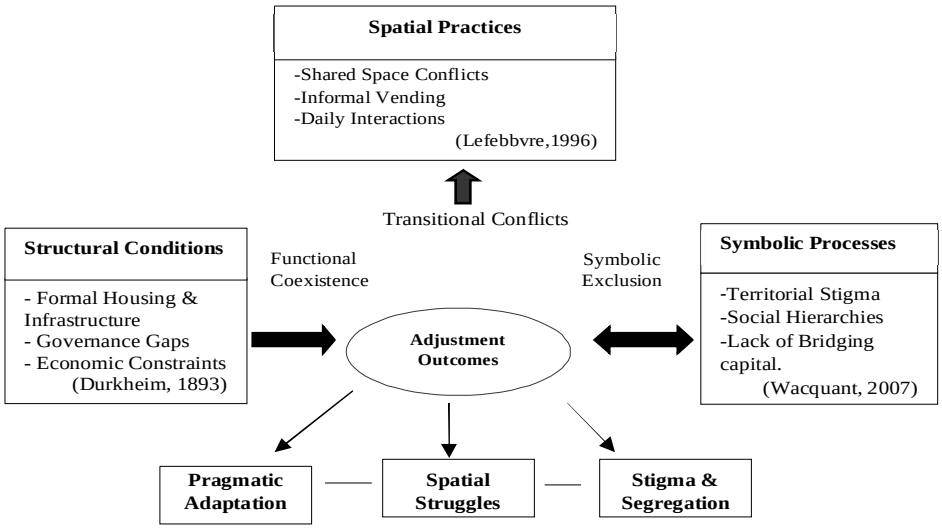
The persistence of stigma reported by a significant proportion of respondents resonates with Wacquant's concept of territorial stigmatisation (Wacquant, 2008). Despite physical upgrading, rehabilitated colonies continue to be perceived socially and morally inferior. Such perception-constrain social acceptance and reinforce symbolic boundaries between residents of rehabilitated colonies and neighbouring settlements.

This interpretation is developed through the analytical framework presented in Table 5, which conceptually explains neighbourhood adjustment in relation to different lengths of time spent living in the neighbourhood, drawing on the results of the fieldwork and the sociological literature available. Although longer residence leads to routine interaction and partial stabilisation, complete social integration is limited by the structural and symbolic barriers that cannot be overcome. This is a manifestation of social and symbolic capital that is not evenly distributed as Bourdieu (1986) theorised, recognition and legitimacy are left behind even as far as the redistribution of material resources like housing is concerned.

The framework is interpretive in nature and demonstrates patterns observed in the field; it does not establish a causal relationship between length of residence and neighbourhood adjustment.

A clear distinction emerges between neighbourhood relations in rehabilitated colonies and those in pre-rehabilitation slums settlements. In slum, social ties were often shaped by shared vulnerability, informal support networks, and longstanding familiarity. Rehabilitation, by contrast, introduced formal housing layouts, altered neighbourhood compositions, and intensified interaction with socially distinct neighbouring settlements. These changes generated new tensions related to regulation, space use, and status recognition.

Figure-1
Interlinking Sociological Theory with Empirical Results in Neighbourhood Adjustment



Source: Developed by the author using primary survey data.

While rehabilitation improved housing conditions and formalised tenure security, it did not automatically translate into seamless social integration. Instead, integration appears as a negotiated and conditional process. Residents navigate everyday interactions within a framework shaped by lingering stigma, spatial contestation, and uneven acceptance. Thus, rehabilitation reshapes neighbourhood relations rather than eliminating urban marginality.

These relationships are conceptually synthesised in figure 1, which demonstrates how structural conditions, spatial practices, and symbolic processes intersect to shape post-resettlement neighbourhood adjustment.

Conclusion

This paper examined neighbourhood adaptation and social integration in rehabilitative housing colonies constructed under Small Flats Scheme in Chandigarh by moving beyond the housing dimension of rehabilitation to focus on social interactions of everyday life. Based on the primary survey data on 351 households in six rehabilitated colonies, the analysis demonstrates that although material living conditions have been improved due to the formal housing provision, social integration is neither complete nor uniform.

The outcomes reveal that most of the rehabilitated households reported satisfactory neighbourhood adjustment and that they are living a life in harmony with neighbours, reflecting that there is a level of functional co-existence within the planned urban environment of Chandigarh. Furthermore, the Chi-square analysis revealed that neighbourhood adjustment problems were not significantly associated with the rehabilitated colony, suggesting that these challenges are broadly shared across the rehabilitated settlements despite minor variations in their prevalence. However, the significant share of households that have adjustment-related issues indicates that there are limitations in rehabilitation through the housing pathway and that neighbourhood adjustment is a key component of the rehabilitation process, reflecting the need to address underlying social inequalities. Such experiences of discrimination, territorial stigma, tensions over sanitation, and struggles over common space imply that symbolic and relational aspects of exclusion do not end with spatial relocation to formal housing.

The interpretative framework developed in this study also suggests that neighbourhood adjustment is dynamic and sensitive to the length of time spent in rehabilitated colonies. Transitional conflicts emerge regarding shared space, informal trading, and sanitation, which represent the negotiation of formal urban norms by households during the first few years of relocation. Over time, regular contacts lead to increased familiarity and partial stabilisation, but infrastructural constraints and symbolic boundaries remain as restrictions on full social

integration. The sociological argument that adjustment is a process that takes time and negotiation to achieve is supported by these findings.

The findings also indicate that the qualitative dimensions of neighbourhood adjustment of the rehabilitated housing colonies vary among respondents and reflect the different experiences after rehabilitation. According to qualitative responses, pre-rehabilitation slum settlements were materially deprived though characterised by tightly-knit social networks, common norms, and relatively less contestation in everyday neighbourhood life. In contrast, rehabilitation brought with it new forms of housing organization, new neighbourly relations, and more frequent contacts with different settlements on the periphery, which created new conflicts regarding regulation, space use, and status recognition. Rehabilitation, in this manner, not only enhanced the physical housing conditions but likewise reshaped the relations within the neighbourhood, thereby producing neighbourhood adjustment challenges that were less pronounced than those in pre-rehabilitation settlements.

Theoretically, the research reinforces the claims put forward by Weber, Bourdieu, and Wacquant that material improvements alone cannot eliminate status-based hierarchies, unequal access to social capital or territorial stigmatization. The conflicts seen in rehabilitated colonies are not based on cultural differences, but rather on the everyday struggles over space and power, the lack of infrastructure, institutional weaknesses, and urban inequality. In this sense, neighbourhood adjustment is an important marker for the social success of rehabilitation policies.

In the context of the national literature, the study shows that social integration of the rehabilitated households is a slow process, which is not uniform, and is contingent upon daily interactions between the neighbourhoods. The evidence shows that slum-free city initiatives should not be assessed solely on the basis of physical redevelopment and tenure security, but also on promotion of inclusive neighbourhood relations, reduction of symbolic exclusion, and facilitation of dignified participation in urban social life.

This study makes a contribution to the field of urban sociology because it shows that neighbourhood adjustment does not necessarily follow on from better housing facilities, but is a process of social negotiation. The study brings together the three concepts of social integration, territorial stigma, and social capital, and deals with the social science literature on the post-rehabilitation experiences, thereby showing the relevance of the everyday nature of neighbourhood relations for rehabilitation. The results indicate that sustainable rehabilitation policies should extend the formal housing support by strengthening the interaction between neighbourhoods, fighting social exclusion, promoting long-term social integration.

Limitations of the study

This study has certain limitations. The cross-sectional design precludes causal inferences and only captures neighbourhood adjustment at a single point in time. Second, the data rely on respondents' self-reported perceptions and retrospective accounts of their pre-rehabilitation experiences, which may be subject to recall and response bias. Thirdly, the findings of the study should not be generalized to other rehabilitation situations without caution because the study is limited to rehabilitated housing colonies under the Chandigarh Small Flats Scheme. Longitudinal and comparative multi-city studies could be conducted in future research to gain a clearer picture of neighbourhood adjustment and social integration following rehabilitation.

Recommendations

The findings highlight the need for a wider consideration of the potential for rehabilitation policies to go beyond formal housing and focus more on neighbourhood integration and social inclusion over time. Shared space conflicts emerged as the most common adjustment problem, and the Chandigarh Administration should improve participatory governance of shared spaces by creating joint committees of residents to ensure that shared infrastructure is managed effectively. Likewise, stigma and discrimination (57%) remain a barrier to social inclusion, and neighbourhood integration programmes or inclusive community-based activities, should be made a matter of institutionalisation to further enhance social cohesion and reduce territorial stigma. Poor waste management (57%) was also identified as a key source of neighbourhood tension, and a greater focus on municipal service delivery and maintenance should be adopted. Moreover, as conflicts over unregulated street vending (52%) illustrate the mismatch between the informal livelihoods and the formal planning, rehabilitation policies should include livelihood-sensitive planning, including designated vending spaces. Finally, rehabilitation programmes should incorporate a social monitoring system for the post-rehabilitation period that periodically evaluate neighbourhood relations, conflicts, service provision, and social integration, to ensure that rehabilitation outcomes are not just assessed based on improved housing conditions but also based on neighbourhood cohesion and long-term social integration.

References

Bhan, G. (2016). *In the public's interest: Evictions, citizenship, and inequality in contemporary Delhi*. University of Georgia Press.

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), Handbook of theory and research for the sociology of education (pp. 241–258). Greenwood Press.

Castells, M. (1977). The urban question: A Marxist approach. Edward Arnold.

Chandigarh Administration. (2006). Chandigarh Small Flats Scheme–2006. Government of India.

Chatterji, R. (2018). *Wasted lives: Narratives of displacement, development, and dispossession*. Oxford University Press.

Debnath, R., Bardhan, R., & Blank, M. S. (2019). Discomfort and distress in slum rehabilitation: Investigating a rebound phenomenon using a backcasting approach. Habitat International, 87, 75–90. https://doi.org/10.1016/j.habitatint.2019.03.010

Dupont, V. (2011). The dream of Delhi as a global city. International Journal of Urban and Regional Research, 35(3), 533–554. https://doi.org/10.1111/j.1468-2427.2010.01027.x

Durkheim, É. (1951). Suicide: A study in sociology (J. A. Spaulding & G. Simpson, Trans.). Free Press. (Original work published 1897)

Durkheim, É. (1984). The division of labour in society (W. D. Halls, Trans.). Free Press. (Original work published 1893)

Engels, F. (1845). The condition of the working class in England. Penguin Classics.

Gupta, N., & Kavita. (2020). Slum rehabilitation through public housing schemes in India: A case of Chandigarh. Environment and Urbanization ASIA, 11(1), 1–16. https://doi.org/10.1177/0975425320938536

Kundu, A. (2009). Urbanisation and migration: An analysis of trend, pattern and policies in Asia. *Human Development Research Paper 2009/16*. United Nations Development Programme.

Lefebvre, H. (1991). The production of space (D. Nicholson-Smith, Trans.). Blackwell. (Original work published 1974)

Marx, K., & Engels, F. (2010). The Communist manifesto. Penguin Classics. (Original work published 1848)

Negi, R. (2017). Gender, space, and collective action in resettlement colonies of Delhi. *Economic and Political Weekly, 52*(7), 54–62.

Neuwirth, R. (2004). Shadow cities: A billion squatters, a new urban world. Routledge.

Putnam, R. D. (2000). Bowling alone: The collapse and revival of American community. Simon & Schuster.

Roy, A. (2005). Urban informality: Toward an epistemology of planning. Journal of the American Planning Association, 71(2), 147–158. https://doi.org/10.1080/01944360508976689

UN-Habitat. (2020). World cities report 2020: The value of sustainable urbanization. United Nations Human Settlements Programme.

Wacquant, L. (2008). Urban outcasts: A comparative sociology of advanced marginality. Polity Press.

Weber, M. (1978). *Economy and society: An outline of interpretive sociology* (G. Roth & C. Wittich, Eds.). University of California Press. (Original work published 1922)

Wirth, L. (1938). Urbanism as a way of life. American Journal of Sociology, 44(1), 1–24. https://doi.org/10.1086/217913

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GENDERED SPACES AND THE MAKING OF PLACE: WOMEN'S PERCEPTIONS IN JAUNSAR-BAWAR, UTTARAKHAND

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Abstract: Women's perceptions of space and place remain central to understanding gender relations in rural societies, yet empirical evidence from the Himalayan region of India remains limited. This paper examines how women in Jaunsar-Bawar, a customarily governed region of Uttarakhand, experience and give meaning to the domestic, agricultural, ritual and civic spaces that structure their daily lives. Drawing on feminist geography and an intersectional approach, the study is based on qualitative fieldwork combining semi-structured interviews, focus group discussions, and participant observation with women differentiated by caste, religion, education and generation. The analysis shows that women's understanding of space is built cumulatively through labour, memory, ritual practice and social relationships, rather than assigned by custom alone. Household responsibility, agricultural cooperation, negotiated ritual participation, and expanding educational and civic engagement together reveal place-making as a continuous, unevenly distributed process rather than a fixed cultural condition. The study challenges homogenised portrayals of rural Himalayan women and argues that culturally embedded place-making processes are fundamental to understanding gender relations and rural transformation. It contributes to debates on gender and development by demonstrating that gender-responsive planning in mountain regions must account for the diverse ways in which women inhabit, interpret, and reshape the spaces that development seeks to transform.

Keywords: Gender and Space; Place-Making; Jaunsar-Bawar; Feminist Geography; Intersectionality; Himalayan Development

Introduction

Gender relations unfold not only inside institutions and economies but inside the ordinary spaces people move through each day. Homes, fields, forests,

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marketplaces, and shrines carry social weight beyond their physical description, these are arenas where identity, obligation and opportunity are worked out in practice. Geographical scholarship has long argued that such spaces are not blank containers waiting to be filled with social life; they are themselves produced through the interplay of culture, power and everyday conduct, which is why spatiality has become central to the study of gender (Lefebvre, 1991; Massey, 1994; McDowell, 1999). Grasping how women read and inhabit these spaces is one route into understanding how gender relations are sustained, contested and altered over time.

Development scholarship has, for good reason, concentrated on measurable gaps in women's education, health, employment and representation in local governance. That body of work has sharpened the case for gender equity considerably, yet it has tended to treat spatial experience as background rather than as the very terrain on which development outcomes are decided. A newer line of argument insists otherwise: access to resources, freedom of movement and the capacity to participate in decisions are all bound up with how everyday space is organised and who controls its meaning (Cornwall, 2016; Hanson, 2022). Women's perceptions of space, read this way, become an entry point for understanding how development is actually lived and interpreted within a specific cultural setting, rather than simply measured against national indicators.

The Himalayan region sharpens this question further. Mountain communities combine scattered settlement, heavy reliance on natural resources and durable local institutions, all of which give gender relations here a distinct texture. Women anchor much of the agricultural, pastoral and domestic work on which mountain households depend, while at the same time operating within customary structures that govern marriage, ritual and access to common resources. A substantial literature documents women's contribution to mountain livelihoods and resource management (Agarwal, 1994; Nightingale, 2011; Joshi et al., 2022), yet comparatively little of it asks how women themselves read the spaces in which these contributions occur. That silence is most conspicuous in regions where custom continues to organise daily life even as education, migration and state programmes reshape the wider social landscape.

Jaunsar-Bawar, tucked into the north-western corner of Uttarakhand, is one such region. Its settlement patterns, kinship institutions, ritual calendar and agrarian economy give it a cultural identity distinct from the surrounding plains and from much of hill Uttarakhand itself. Across a single day, a woman here might move between the kitchen, the terraced field, the forest path, the temple courtyard and the village meeting ground, each carrying its own expectations and social meaning. Over the period of time, better roads, wider schooling and shifting livelihood ambitions are gradually altering this pattern without erasing it, producing a mixture of continuity and change that makes Jaunsar-Bawar a useful

setting for examining how women themselves narrate the spaces of their everyday lives.

This paper takes up the task using the conceptual resources of feminist geography and intersectionality. Rather than approaching women in Jaunsar-Bawar as an undifferentiated group, it asks how the experience of domestic, productive, ritual and civic space varies with caste, religion, education and generation.

The empirical material is drawn from qualitative fieldwork centred on women's own accounts, which interpret how ordinary environments become socially meaningful through repeated practice, memory and relationship.

The paper offers three things to the literature on gender and development: grounded evidence from a Himalayan region that has drawn little sustained scholarly attention despite its distinctive social organisation; an extension of feminist geographical argument showing that gendered meaning attaches to space through routine engagement with home, field, shrine and public ground rather than through the physical setting alone; and an argument that rural development policy in mountain regions needs to reckon with how differently women experience space if it is to be genuinely responsive to gender.

The four major sections lay out the conceptual apparatus that frames the analysis, describe the study area and methods, and presents the empirical findings thematically before drawing the narratives into dialogue with one another. The concluding section considers the implications for feminist geography and gender-responsive planning in mountain societies.

Rationale and Theoretical Framework

From Space to Place: Conceptual Foundations

Research on gender has gradually widened its focus from measuring inequality in schooling, work and political voice to asking how everyday life is spatially arranged in the first place. Feminist geography played a large part in that shift by rejecting the older assumption that space is simply the stage on which social relations happen. Space, in this alternative reading, is produced, assembled continuously out of material arrangement, routine practice and symbolic meaning (Lefebvre, 1991; Massey, 1994; McDowell, 1999). Once this move is accepted, the spaces women pass through daily, kitchen, field, forest, market, shrine, stop being neutral backdrops and become sites where cultural norms are rehearsed, contested and sometimes quietly revised.

Lefebvre's (1991) account of the production of space is a useful starting point precisely because it refuses to treat space as a passive container. Feminist geographers picked up this idea to show how ordinary spaces are bound into the making of gendered identity: domestic settings organise who does what work, agricultural land reflects unequal claims on productive resources and public or

institutional space often reproduces broader hierarchies (McDowell, 1999; Rose, 1993).

More recent writing pushes this further, cautioning against reading gendered space purely as restriction. Women routinely use these same spaces to manage responsibility, exercise judgment and rework relationships through the accumulation of ordinary practice (Brickell, 2020; Hanson, 2022).

A second distinction matters here, between space and place. Space, in this vocabulary, is the material and locational fact of an environment; place is what that environment becomes once it is layered with memory, feeling and lived experience (Relph, 1976; Tuan, 1977). Place, on this account, is not a property that geography simply possesses; it is an outcome, built up through repeated contact between people and their surroundings.

Massey (1994) pushed back against static readings of place, arguing that places are relational, constantly reassembled through social ties that stretch across different scales rather than sealed within a fixed boundary. Cresswell (2015) offers a related formulation, describing place as a meeting of location, locale and a felt sense of place, which underlines that meaning grows out of what people do in a setting, not from the setting's physical features alone. This distinction matters directly for rural societies, where the same routine activities turn household, field and shrine into places carrying specific cultural weight.

Feminist geography adds one further point: place-making is gendered from the start, because men and women rarely experience an identical physical setting in identical ways. Divisions of labour shape who moves where, who controls resources and who is visible in public life, while cultural expectation colours how a given space is read and used. Even so, recent scholarship warns against squeezing women's spatial experience into a simple public/private or oppression/empowerment binary (Pain & Staeheli, 2014; Sultana, 2021), since such binaries flatten out a lived complexity in which duty sits alongside attachment, cultural continuity alongside personal ambition and everyday accommodation alongside genuine structural constraint.

Intersectionality and the Differentiation of Women's Experience

Intersectionality supplies the second conceptual anchor for this paper. Crenshaw's (1989, 1991) foundational argument was that gender cannot be read in isolation from the other social positions a person occupies. Feminist geographers have since shown that caste, class, religion, ethnicity, generation and education all bear directly on how women access, use and interpret space (Valentine, 2007; Hopkins, 2019). Work from South Asia points the same way: women's mobility, standing within community institutions and access to livelihood opportunity differ sharply across intersecting social positions rather than following one common pattern of female experience (Chakraborty & Thambiah, 2023; Rao, 2020).

Treating women as a single social category, on this evidence, risks erasing exactly the variation that matters most for understanding everyday spatial life in rural communities.

This differentiation carries particular weight in mountain societies, where scattered settlement, ecological limits and livelihood systems built around continuous contact with farmland, forest and shared resources give women's spatial engagement both economic and social weight. Women here typically carry much of the load in farming, animal care, fuel and fodder collection and household maintenance, while custom, kinship and religious practice regulate access to these same spaces in ways that differ from one community to the next.

Existing scholarship has documented women's role in resource management, their adjustment to male out-migration and their place in mountain livelihoods with real care (Agarwal, 1994; Nightingale, 2011; Joshi et al., 2022). What remains thin is an account of how women themselves read these spaces and what meaning they attach to the responsibilities carried out within them, the gap this paper addresses.

The Gendered Place-Making Framework

The study treats place-making as an everyday gendered process, not a fixed cultural inheritance or a purely geographical fact. Physical settings become meaningful places, on this view, through the interaction of cultural institutions, gendered practice and women's own interpretation of their surroundings. This reframes the guiding question: rather than asking where women are, the analysis asks how women experience, read and reshape the spaces they inhabit. That shift matters for feminist geography, but it also matters for development research, because it treats spatial meaning as a genuine driver of development outcomes, standing alongside, not subordinate to, economic and institutional change.

Instead of viewing development as something imposed on villages from the outside, the framework conceptualizes it as emerging from the ongoing interaction between physical environment, socio-cultural institution, everyday gendered practice and women's own reading of place. By integrating insights from feminist geography and intersectionality with rich empirical fieldwork from the culturally distinct Himalayan region of Jaunsar-Bawar, the gendered place-making framework offers a grounded approach to understanding gender relations in mountain societies, one that privileges women’s own interpretations and lived experiences rather than imposing externally derived categories.

Guided by this perspective, the present study aims to address the questions: How women in Jaunsar-Bawar perceive, experience and actively construct meaning in the domestic, productive, ritual and civic spaces of their everyday lives; and How these place-making processes differ across intersecting social positions of caste, religion, education and generation.

Study Area and Methodology

Jaunsar-Bawar lies in the north-western part of Uttarakhand, a hill tract long set apart from neighbouring regions by its customary law, kinship structure and ritual calendar. The study is focused on Chakrata and Kalsi blocks, where percentage of women is 48.01 per cent. The villages here are typically compact and dispersed across steep terrain, with life organised around terraced cultivation, livestock rearing and seasonal use of forest resources. Households commonly maintain a second, temporary residence, the channi, near their cultivated land, to which families relocate during peak agricultural periods. Customary institutions continue to regulate marriage, inheritance and access to communal resources in ways that differ from patterns found in much of the rest of Uttarakhand, giving the region a distinct social and cultural profile even as improved connectivity and state development programmes reach further into everyday life.

The study adopts a qualitative, interpretive research design aimed at capturing women's own lived accounts and meanings of the spaces that structure their daily lives, rather than testing predetermined hypotheses about gender roles. This approach is consistent with feminist geography's emphasis on situated knowledge and women's subjective experiences (McDowell, 1999; Rose, 1993). Fieldwork was conducted in six selected villages of Chakrata and Kalsi blocks in Jaunsar-Bawar during a ten-month period spanning 2022-2023 and combined three complementary methods: semi-structured in-depth interviews conducted by the author, focus group discussions (FGDs) and participant observation. This design allowed for collective reflection, cross-checking of individual accounts and sustained observation of household, agricultural and ritual activities. The six villages were selected using purposive, criterion-based sampling to capture the diverse socio-spatial realities of the Jaunsar-Bawar region. The selection was guided by four key parameters:

Infrastructural Connectivity and Accessibility: To examine how physical isolation and development affect women's spatial mobility, the sample includes a mix of roadside, highly accessible villages (closer to markets) and interior, off-road villages situated on steep, remote terrain.

Demographic and Caste Composition: Given that spatial access is deeply mediated by social hierarchy in Jaunsar-Bawar, villages were chosen to ensure a balanced representation of dominant Rajput households, marginalised Scheduled Caste (SC) communities and minoritised religious pockets (such as the inclusion of Dakra village to capture the lived experiences of Muslim women in the tract).

Livelihood and Agrarian Profile: The selection prioritised villages with varying dependencies on natural resources. This includes villages where households heavily rely on traditional, high-altitude terraced farming and seasonal

channi migrations, contrasted with villages showing higher rates of male out-migration and transition to non-farm wages.

Institutional and Customary Governance: Villages were selected based on the active co-existence of both modern Gram Panchayats and traditional customary governance systems (such as the Sayana system), allowing for an analysis of how different institutional spaces dictate women's civic and ritual participation.

Being an outsider to Jaunsar-Bawar yet sharing a broader regional and gendered identity facilitated rapport with participants, particularly on issues of household labor and mobility. Regular discussions with local female Aanganwadi workers and women development officers (WDOs) of the region coordinating with child development project officers (CDPOs) helped mitigate initial inhibitions and enrich the interpretation of cultural nuances. This reflexive approach was maintained during data analysis to ensure that participants' voices remained central and were not overshadowed by the researcher's own assumptions.

Semi-structured interviews were conducted with 32 women across the six selected villages. Participants were selected through purposive sampling to ensure diversity in terms of caste (Brahmin, Rajput and Scheduled Castes), religion (Hindu and Muslim), educational attainment (ranging from no formal education to post graduate level), age/generation (ranging from 20 to 68 years) and livelihood roles (including homemakers, agricultural workers and aanganwadi workers). Interviews lasted between 45 and 60 minutes and were conducted in Hindi or the local Jaunsari dialect, with the assistance of a female local translator where necessary. Participant observation was carried out over the entire ten-month fieldwork period, involving immersion in daily household routines, agricultural activities (including seasonal shifts to channi settlements), forest resource collection, ritual practices and village meetings.

This allowed the author to observe how women moved through and interacted with different spaces, providing a valuable check against purely verbal accounts of gender norms. Interview and discussion guides were developed after initial scoping visits and a review of literature on gender and mountain livelihoods. The guides were organised around four broad domains:

1. Domestic life and household responsibility.
2. Agricultural, pastoral and forest-based work.
3. Participation in ritual and sacred space.
4. Engagement with education, mobility and public institutions.

Questions were deliberately open-ended to allow respondents to define the terms and priorities of the discussion in their own words. All interviews and FGDs were audio-recorded with informed consent, transcribed verbatim and translated

where required. Principles of informed consent, voluntary participation, confidentiality and "do-no-harm" were strictly followed. Particular attention was paid to creating a safe and culturally sensitive environment, especially when discussing sensitive issues related to mobility and ritual participation.

Participant Profile and Analytical Approach

Participants were selected through purposive sampling to reflect the social diversity of the region rather than to achieve statistical representation, capturing differentiated experiences of space and place across key intersecting identities. The final sample comprised 32 women from six villages in Chakrata and Kalsi blocks. The wider set of interviews and focus group material informs the analysis throughout. Table 1 provides socio-demographic profile of participants/respondents.

Table-1
Socio-Demographic Profile of Interview Participants (n = 32)

Category	Sub-Category	No of Participants	Percentage
Age Group (years)	20-35	11	34.4
	36-50	13	40.6
	51-70	8	25
Caste	Brahmin & Rajput	18	56.3
	SC	11	34.4
	Muslim	3	9.4
Education	No formal education	12	37.5
	Primary-middle	9	28.1
	Secondary & higher	11	34.4
Primary Occupation	Home-maker	10	31.3
	Agricultural work	16	50
	Aanganwadi/Paid role	4	12.5
	Others	2	6.2
Block	Chakrata	18	56.3
	Kalsi	14	43.7

Source: Fieldwork data analysis

In addition, four focus group discussions (FGDs) were conducted with a total of 28 participants. These groups were stratified by age (two groups of younger women aged 20-35 and two groups of older women aged 40+ years) to facilitate comparative discussion of generational changes in spatial practices. Data analysis was conducted using thematic analysis following Braun and Clarke's (2006) six-phase framework, which allowed themes to be built up from repeated close reading

of transcripts rather than imposed from a coding frame fixed in advance. Four principal themes emerged inductively from the data:

1. Domestic socialization.
2. Productive landscapes as lived spaces.
3. Negotiating the sacred: ritual space and gendered belief.
4. Widening horizons: education, mobility and public life.

Additionally, a dialogic analytical strategy was employed in which the four illustrative narratives were read against one another. Points of convergence and divergence between respondents were treated as valuable data in their own right, revealing how place is actively and differently constructed across social locations.

Results and Discussion

This section presents the findings from the fieldwork in Jaunsar-Bawar, showing how women turn physical spaces into meaningful, lived "places" through their daily work, relationships and choices. Rather than being simple backdrops, spaces like the home, the fields and the temples are constantly reshaped by the women who use them. Because women's lives are shaped differently by caste, religion, education and age, this analysis avoids treating rural Himalayan women as one single, identical group. Instead, it highlights how these intersecting identities create very different experiences of freedom, duty and belonging.

The empirical findings are organised around four major themes that emerged from the thematic analysis: domestic socialisation, productive landscapes, sacred and ritual spaces and expanding spatial horizons. These themes are presented in turn, followed by a dialogic reading of four illustrative narratives and a synthesis. Throughout the analysis, particular attention is paid to how intersecting identities of caste, religion, education and generation shape women’s place-making practices.

Learning Gender at Home: Domestic space and everyday socialisation

Gender socialisation was the theme respondents returned to most consistently and they rarely described it in abstract terms. Instead, women explained it through concrete daily practice, cooking, caregiving, serving elders, keeping the house, observing family ritual, through which they came to be recognised as full members of their households and communities. These were not narrated as isolated chores but as socially legible responsibilities that established a woman's standing within her marital family. Domestic space, on this account, works less as a physical dwelling than as the primary institution through which gendered identity is actually built.

Marriage figured repeatedly as the moment of entry into this new spatial and moral order. Respondents described domestic responsibility less as an obligation forced on them from outside than as a recognised path to legitimacy within the household they had married into. As one older Rajput respondent recalled: "When I came after marriage, I started making chapatis from the second day. That was how we learnt the work of the family." Her account casts domestic labour not as punishment but as an accepted route into relationship and responsibility, learning to cook meant learning how to belong.

The younger and more educated respondents complicated this picture without discarding it. An aanganwadi worker with formal schooling reframed the same domain: "Girls today study first. Household work is important, but education has also become necessary." Therefore, rather than rejecting household responsibility, she set it alongside a new claim, that education now sits beside domestic duty rather than being crowded out by it. A Scheduled Caste homemaker added a further layer, describing not less work but more voice: "The work of the house continues every day, but decisions are now discussed more than before." Authority within the household, in her account, has become more negotiable even where the daily workload has not changed. Table 2 summarises the everyday practices through which this socialisation occurs, together with the meanings women attach to them.

Table-2
Everyday Practices Producing Gender Socialisation

Everyday practice	Women's interpretation	Social meaning	Contribution to place-making
Cooking after marriage	Responsibility	Becoming part of the marital family	Domestic belonging
Caring for children and elders	Duty and affection	Family continuity	Emotional attachment
Household rituals	Tradition	Cultural continuity	Shared memory
Respecting senior family members	Moral obligation	Household hierarchy	Collective identity
Daily domestic work	Normal part of life	Gendered responsibility	Household as a meaningful place

Source: Fieldwork data analysis

These accounts resist a simple story of either patriarchal confinement or unexamined harmony. The household emerges instead as a place where care, labour, authority and belonging sit together, sometimes uneasily. According to the observation, domestic place-making happens through the accumulation of ordinary practice that reproduces cultural expectation while still leaving room for gradual renegotiation, a household is not simply inherited as a finished social

arrangement; it is built and rebuilt through what women actually do inside it, day after day.

Fields, Forest, and Channi: Productive landscapes as lived spaces

The ways in which the women of Jaunsar-Bawar experience and narrate their productive landscapes offer a concrete illustration of Doreen Massey's (1994) relational concept of place. Massey famously argued that places are not static, bounded entities frozen in time, but are rather progressive, open-ended networks of social relations that stretch across different scales. In this study, spaces like the agricultural terraces, forest paths and seasonal channi settlements are not merely physical backdrops where economic tasks are performed; they are continually produced as relational "places" through lived practice and connection.

Agricultural terraces, forest paths, livestock shelters and seasonal channi settlements form a linked spatial network that organises much of women's working lives in Jaunsar-Bawar and respondents rarely spoke of these landscapes as merely economic. While a conventional development framing might treat farmland and forest chiefly as productive assets, women's accounts foregrounded cooperation, accumulated ecological knowledge, family continuity and everyday sociability. Productive labour, in other words, is also the process through which these landscapes acquire social meaning.

The respondents consistently folded agricultural work into household responsibility rather than treating it as a distinct economic sphere. Cultivation, livestock care and forest collection were described as part of sustaining the family, not as separate from domestic duty and the women interviewed rarely drew a firm line between "household work" and "agricultural work." This blending reflects the wider structure of mountain livelihoods, where domestic and productive life are not easily separated.

The compiled fieldwork also picked up an important social dimension to this labour. The movement of women to the terraces or into the forest routinely became occasions for women to exchange information, share assistance and reinforce relationships with neighbours. One respondent recalled: "Earlier we walked together every day to collect grass and firewood and used to plan about coming festivals, making dishes and shopping new clothes." Another described how road improvement had changed but not removed this pattern: "Roads have reduced some of that walking, but we still work together during farming." That is how fields and forest paths function as sites of social cohesion as much as of labour.

During the field work, ecological knowledge surfaced repeatedly as part of women's attachment to these landscapes, judgment about when to collect fodder, which forest route to take, how to time seasonal agricultural tasks, rarely framed

as specialised expertise but described instead as an ordinary part of life passed down across generations, which is precisely why development planning tends to overlook it despite its evident importance to mountain livelihoods. The seasonal movement to the channi extends this pattern of place-making beyond the permanent village settlement: during the busiest agricultural periods families relocate temporarily closer to their cultivated land and respondents described these dwellings not as makeshift shelter but as familiar places tied to agricultural continuity and shared labour, sustaining attachment to more than one place at once. Activities like long walks on steep terrain and the daily burden of fodder and fuelwood collection were acknowledged plainly, especially by older respondents, yet these difficulties rarely stood alone; they sat alongside satisfaction at sustaining the household and continuing established livelihood practice. Productive labour, in short, carries both constraint and meaning together, which is one more reason to resist collapsing women's spatial experience into a simple binary of oppression or empowerment.

Table-3
Productive Landscapes as Lived Spaces

Productive space	**Dominant everyday practice**	**Women's perception**	**Place-making outcome**	**Development implication**
Agricultural terraces	Cultivation, sowing, harvesting	Responsibility towards household livelihood	Productive place rooted in family continuity	Recognition of women's agricultural contribution
Forests	Collection of fodder and fuelwood	Shared responsibility and environmental knowledge	Collective ecological place	Importance of women's ecological knowledge in resource management
Channi (seasonal settlement)	Seasonal residence during agricultural activities	Family cooperation and continuity	Seasonal lived place	Seasonal mobility as part of mountain livelihoods
Livestock shelters	Animal care	Everyday responsibility	Working landscape	Invisible contribution to rural economy
Mountain pathways	Daily movement between productive spaces	Familiarity and social interaction	Connected spatial network	Need for gender-sensitive rural infrastructure

Source: Fieldwork data analysis

The younger respondents linked education, better roads and growing access to wage work with opportunities reaching beyond agriculture, though none of them described this as a wish to abandon farming. A younger Scheduled Caste woman summed up the balance: "Agriculture is our work, but we also want our children to study so they have more opportunities." Productive landscape therefore remains central to women's sense of self even as it gathers new meaning alongside broader economic change. Table 3 sets out the principal productive spaces identified in the fieldwork together with their associated practices, meanings and development implications.

Negotiating the Sacred: Ritual space and gendered belief

The complex, uneven access to sacred and ritual spaces in Jaunsar-Bawar provides a vivid, empirical demonstration of Kimberlé Crenshaw's (1989, 1991) framework of intersectionality in practice. Crenshaw's core insight, that social categories like gender, caste, class and religion do not operate as isolated, additive variables but instead intersect to produce distinct, compound systems of privilege and marginalisation, is highly visible in the ritual landscape of the region. Rather than a uniform "female experience" of religious exclusion, the fieldwork reveals that a woman's ability to navigate sacred spaces is highly contingent upon where she stands at the intersection of gender, caste and local kinship. For instance, while a Rajput woman's spatial constraints in the temple courtyard might be dictated primarily by gendered rules of ritual purity, a Scheduled Caste (SC) woman experiences a double-layered spatial marginalisation where caste hierarchy and gender constraints compound one another, dictating entirely different boundaries of physical access and social visibility.

All the different sacred spaces proved to be one of the more complicated areas of women's spatial experience. The spaces like temples, household shrines, the mosque, cremation grounds and ritual pathways were not described as uniformly open or closed to women; gender, faith, custom and family tradition intersected differently depending on household, caste group and religious community. Access and meaning varied enough across households to suggest that participation is negotiated through local relationships rather than dictated wholesale by doctrine.

In contrast to a common assumption that women are simply excluded from religious space, respondents described a genuinely mixed picture. Household shrines were consistently framed as intimate settings where women carried real responsibility for sustaining everyday religious practice, daily worship, preparing for rituals, keeping household ceremonies going, which placed women at the center of domestic spirituality rather than at its margins. In this setting, sacred space folds directly into domestic life and reinforces a sense of cultural continuity.

On the other hand, village temples carried a different, more collective significance: festivals and shared worship offered chances for social contact, reaffirmed community identity and marked the turn of the seasonal calendar. Even here, though, women's experiences were not identical, the extent of ritual participation depended on local custom, family tradition and the particular ceremony in question, which again argues against reading sacred space through one single template of inclusion or exclusion.

The clearest evidence of this variation came from directly comparing accounts of the same category of site. One respondent, from a Scheduled Caste household, stated plainly that "women do not go to the cremation ground in our family." Another, from a different household, described the opposite pattern: "In our village, women stay during the funeral rituals for three days." Neither of the two respondents treated their own experience as unusual; each spoke of what was simply normal within her own community.

A similar contrast appeared around the village council ground, where one respondent felt women’s opinions were heard but rarely shifted outcomes, while another reported somewhat greater influence within the smaller social world of her hamlet. Gendered access to sacred and public ground, on this evidence, is mediated by local social relationship rather than fixed by a single cultural rule applying everywhere alike.

Muslim respondent from Dakra added a further layer to this picture: "Our customs are different, but respect for family and community remains the same." Her comment signals that difference across religious community does not translate into a fundamentally different relationship to family or place, the specific customs vary, but the underlying logic of respect and belonging does not.

These findings point to sacred space as socially negotiated rather than culturally fixed in advance. Women's accounts described ongoing accommodation and reinterpretation, through which customary practice shifts alongside changing education, family structure and community relationship; rather than simply receiving religious tradition, women appear to sustain, interpret and in some cases quietly reshape it through everyday participation.

Understanding these differences through caste and religious identity together, rather than assuming religious identity alone explains the pattern, matters because sacred place-making reflects household norm, community tradition, education and individual life history acting in combination.

Table 4 summarises the sacred spaces identified in the fieldwork, the everyday engagement associated with each and the nature of the negotiation involved.

Table-4
Sacred and Ritual Spaces: Negotiated Meanings

Sacred space	Everyday engagement	Women's perception	Nature of negotiation	Place-making outcome
Household shrine	Daily worship and family rituals	Familiar and intimate spiritual space	Shared by women across households	Everyday sacred place
Village temples	Festival participation and collective worship	Centre of community identity	Participation shaped by local customs and ritual practices	Collective sacred place
Mosque	Regular prayers and religious gatherings	Source of religious belonging	Participation organised within community traditions	Religious place of identity
Cremation ground	Death rituals	Differing perceptions across households	Access negotiated through family traditions rather than uniformly prohibited	Contested sacred place
Ritual pathways and festival spaces	Processions and seasonal rituals	Shared cultural experience	Gender participation varies by ritual context	Ritual landscape

Source: Fieldwork data analysis

Widening Horizons: Education, Mobility, and Public Life

Women's spatial experience in Jaunsar-Bawar is shifting, though gradually and unevenly. Domestic responsibility and agricultural work remain central to daily life, yet wider access to education, better roads, mobile communication and greater contact with public institutions have opened up new spatial territory within which women build their identities. These changes are not experienced evenly across the sample: caste, religion, education, generation and household circumstance all mediate how much mobility and participation a given woman actually gains.

The finding that emerges is not a straightforward shift from tradition to modernity but a differentiated process of place-making in which continuity and change run alongside one another. Education stood out as one of the strongest forces reshaping spatial experience. Younger respondents and those with formal schooling described education as more than a route to employment; it was also a way of engaging more confidently with institutions beyond the household. One aanganwadi worker observed simply: "Due to more exposure and knowledge because of educational qualification, my opinions are valued more" Therefore, schools and colleges, in this statement function as places of aspiration, they widen

what women imagine as possible while strengthening their standing in family and community decisions.

On the other hand, older respondents mostly linked movement outside the household to agriculture, livestock and forest collection; younger respondents, while still carrying these responsibilities, also described travelling for education, healthcare, government services and occasional paid work, aided by roads that have narrowed the isolation of many villages. None of this was framed as a break with earlier life; mobility reads instead as an extension of existing responsibility, layering new opportunity onto customary roles rather than replacing them.

Table-5
Expanding Spatial Horizons: Dimensions of Change

	Earlier perception	**Emerging perception**	**Influence on place-making**
Education	Limited to basic literacy for many women	Education valued for daughters and employment	School becomes an aspirational place
Mobility	Movement largely linked to domestic and agricultural work	Greater travel for education, employment and public services	Expanded spatial identity
Public participation	Voice often mediated through male family members	Increasing engagement with village institutions and self-help groups	Emerging civic place
Communication	Information circulated through family and neighbourhood networks	Greater exposure through mobile phones and digital media	Wider social horizons
Livelihood aspirations	Agriculture as primary occupation	Coexistence of farming with education and wage employment	Multiple place attachments

Source: Fieldwork data analysis

Even public participation followed a similarly uneven pattern. Women are found attending village meetings and dealing with government offices more often than earlier generations did, yet their formal influence within these settings remained limited, several noted that their opinions were heard without necessarily shifting collective decisions, a sign that gendered hierarchy persists even as

participation expands. Even the partial participation, though, marked a clear departure from earlier exclusion, suggested that public space is becoming a site of negotiation rather than one closed to women outright. Table 5 sets out this shift across the principal dimensions of change identified in the fieldwork.

Women with more schooling generally spoke with greater confidence about institutions beyond the household, while older respondents continued to give priority to domestic and agricultural responsibility and the Muslim respondent from Dakra described a pattern of mobility shaped by her own community's structures, distinct in specific ways from accounts given by Hindu respondents. Change in spatial experience, on this evidence, cannot be read off a single developmental timeline; it has to be understood through the several, overlapping social identities women actually occupy.

Therefore, rather than displacing older attachments, expanding mobility layered new places onto existing ones, the respondents kept valuing household, field and shrine even as they built new relationships with school, market and government office. A younger respondent captured this balance: "Our daughters should have more opportunities than we had," while an older respondent added, in the same conversation, "Education is important, but children should also remember their traditions."

Women in Dialogue: Reading the narratives together

This dialogic reading operationalizes Massey’s (1994) relational conception of place, in which meaning emerges through the relationships between accounts rather than residing in any single narrative, together with Crenshaw’s (1989, 1991) intersectional framework, which holds that caste, religion, education and generation must be read together rather than in isolation.

The value of the four profiles introduced above lies less in any single account than in what emerges when they are read against one another. On the home, the three respondents quoted in the above section on domestic space and everyday socialisation, do not converge on a single position, one recalls domestic labour as the route to acceptance within her marital family, another places education alongside household duty rather than in competition with it and a third describes unchanged daily labour combined with a new degree of voice in family decisions. None of these positions cancels out the others; together they show a household that teaches belonging through work while slowly renegotiating who gets a say in it, continuity and change operating inside the same institution at the same time.

The productive landscape follows a similar logic. Memory of shared walks to collect fodder, the observation that roads have shortened those walks without ending collective labour and a younger respondent's wish to combine farming with her children's education are not competing claims about the same fields and forests,

they are three layers of the same attachment, accumulated across a single generational span.

The understanding of sacred space produces the sharpest contrast of all and precisely for that reason it is the clearest evidence for the argument this paper is making. That one household bars women from the cremation ground while another has them present for three days of funeral ritual is not a contradiction to be resolved; each respondent describes what is simply normal within her own community and the Muslim respondent's insistence that "our customs are different, but respect for family and community remains the same" extends the same logic across a religious boundary. The difference between households, here, is not a deviation from some underlying norm, it is the defining feature of how ritual space actually works in Jaunsar-Bawar.

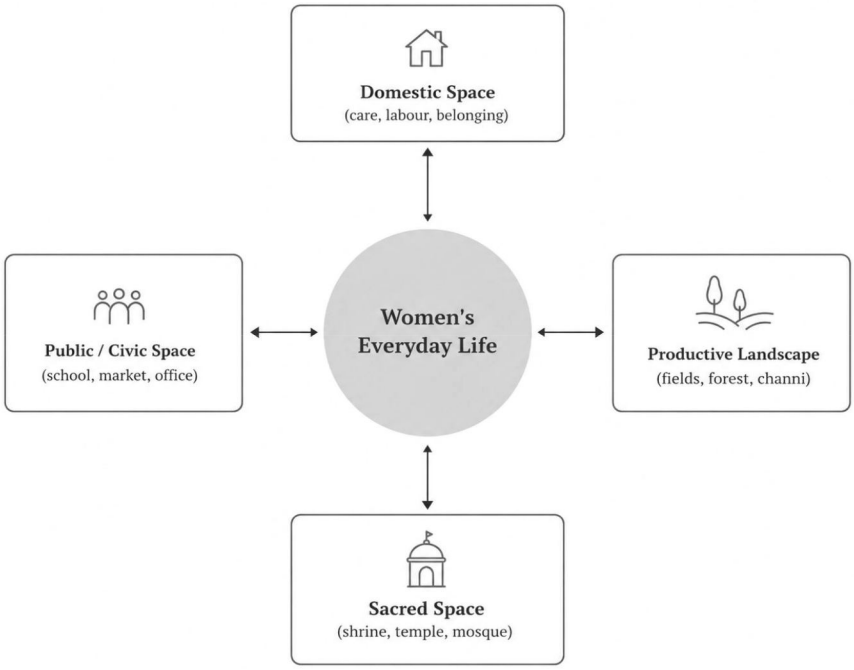
The four narratives converge far more than they diverge: all express a wish for daughters to have wider opportunity, differing chiefly in how firmly they tie that opportunity to continued regard for family tradition. Read together, these conversations confirm that place in Jaunsar-Bawar is built through practice rather than assigned by geography, a house becomes a place through care, a field through labour, a forest through shared memory, a temple or mosque through lived faith rather than one uniform rule, a school through hope invested in the next generation. Disagreement over custom, mobility and education does not fragment this picture; it demonstrates that place is continually negotiated across intersecting identities and cultural continuity, exactly as an intersectional reading of gendered space would predict.

From Space to Place: A Synthesis

Taken together, the findings demonstrate that women's spatial experience in Jaunsar-Bawar cannot be understood through rigid, separate categories of household, agriculture, religion, or public space. Instead, these domains are deeply interconnected and mutually constitutive, and are continuously woven together through everyday practices of labour, care, ritual, negotiation and aspiration. The household is simultaneously a site of labour, of emotional attachment, of intergenerational learning and of negotiated authority. Agricultural terraces are at once productive assets, cooperative institutions and repositories of ecological knowledge and family continuity. Sacred spaces combine belonging with negotiated restriction. Schools, markets and public offices are becoming spaces of aspiration without displacing older attachments to home, field and shrine. Meaning, in short, accumulates in layers rather than sitting fixed within any one physical setting.

Figure 1 illustrates this dynamic interplay, showing how women actively construct place across overlapping spatial spheres.

Figure-1
Interconnected spatial domains through which women build place in Jaunsar-Bawar



Overlapping of spaces in women's everyday life

The Figure 1 and the accompanying text illustrate that a woman's everyday life is not isolated in a single sphere, but is instead shaped by continuous movement and overlap between these domains.

Fluidity of boundaries: The double headed arrows indicate that these spaces are not separate groups; experiences and responsibilities in one domain directly influence and feed into the others.

Expansion of roles: Domestic responsibilities are not confined strictly to the household ("Domestic space"). Instead, they stretch outward into the "Productive Landscape" (agricultural work in fields) and "Sacred space" (ritual duties).

Feedback loops: The diagram represents dynamic flow where new external experiences-such as gaining an education or participating in the community within public/civic space - subsequently flow back into the home, impacting family decision-making and domestic dynamics.

Table 6 draws these findings together across the four spatial domains discussed in this section, summarizing the dominant perception, everyday practice, place-making outcome and development implication associated with each.

Table-6
Synthesis: Spatial Worlds, Practices, and Development Implications

Spatial world	Dominant perception	Everyday practices	Place-making outcome	Implications for gender and development
Domestic	Responsibility, care and belonging	Cooking, caregiving, household rituals	Household as a place of identity and continuity	Policies should recognise unpaid care work and women's role in household decision-making
Productive	Livelihood, cooperation and environmental knowledge	Farming, livestock management, fodder and fuelwood collection	Productive landscapes become lived places through labour	Agricultural and forest policies should incorporate women's local ecological knowledge
Collective (sacred and civic)	Faith, participation and negotiated authority	Rituals, festivals, village meetings	Collective spaces are continuously negotiated	Gender-responsive governance should recognise women's differentiated participation
Emerging public spaces	Education, aspiration and mobility	Schooling, markets, health centres, government offices	Expansion of spatial identities and opportunities	Development should strengthen women's access to education, mobility and public institutions
Across all spatial worlds	Belonging shaped by intersecting identities	Everyday negotiation across domestic, productive and public life	Place is socially produced through lived experience	Gender-responsive planning should move beyond uniform representations of rural women

Source: Fieldwork data analysis

Diversity of experience matters just as much as this shared pattern of layering. Even where responsibility, care and attachment recur across accounts, caste, religion, education, age and household structure mediate how they are lived out. For example, the same temple or ritual occasion can carry different meanings

depending on who is describing it, which is the clearest evidence that gendered place-making here is intersectional through and through. "Rural women" is not a category fine enough to capture what the fieldwork shows, and recent change appears to widen rather than replace women's spatial world: education, better roads, communication technology and greater contact with public institutions add new places to daily life without displacing their continuing engagement with domestic, agricultural and religious space. Development here looks like an enlargement of women's geographical world rather than a rupture with what came before.

After relating these results against the theoretical framework set out earlier, the case for a Gendered Place-Making Framework becomes concrete rather than abstract. Development in Jaunsar-Bawar is not simply something that happens to a fixed physical setting; it is worked out through the changing relationship between environment, institution and women's own practice. Hence, recognising this matters for rural planning that too often treats infrastructure, productivity and service delivery as sufficient in themselves, while overlooking the experiential ground on which communities actually inhabit and value their environment.

Conclusion and Implications

This paper set out to examine how women in Jaunsar-Bawar perceive and inhabit the spaces that make up their everyday lives. Moving past a narrower focus on gender roles and spatial access, it has argued that women's engagement with domestic, productive, sacred and public space actively turns physical surroundings into socially meaningful places, a lived social fact built through care, labour, ritual, mobility and community relationship, not simply a location on a map.

The findings show continuity and change running together rather than one displacing the other. Domestic space continues to anchor family identity and belonging; agricultural land and forest continue to sustain livelihood, ecological knowledge and collective memory. At the same time, education, improved connectivity and fuller engagement with public institutions have widened women's spatial world, adding opportunity without erasing customary practice. This is not a transition from tradition to modernity in any simple sense; it is a process through which women hold several overlapping places together across different stages of life.

A central contribution of the study is to show that women's experience of place is neither uniform nor determined by gender in isolation. The comparative material makes clear that caste, religion, education, generation and household context shape how identical physical environments are read. Gendered experience of place is intersectional and relational, tracing several distinct paths of belonging, participation and aspiration within a single cultural landscape. That should caution against treating rural women as one social category, in scholarship as much as in

policy, and argue instead for recognising differentiated lived experience as a starting point.

Building on this, the paper proposes the Gendered Place-Making Framework as a context-sensitive way of reading gender and development in mountain societies. Hence, rather than treating development chiefly as infrastructure, economic growth or institutional reform, the framework treats development as something experienced through a changing relationship with place. Women's everyday practice generates meanings of responsibility, belonging, identity and aspiration that shape how development initiatives are actually understood, negotiated and sustained locally. The framework is offered as an empirically grounded starting point rather than a universal theory; its reach into other culturally distinct mountain regions is a question for further comparative work, not something this single study can settle on its own.

The findings carry a fairly direct policy implication. Mountain development programmes tend to prioritise physical infrastructure, agricultural output and service delivery while paying less attention to the lived geography through which communities actually experience change. Gender-responsive planning needs to move past treating women simply as beneficiaries and recognise them instead as active makers of place, accounting for unpaid care work, ecological knowledge built through daily practice, participation in community institutions and differentiated experience of mobility, education and public engagement.

Methodologically, the paper shows what is gained by pairing women's narratives with reflexive thematic analysis and a dialogic reading that sets accounts against one another rather than flattening them into a single composite voice, keeping participants' own framing intact while still building conceptual argument from the material. Future research should test the proposed framework comparatively, across other Himalayan regions and culturally distinct rural societies, to see how women construct and negotiate place under different ecological, cultural and institutional conditions; combining narrative material with participatory spatial methods and geospatial analysis could sharpen this picture further.

The women of Jaunsar-Bawar make plain, in any case, that development is not experienced only through roads, schools, markets and government schemes. It is experienced in kitchens where families are sustained, on terraces where livelihood and memory are cultivated together, in forests where cooperation is renewed, in sacred spaces where tradition is negotiated rather than simply followed, and in public spaces where new aspiration is beginning to take shape. Recognising these everyday geographies is necessary for understanding rural transformation in the round and for designing development that is economically sound as well as socially inclusive and culturally grounded.

References

Agarwal, B. (1994). A Field of One's Own: Gender and Land Rights in South Asia. Cambridge University Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101.

Brickell, K. (2020). Home SOS: Gender, Violence and Survival in Crisis Ordinary Cambodia. Wiley-Blackwell.

Chakraborty, R., & Thambiah, S. (2023). Gender, mobility and everyday space in South Asia: New directions. Gender, Place & Culture, 30(4), 512–530.

Cornwall, A. (2016). Women's empowerment: What works? Journal of International Development, 28(3), 342–359.

Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. University of Chicago Legal Forum, 1989(1), 139–167.

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics and violence against women of color. Stanford Law Review, 43(6), 1241–1299.

Cresswell, T. (2015). Place: An Introduction (2nd ed.). Wiley-Blackwell.

Hanson, S. (2022). Gender and mobility: Rethinking spatial constraints in development research. Gender, Place & Culture, 29(2), 145–162.

Hopkins, P. (2019). Social geography I: Intersectionality. Progress in Human Geography, 43(5), 937–947.

Joshi, D., Platteeuw, J., & Singh, N. (2022). Gender, migration and mountain livelihoods in the Himalaya. Mountain Research and Development, 42(1), R1–R10.

Lefebvre, H. (1991). The Production of Space (D. Nicholson-Smith, Trans.). Blackwell. (Original work published 1974)

Massey, D. (1994). Space, Place and Gender. Polity Press.

McDowell, L. (1999). Gender, Identity and Place: Understanding Feminist Geographies. University of Minnesota Press.

Nightingale, A. J. (2011). Bounding difference: Intersectionality and the material production of gender, caste, class and environment in Nepal. Geoforum, 42(2), 153–162.

Pain, R., & Staeheli, L. (2014). Introduction: Intimacy-geopolitics and violence. Area, 46(4), 344–347.

Rao, N. (2020). Gender, mobility and rural transformation in South Asia. Journal of Peasant Studies, 47(3), 613–634.

Relph, E. (1976). Place and Placelessness. Pion.

Rose, G. (1993). Feminism and Geography: The Limits of Geographical Knowledge. Polity Press.

Sultana, F. (2021). Political ecology 1: From margins to center. Progress in Human Geography, 45(1), 156–165.

Tuan, Y. F. (1977). Space and Place: The Perspective of Experience. University of Minnesota Press.

Valentine, G. (2007). Theorizing and researching intersectionality: A challenge for feminist geography. The Professional Geographer, 59(1), 10–21.

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SCHEDULED CASTES REPRESENTATION IN THE PUNJAB LEGISLATIVE ASSEMBLY: A STUDY OF ELECTORAL TRENDS (1967–2022)

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Abstract: This study examines the representation of Scheduled Castes (SCs) in the Punjab Legislative Assembly across thirteen elections from 1967 to 2022, analysing party-wise patterns and the religious composition of SC legislators. Drawing on electoral data from the Chief Electoral Officer, Punjab, the study finds that SCs constituted 25.7 per cent of all legislators, broadly reflective of their 31.9 per cent share in the state's population. The Shiromani Akali Dal (37.27%) and the Indian National Congress (35.96%) together accounted for 73.22 per cent of SC legislators, while the Aam Aadmi Party emerged as a significant representative (9.97%) in recent elections. Sikh SCs outnumbered Hindu SCs by nearly five-to-one among legislators (80.8% vs. 13.9%). Notably, SC candidates rarely won from general (non-reserved) constituencies, with only seven such victories across five decades. The Bahujan Samaj Party, despite its pro-Dalit mandate, secured minimal representation except in 1992, when the Akali Dal boycotted the elections. Despite their numerical presence, SC legislators remained peripheral to ministerial and organisational leadership. The study concludes that while the reservation policy ensures a baseline legislative presence, political parties' reluctance to nominate SC candidates for general seats, driven by perceived winnability, financial capacity, and caste calculations, perpetuates their marginalisation. Systemic reforms in candidate selection and campaign finance are necessary to enhance substantive political representation for SCs.

Keywords: Scheduled Castes, Punjab, Political Representation, Electoral Trends, Dalit Politics

Terminology: This paper uses three key terms with distinct meanings. **Scheduled Castes (SC)** is the legal administrative category defined under Article

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341 of the Constitution of India, referring to communities historically subjected to untouchability. It is the official term used in census data, electoral rolls, and reservation policies. **Dalit** (meaning "broken" or "oppressed") is a self-chosen political identity adopted by these communities, emphasising agency, dignity, and resistance. It is preferred in contemporary scholarship and activist discourse. **Untouchable** is a historical and pejorative term; this paper uses it only when directly quoting historical texts or colonial records, and never as an analytical descriptor. Whenever possible, the paper uses "SC" for statistical data and "Dalit" for discussions of political consciousness and mobilisation, recognising that the shift in nomenclature reflects a broader trajectory of assertion by marginalised communities.

The interaction between caste and politics in India is a complex and dynamic phenomenon that reflects a reciprocal relationship, each shapes and influences the other. On the one hand, caste provides a critical social framework upon which political identities, alliances, and mobilizations are constructed. On the other hand, politics redefines and reshapes caste structures, either reinforcing traditional hierarchies or challenging them through democratic processes and social movements. By drawing the caste system into its web of organization, politics finds material for its articulation and moulds it into its own design. Conversely, by making politics their sphere of activity, caste and kin groups gain the opportunity to assert their identity and strive for for power and position (Kothari 1970:5). Caste-based inequalities have long shaped the socio-political fabric of India, influencing access to resources, opportunities, and representation. Among the historically marginalized groups, the Scheduled Castes (SCs) have faced centuries of social exclusion and economic deprivation. The exclusion of SCs in India is deeply rooted in the socio-religious construct of caste, a hierarchical system that has historically dictated social status, occupational roles, and access to resources. At the bottom of this rigid hierarchy, the Scheduled Castes, formerly referred to as "Untouchables", have faced systemic discrimination, social ostracism, and economic exploitation for centuries. These practices have been perpetuated through religious doctrines, social customs, and economic structures, creating a persistent cycle of marginalisation that continues to affect millions of SCs across the country.

Caste exerts a profound influence on electoral politics in India. Behind political parties' choice of candidates, for example, lies a careful calculation of caste appeal. Caste has been one of the most distinctive features of Indian society since time immemorial. Hindu society was originally divided into four *varnas*: the Brahmins (priests and teachers), the Kshatriyas (rulers and warriors), the Vaishyas (traders), and the Shudras (servants). The theoretical basis of the four-*varna* system, as described in the *Dharmasutras*, was systematized in the *Manusmriti*, which was compiled between 200 BCE and 200 CE. The *Manusmriti* states that the Shudra *varna* was created to serve the Brahmins and that any

wealth accumulated by Shudras rightfully belonged to the latter (Yamazaki 1997: 8). Shudras occupied the lowest position in the Hindu hierarchy. Over time, these *varnas* came to be known as castes. Certain sections of Shudras were classified and treated as 'Untouchables' (the so-called Outcastes) for centuries and have been victims of profound social injustice.

The concept of political representation extends beyond mere numerical presence. Following Hanna Pitkin's foundational work, representation can be understood along two key dimensions: 'descriptive representation', the extent to which elected bodies mirror the demographic composition of the population, and 'substantive representation', the degree to which representatives act in the interests of their constituents, particularly marginalised groups (Pitkin 1967). In the Indian context, Rajni Kothari (1970) argued that caste operates as a "political category," where parties mobilise caste groups for electoral gain, yet rarely translate this into meaningful policy influence for those groups. This study adopts both lenses: it measures descriptive representation (SC presence in the Assembly) while critically reflecting on the limits of substantive representation, given the peripheralisation of SC legislators from ministerial and organisational leadership.

The Constituent Assembly, while drafting the Constitution, adopted the term 'Scheduled Castes' (SC) to designate various sections of Shudras and other historically disadvantaged communities. These groups were hence forth recognised as Scheduled Castes in the Constitution. The term SC refers to castes or communities included in the Fifth Schedule of the Constitution of India. Article 341 of the Constitution states "The Scheduled Castes means such castes, races or tribes, as are deemed under Article 341 to be Scheduled Castes for the purpose of this Constitution". In independent India, national leaders sought to create a modern, welfare-oriented, and egalitarian state. The principle of 'preferential treatment' or 'positive discrimination' was adopted in favour of the Scheduled Castes. Thus, alongside the Constitution's commitment to equality for all citizens, the notion of positive discrimination in favour of certain classes and sections was also accepted and was duly incorporated in the Fundamental Rights. Since the adoption of the Constitution in 1950, successive governments have made sustained efforts to uplift the Scheduled Castes. Over the years, they have been granted reservations in several areas, including education, public employment, and legislative bodies. For instance, out of a total of 543 elected Lok Sabha seats, 84 have been reserved for the Scheduled Castes.

At the all-India level, Scheduled Castes constitute 16.6 per cent of India's total population (Census of India 2011). However, Punjab is a state where the percentage of the Scheduled Castes is the highest in the country. According to 2011 census, the Scheduled Castes constitute 31.9 per cent of the total population of Punjab, whereas they were 29.9 per cent in 2001, 28.31 per cent of the total population at the 1991 census and 26.27 per cent in the 1981 census. Punjab has

no Scheduled Tribes. Certain sections of the populationhave, however, been recognized as Backward Classes. The Scheduled Caste population is spread across the state in varying degrees. The district of Shaheed Bhagat Singh Nagar has the highest number with 42.5 per cent Scheduled Castes population. Proportionately, 'SCs of Punjab are less urbanised than the state average of urban population' (Gosal 2004:21-22). Around 73.32 per cent of the Scheduled Castes live in the rural areas, while 26.67 per cent resides in cities and towns, generally in semi-urban and suburban rural areas.

Since independence, successive Punjab governments have made consistent efforts to uplift the Scheduled Castes. Following the footsteps of the Union Government, the Scheduled Castes were provided reservation in State Legislature, education and services, etc. Of Punjab's 13 Lok Sabha seats from Punjab, 4are reserved for SCs; of the 117 Vidhan Sabha seats, 34 are reserved. In recent years, the state government has introduced several schemes targeting Scheduled Castes, with a particular focus on women. These include the *'Shagun/Ashirwad*' schemes, free text-books to girl school students and scholarships, houses, loans, free electricity upto 300 units, and so on. Smaller SC groups remain relatively less mobilised and more disadvantaged. To address this, the Punjab government identified 13 communities as 'depressed scheduled castes'. Together they account for only 11 per cent of the total scheduled caste population. Among these 13 castes, seven are the 'de-notified tribes' or the '*vimukat jatis*'. Because they followed a nomadic way of life, the colonial administration had branded them as 'vagrant and criminal tribes'. After independence, they were initially called 'ex-criminal tribes' but later they were designated as the 'de-notified tribes' (Jodhka 2007). Despite these efforts, the overall socio-economic condition of the SCs in Punjab has not changed substantially.

Punjab presents a distinctive case within India's caste landscape. While the state has the highest proportion of SCs (31.9%), its political economy is dominated by the Jat Sikh peasantry, who have historically controlled land, agrarian institutions, and major political parties, particularly the Punjab Congress and the Shiromani Akali Dal (SAD). This Jat dominance has relegated SCs, primarily as landless agricultural labourers, to a subordinate socio-economic position (Brass 1991). Simultaneously, the rise of '*deras*' has provided alternative platforms for SC assertion, often challenging traditional party loyalties. Beyond registered political parties, several non-party actors have gained considerable influence in Punjab's SC politics. *Deras* are perhaps the most consequential: they not only provide spiritual guidance but also issue political directives, especially during elections. The *Dera Sacha Sauda*, for instance, has openly endorsed parties and candidates, effectively shifting thousands of votes. Similarly, farmer unions, particularly during the 2020-2021 farmers' protests, created new solidarities that temporarily bridged caste divides, though SCs often remained at

the margins of these movements. Social movements like the '*Ad-Dharm*' movement, which began in the 1920s, continue to resonate, as many SCs declare themselves '*Ad-Dharmis*' to reject Hindu and Sikh hierarchies. More recently, Dalit youth activism on social media and university campuses has begun to challenge traditional leadership patterns, demanding not just tickets but also policy agendas on land rights, education, and dignity. These actors complicate the electoral calculus, as parties must now negotiate with *deras*, community organisations, and civil society groups alongside traditional caste and kinship networks. Since the 1990s, three major shifts have reshaped Punjab's electoral landscape: (a) the decline of the Congress-SAD bipolarity, (b) the emergence of the Aam Aadmi Party (AAP) as a significant third force, and (c) growing fragmentation of SC votes, with the Bahujan Samaj Party (BSP) and *deras* mobilising distinct sub-caste groups.

The Scheduled Caste population of Punjab is mainly divided into Sikh and Hindu sections. Scheduled Caste in the Malwa and Majha regions are mostly Sikhs, while those in Doaba are predominantly Hindus. Over the years, however, their religious identity has remained fluid. They occupied a subordinate economic status and stand in a subordinate relationship with the Jat Sikh peasantry, for whom they largely work as agricultural labor (Brass 1991:224). The Scheduled Caste population constitutes the major proportion of the workforce in both rural and urban areas of Punjab. In rural areas, their main occupations are agriculture labour, shoe-making, weaving, and handicrafts. In urban areas, a large number of SCs are engaged in scavenging, sanitation, canning, and related occupations. Religion-wise, the Scheduled Castes are both Hindus and Sikhs. Some of them have also turned to Christianity. Another notable trend is the growing number who declare themselves as *Ad-dharmis*, thereby rejecting the above-mentioned religions. In addition, many are increasingly drawn to sects such as the *Nirankaris, Radhasoamis*, and *Premis* (Dera Sacha Sauda followers).In Punjab, thirty nine castes[i] are included in the Fifth Schedule. Among these, the *Majhbis*[ii] and *Chamars*[iii] exercise far greater influence in the state politics than any other SC group because of their numerical strength, *Chamars* (29.31%) and Majhbis (28.75%) as per the 1971 Census. However, the *Chamars* have secured greater political representation, largely due to their relatively higher political awareness. As a result, they often remain alienated from other SC sections.

Methodology

All electoral data presented in this study are drawn from the official Reports of the Chief Electoral Officer, Punjab, for the respective election years. The data have been compiled, cross-verified, and presented in tabulated form by the author. Personal interviews were conducted with some SC legislators and persons with expertise in the political sociology of Punjab. This study relies primarily on aggregate legislative data and does not examine intra-party decision-making

processes or voter behaviour in depth. Interpretations regarding party character should therefore be viewed as reflective of legislative outcomes rather than comprehensive organisational analyses.

Analysis and Observations

The first general election to the Punjab Legislative Assembly after reorganization was held in February 1967. At that time, the Assembly had 104 seats. The number of seats was increased from 104 to 117 on the basis of the 1971 Census, effective from the fourth general election in 1977. From 1967 to 2022, a total of 1,482 members have served Vidhan Sabha. Out of which 612 (41.29%) have belonged to the Congress Party, 503 (33.94%) to the Akali Dal, 112 (7.55%) to the BJP/Jan Sangh/JP, 112 (7.55%) to the Aam Adami Party (AAP), 64 (4.31%) to Communists, 11 (0.74%) to BSP and 68 (4.58%) have been the independents. The data show that the Congress Party and the Akali Dal have been in the dominant position amongst the Punjab legislators in aggregate terms. The Communist parties and the Bharatiya Janata Party (Jan Sangh/JP) have a marginal share and AAP is the emerging player among the State legislators in Punjab. The independents have also a marginal share among the Punjab Assembly legislators. Before proceeding further, it is imperative to have a look at the party-wise representation of SCs in the State Legislative Assembly in Punjab.

SC legislators constituted the second largest group (after *Jat* legislators) amongst the State legislators in Punjab. Their average share from 1967 to 2022 amongst the State legislators has been 25.7 per cent (See Table 1). With a very few exceptions, the SC candidates are elected only from the reserved constituencies. In 104-member Assembly, the total number of reserved constituencies up to 1972 was 23 and no SC was elected from any general constituency during 1967, 1969 and 1972 Assembly elections. The number of reserved constituencies was raised to 29 after 1977 in the 117 member Assembly. The first SC candidate to win from a general constituency was Madho Singh, from Anandpur Sahib on Janata Party ticket. Amongst the three SC candidates who were elected in 1992 from general constituencies, one was Surjan Singh Joga from Joga (Mansa) constituency who won on IPF's ticket and later on joined the Congress Party and the others were Hargopal Singh who won from Balachaur (Hoshiarpur) constituency and Shangara Ram Sahungra from Garh Shankar (Hoshiarpur) constituency on BSP's ticket. The Joga constituency has otherwise always been represented by Jat Sikhs and the (Balachaur) constituency by *Gujjar* candidates. The Garh Shankar seat was again won by Shangara Ram Sahungra on BSP ticket in 1997. In 1997 he was the only SC MLA who won from general constituency. In the 2002, 2007, 2012 and 2017 elections, no SC candidate has succeeded to win from the general constituency.

Table-1
The representation of SCs within Party Legislative Wings in Punjab (1967 to 2022)

(in nos. and per cent)

Political Party	1967	1969	1972	1977	1980	1985	1992	1997	2002	2007	2012	2017	2022	Total
SAD														
Total MLAs	26	43	24	58	37	73	3	75	41	49	56	15	3	503
SCs MLAs	6 (23.08)	11 (25.58)	7 (29.17)	15 (25.86)	9 (24.32)	18 (24.66)	1 (33.33)	22(28.94)	12(29.26)	16(32.65)	21 (37.5)	03 (20)	1 (33.3)	142 (28.2)
Sikh SCs	5 (19.23)	11 (25.58)	7 (29.17)	15 (25.86)	9 (24.32)	18(24.66)	1 (33.33)	22(28.94)	12(29.26)	15(30.61)	17 (30.3)	02 (13)	-	134 (26.6)
Hindu SCs	1 (3.85)	------	-----	------	------	------	------	-------	------	1 (2.04)	04 (2.04)	01 (6.6)	1 (33.3)	8 (1.59)
Congress														
Total MLAs	48	38	66	17	63	32	87	14	62	44	46	77	18	612
SCs MLAs	12 (25.0)	9 (23.68)	13 (19.70)	3 (17.65)	13 (20.63)	10 (31.25)	19(21.84)	1 (7.14)	14(22.58)	7 (15.90)	10 (21.7)	21 (27.3)	5 (27.8)	137 (22.3)
Sikh SCs	8 (16.67)	6 (15.79)	10 (15.15)	3 (17.65)	10 (15.87)	7 (21.87)	15(17.84)	------	7 (11.29)	7 (15.90)	08 (17.3)	14 (18.18)	03 (16.7)	98 (16)
Hindu SCs	4 (8.33)	3 (7.89)	3 (4.55)	------	3 (4.76)	3 (9.38)	4 (4.60)	1 (7.14)	7 (11.29)	-------	02 (4.3)	07 (9.1)	02 (11.1)	39 (6.4)
BJP(Jan Sangh)														
Total MLAs	09	08	-------	25	01	06	06	18	03	19	12	03	02	112
SCs MLAs	------	1 (12.50)	-------	4 (16.00)	------	1 (16.67)	-------	4 (22.22)	------	4 (21.05)	3 (25)	01 (33.3)	-	18 (16)
Sikh SCs	------	-----	-------	3 (12.00)	------	-------	------	------	------	-------	-	-	-	3 (2.7)
Hindu SCs	------	1 (12.50)	-------	1 (4.00)	------	1 (16.67	------	4 (22.22)	------	4 (21.05)	3 (25)	01 (33.3)	-	15 (13.4)
Communist														
Total MLAs	08	06	11	15	14	01	05	02	02	-------	-	-	-	64
SCs MLAs	2 (25.00)	2 (33.33)	3 (27.27)	8 (53.33)	7 (50.00)	------	1 (20.00)	1(50.00)	2(100)	-------	-	-	-	26(40.62)
Sikh SCs	2 (25.00)	1 (16.67)	2 (18.18)	7 (46.66)	7 (50.00)	-------	1 (20.00)	1 (50.00)	1 (50.00)	-------	-	-	-	22(34.37)
Hindu SCs	------	1 (16.66)	1 (9.09)	1 (6.67)	------	-------	------	-------	1 (50.00)	-------	-	-	-	4 (6.25)
BSP Total MLAs	-	-	-	-	-	-	09	01	------	-------	-	-	1	11
SCs MLAs	-	-	-	-	-	-	7 (77.28)	1 (100)	-------	-------	-	-	1 (100)	9 (81.8)
Sikh SCs	-	-	-	-	-	-	6 (66.67)	------	-------	-------	-	-	1 (100)	7 (63.6)
Hindu SCs	-	-	-	-	-	-	1 (11.11)	1 (100)	------	-------	-	-	-	2 (18.2)
AAP Total MLAs	-	-	-	-	-	-	-	-	-	-	-	20	92	112
SCs MLAs	-	-	-	-	-	-	-	-	-	-	-	9 (45)	29 (31.5)	38 (34)
Sikh SCs	-	-	-	-	-	-	-	-	-	-	-	9 (45)	26 (28.2)	35 (31.2)
Hindu SCs	-	-	-	-	-	-	-	-	-	-	-	-	3 (3.2)	3 (2.7)
Independents														
Total MLAs	13	09	03	02	02	05	07	06+1*	09	05	3	02	01	68
SCs MLAs	03 (23.07)	---------	-------	---------	-------	--------	04 (57.14)	1 (16.66)	01(11.11)	02 (40.0)	-	-	-	11 (16.2)
Sikh SCs	01 (7.69)	---------	-------	---------	-------	--------	03 (42.85)	1 (16.66)	01(11.11)	02 (40.0)	-	-	-	8 (11.7)
Hindu SCs	02 (15.38)	---------	-------	---------	-------	--------	01 (14.28)	--------	------	---------	-	-	-	3 (4.4)
Total MLAs	104	104	104	117	117	117	117	117	117	117	117	117	117	1482
SCs MLAs	23(22.12)	23 (22.12)	23 (22.12)	30 (25.64)	29 (24.79)	29 (24.79)	32 (27.35)	30 (25.64)	29 (24.79)	29 (24.79)	34 (29 %)	34 (29)	36 (30.7)	381 (25.7)
Sikh SCs	16 (15.39)	18 (17.31)	19 (18.26)	28 (23.93)	26 (22.22)	26 (22.22)	26 (22.22)	24 (20.51)	21 (17.94)	24 (20.51)	25 (21.3)	25 (21.3)	30 (25.6)	308 (20.8)
Hindu SCs	07 (06.73)	05 (04.81)	04 (03.84)	02 (01.70)	03 (02.56)	03 (02.57)	06 (05.13)	06 (05.12)	08 (06.83)	05 (04.21)	09 (7.7)	9 (7.7)	6 (5.12)	53 (3.6)

Source: Reports of Chief Electoral Officer, Punjab and personal interviews with State Legislators.
*one seat won by SAD (M)

But in 2022 elections, two SC candidates succeeded from general constituencies: Dr. Nachhattar Pal on BSP's ticket from Nawanshahr (SBS Nagar) seat and other is Kulwant Singh on AAP's ticket from Mohali (SAS Nagar) constituency. Since 1967, thirteen Assembly elections have been held in the state and only seven SC candidates have managed to win on general seats. This shows that dominant political parties generally do not allocate tickets to SC candidates from the general constituencies and it is the constitutional provision that compels the parties to allocate the tickets to SC candidate from the reserved constituencies.

The SCs have constituted 25.7 per cent of the total legislators. Religion-wise, Sikh SCs and Hindu SCs have constituted 20.8 per cent and 3.6 per cent respectively of the total State legislators. This shows that the share of the Sikh SCs has been roughly five times more than that of Hindu SCs.

Generally, the Akali Dal is regarded as the party of Jats, but the above data show that the number of Scheduled Caste legislators is the highest in the Akali Dal compared to other parties. Their share has never fallen below 20 per cent (in 2017) of Akali legislators. Their average share has been 28.20 per cent, which is 5.9 percentage points higher than that of Congress legislators (22.3%). The SC Akali state legislators have been mainly the Sikhs. Out of a total of 142 SCs Akali legislators, only eight have been Hindu.

The BJP is the only major party in Punjab that is dominated by Hindu upper castes. The share of SC Legislatures has been only 16 per cent among total Legislature of the BJP. Out of a total of 18 SC BJP State legislators only three have been a Sikh. Thus, it is clear that BJP is dominated by Hindus. Scheduled Castes have been numerically dominant among Communist legislators. Their average share has been 40.62 per cent, which is higher than any other political party's State legislatures expect the BSP. The religion-wise compositions of the Communist State legislators have been as follows: Sikhs SCs 34.37 per cent and Hindus 6.25 per cent. This shows that the Communist State legislative leadership in Punjab has been predominantly Sikh.

The Bahujan Samaj Party (BSP) entered the Punjab Vidhan Sabha for the first time in 1992 State election. From 1992 out of a total of 11 BSP legislators, 81.8 per cent were the SCs. No higher caste including *Jats*, *Brahmins*, *Khatri*s and *Banias* have any representation in the BSP legislative leadership. Thus, from the point of view of caste-wise legislative representation, the BSP proves to be the party of the lower castes only. From the perspective of caste-wise representation, the BSP is essentially a party of lower castes. Religion-wise, the Sikhs and Hindus have comprised 63.6 per cent and 18.2 per cent respectively of the BSP legislators. It implies that the Sikh representation is three times more than that of the Hindus amongst the BSP legislators.

Independent candidates have also managed to win every time in the reorganized Punjab assembly elections. Out of a total of 68 legislators who has

won independently, only 16.2 per cent are SCs. It proves that SCs have largely found their place in the state assembly on the tickets of registered political parties. Only 11 SC candidates have managed to win on their own in the total thirteen assembly elections from 1967 onwards. Here too, Sikh dominate: out of total independent legislators, Sikh SCs have constituted 11.7 per cent and Hindu SCs only 4.94 per cent.

Table-2
Party-wise Representation of SCs in State Legislative Assembly in Punjab (1967-2022)

(in nos. and per cent)

	SAD	Congress	CPI/CPI (M)	BJP	BSP	AAP	Independents/ Others	Total
Total SC	142 (37.27)	137 (35.95)	26 (6.8)	18 (4.72)	9 (2.36)	38 (9.97)	11 (2.8)	381
Sikh SC	134 (94.3)	98 (71.5)	22(84.6)	3 (16.6)	7 (77.7)	35 (92.1)	8 (72.7)	308 (80.8)
Hindu SC	8 (5.6)	39 (28.4)	4 (15.3)	15 (83.3)	2 (22.2)	3 (7.9)	3 (27.2)	53 (13.9)

Source: Reports of Chief Electoral Officer, Punjab and personal interviews with State Legislators.

There have been a total of 381 SC legislators in the Assembly from 1967 to 2007. The party-wise average representation of the SCs in the Assembly has been as follows: Akali Dal 37.27 per cent, Congress Party 35.95 per cent, CPI/CPI (M) 6.8 per cent, BJP 5.05 per cent, BSP 2.36 per cent, AAP 9.97 per cent and independents and others 2.88 per cent. These figures show that the Akali Dal leads other parties in representing the SCs, while the Congress Party has also substantially represented them. The Akali Dal's representation would have been even higher had it not boycotted the 1992 Assembly election. The Communist parties also have considerable support amongst the SC population whereas the BJP seems to have little support base in the SCs population in Punjab. Religion-wise, Sikh SCs have constituted 80.8 per cent and Hindu SCs 13.9 per cent of the total SC legislators.

It is, thus, evident that the SCs, both Sikhs and Hindus, have constituted the second largest group amongst the State legislators in Punjab from 1967 to 2022. However, their representation has been confined to the reserved seats. Religion-wise, the representation of Sikh SCs has been nearly five times more than that of the Hindu SCs. Political parties generally do not allocate tickets to SC candidates from the general constituencies and it is the constitutional provision that compels the parties to allocate the tickets to SC candidate from the reserved constituencies. The reluctance of political parties to allocate election tickets to SC candidates for general (non-reserved) seats is a complex phenomenon influenced by structural and socio-political factors. A significant determinant of candidate selection is perceived "winnability," which is often shaped by a candidate's financial capacity to fund election campaigns. Election expenditure, encompassing activities such as voter outreach, publicity, and logistical operations, plays a critical role in modern electoral politics. Candidates with

substantial financial resources are viewed by parties as better positioned to mount effective campaigns and secure voter support, making them more likely to be prioritized for ticket allocation. However, SC candidates, as a historically marginalised group, generally face significant economic disadvantages compared to candidates from dominant social groups. Structural inequalities and systemic barriers have limited their access to wealth, land, and other resources, reducing their capacity to meet the high financial demands of competitive electoral politics. Consequently, political parties may perceive SC candidates as less viable options for general seats, where electoral dynamics are more competitive and not safeguarded by reservation policies.

In addition to economic considerations, political parties may also factor in social acceptability and the entrenched caste dynamics of constituencies when allocating tickets. In general seats, where the electorate is not predominantly SC, parties may assume that nominating SC candidates could alienate voters from dominant or intermediate caste groups, thereby reducing the candidate's chances of winning. This calculation reinforces the exclusion of SC candidates from general seats, perpetuating their underrepresentation in electoral politics. This pattern of exclusion has broader implications for political equity and inclusion. By prioritising financial capacity and caste-based electoral calculations over representational equity, political parties contribute to the marginalisation of SC leaders in mainstream politics. This practice undermines the goals of social justice and empowerment that underpin India's democratic framework. It also highlights the need for systemic reforms, such as caps on election expenditure, stricter enforcement of financial transparency, and measures to promote diversity in ticket allocation—to create a more level playing field for candidates from marginalised communities.

Conclusion

The analysis shows that the majority of SC leaders in Punjab's Legislative Assembly have been elected through the Shiromani Akali Dal and the Congress, the two dominant political parties traditionally led by upper-caste groups. Together, these two parties account for 73.22 per cent of SC legislators. However, SC leaders have had limited representation in ministerial portfolios and party organisational hierarchies. Although the BSP positions itself as a party for Scheduled Castes, it has largely failed to consolidate and effectively organise SC communities in Punjab. Unlike Uttar Pradesh, where the BSP has achieved significant success in mobilising Scheduled Castes, the party's influence in Punjab remains limited despite the large proportion of SCs in the state's population. The BSP's notable performance in 1992, when it secured nine seats, was an anomaly, largely because of the Akali Dal's boycott of that election. Furthermore, SC representation within Communist parties has been numerically significant but politically peripheral.

In conclusion, the reservation policy has undoubtedly provided Scheduled Castes with a guaranteed presence in the Punjab Legislative Assembly. However, their election from general (non-reserved) constituencies remains rare. Despite constituting a substantial segment of Punjab's population, SC participation in the state's political landscape continues to lag behind their numerical strength and potential. Addressing this disparity is essential to improving the socio-political status of Scheduled Castes and ensuring their meaningful representation across all spheres of public life.

Punjab's pattern of SC representation, dominated by two upper-caste-led parties (Congress and SAD) with limited success for independent Dalit parties, contrasts sharply with states like Uttar Pradesh, where the Bahujan Samaj Party (BSP) has formed multiple governments and substantially enhanced Dalit political power. In UP, the BSP's success stemmed from building a broad "Bahujan" coalition of SCs, Other Backward Classes (OBCs), and Muslims. In Punjab, by contrast, the BSP has remained largely a Dalit-only party, failing to attract support from other social groups (Jaffrelot 2003). Similarly, in Bihar, the Rashtriya Janata Dal (RJD) has effectively integrated Dalits into its broader Yadav–Muslim–Dalit alliance, resulting in significant (though often junior) ministerial representation for SCs. Nationally, SCs hold about 16 per cent of Lok Sabha seats through reservations, but their representation in general seats across states remains below 3 per cent (Lokniti 2019). Punjab thus mirrors the national trend: reservation ensures a baseline presence, but political parties remain reluctant to nominate SC candidates in general seats due to concerns about winnability and caste dynamics. What makes Punjab distinct is its unusually high SC population (31.9 per cent) combined with the near-absence of a robust, independent Dalit party, largely because the SAD's incorporation of Sikh SCs under a Sikh-nationalist framework and the Congress's welfare schemes have successfully fragmented the Dalit vote.

Endnotes

[i] List of SCs in Punjab: 1. Ad Dharmi, 2. Balmiki (Chura/Bhangi), 3. Bangali, 4. Barar (Burar/Berar), 5. Batwal (Barwala), 6. Bauria (Bawaria), 7. Bazigar, 8. Bhanjra, 9. Chamar (Ravidasia), 10. Chanal, 11. Dagi, 12.Darain, 13. Deha, 14. Dhanak, 15. Dhogri (Siggi), 16. Doom (Marasha), 17. Gagra, 18. Gandhila, 19. Kabirpanthi (Julaha), 20. Khatik, 21. Kori, 22. Marija, 23. Mazhbis, 24. Megh, 25. Nat 26. Od, 27. Pasi, 28. Perna, 29. Pherera, 30. Sanhai, 31. Sanhal, 32. Sansi 33. Sansoi, 34. Sapela, 35. Sarera, 36. Sikligar, 37. Sirkiband 38. Mochi and 39. Rai Sikh

[ii] The term, Majhbi, is applied to those 'untouchables' from the sweeper castes , the lower of the two untouchables castes in the Punjab , who have become Sikhs. They literally mean those who are faithful. Guru Gobind Singh is said to have singled out Majhbis for their loyalty, he had in mind especially the Majhbi Sikhs who had brought the severed head of the ninth Guru from Delhi to his headquarters at Anandpur.

[iii] who works in leather.

References

Brass, Paul R. (1991). *Ethnicity and Nationalism*, New Delhi: Sage Publication.

Gosal, R.P.S. (2004). "Distribution and Relative Concentration of Scheduled Castes in Punjab," in H.K. Puri (ed.), *Dalits in Regional Context*, Jaipur: Rawat Publications.

Jaffrelot, Christophe (2003). *India's Silent Revolution: The Rise of the Lower Castes in North India*. New Delhi: Permanent Black.

Jodhka, Surinder Singh (2007). "Caste and Untouchability in Rural Punjab", *Economic and Political Weekly*, March 20, 2007.

Kothari,Rajni (1970). *Caste in Indian Politics*, New Delhi: Orient Longman.

Lokniti (2019). *National Election Study 2019*. New Delhi: Centre for the Study of Developing Societies.

Pitkin, Hanna Fenichel (1967). *The Concept of Representation*. Berkeley: University of California Press.

Yamazaki, Gen'Ichi (1997). "Social Discrimination in Ancient India and its Transition of the Medieval Period", in H. Kotani (ed.) *Caste System, Untouchability and the Depressed*, New Delhi: Manohar Publishers.

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CHINA'S REGIONAL ECONOMIC COOPERATION (REC) IN CENTRAL ASIA: CHALLENGES AND PROSPECTS

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Abstract: This article analyses China's Regional Economic Cooperation (REC) in Central Asia, focusing on strategic importance, challenges, and prospects. Central Asia, situated between China and Europe and endowed with significant natural resources, is vital to China's energy security and economic goals. Since the early 1990s, China has strengthened ties with the five Central Asian republics through agreements in trade, transport, and energy.

The Belt and Road Initiative (BRI) is central to China's economic strategy, driving infrastructure and industrial development across the region. The Shanghai Cooperation Organisation (SCO) supports security and economic cooperation, though its economic impact remains limited. Using a dual-perspective SWOT analysis, this article outlines strengths (historic Silk Road links, diplomatic foundations, and major initiatives), weaknesses (cultural barriers, investment risks, and limited SCO economic efficacy), opportunities (resource wealth and shifting geopolitics), and threats (debt risk, market dominance by Chinese goods, demographic concerns, and competition from other global powers). The article concludes that sustainable cooperation will require transparency, balanced investment, and sensitivity to political and cultural dynamics.

Keywords: China, Central Asia, Regional Economic Cooperation, Belt and Road Initiative, Shanghai Cooperation Organisation, SWOT Analysis, Geopolitics

Introduction

Central Asia occupies a pivotal position in contemporary geopolitics, functioning as both a crossroads of civilisations and a strategic arena for global powers. In recent decades, China's deepening engagement in the region, driven by its

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ambitious Belt and Road Initiative (BRI) and active participation in multilateral institutions such as the Shanghai Cooperation Organisation (SCO), has transformed the dynamics of regional economic cooperation. This article explores the evolving nature of China's regional economic cooperation (REC) with Central Asia, critically analysing its strategic drivers, the challenges it faces, and the prospects for sustainable partnership. Drawing on theories of regionalism and international political economy (Borzel, 2011; Keohane & Nye, 1977; Sidaway, 2019), the study adopts a dual-perspective SWOT analysis to assess both Chinese and Central Asian interests, while situating the discussion within broader trends of institutional evolution and shifting geopolitical alignments. By offering a balanced and theory-informed assessment, the article aims to contribute to a nuanced understanding of the opportunities and risks inherent in China–Central Asia economic engagement.

Review of Literature

Over the past decade, the Belt and Road Initiative (BRI) has been the subject of extensive academic and policy-oriented research, focusing on its geopolitical implications, economic impact, and the challenges and opportunities it presents to participating countries. Existing literature explores how the BRI has reshaped connectivity across Eurasia (Garlick, 2020), its influence on regional power balances (Kavalski, 2010), and its role in fostering economic integration (Lukin, Novikov, Puzanova, & Yenikeyeff, 2025; Zhuang, 2020). Studies also highlight concerns regarding debt sustainability, governance, and local perceptions of Chinese investment (Civic Idea, 2022; OSCE Academy, 2020). However, much of the existing scholarship prioritises China's perspective or adopts a single-country focus, often overlooking the nuanced, interactive dynamics between China and the Central Asian republics and the evolving institutional context provided by frameworks like the SCO and EEU.

Research Gap

While there is significant analysis of the BRI's economic, political, and infrastructural dimensions, few works systematically examine China–Central Asia regional economic cooperation through a dual-perspective lens, especially in relation to the interplay of regionalism, international political economy, and institutional evolution. This article fills this gap by employing a dual SWOT analysis, considering both China's and Central Asia's roles, and explicitly situating the discussion within contemporary theoretical frameworks. In doing so, it provides a more balanced understanding of the drivers, constraints, and future prospects of regional cooperation in the context of the BRI and related institutions.

Objectives and Research Questions

Objectives

- To analyse the strategic significance and challenges of China's regional economic cooperation with Central Asia within BRI and SCO framework.
- To assess the interplay between economic, political, and institutional factors in shaping regional cooperation.
- To identify gaps, opportunities, and risks through a dual-perspective SWOT analysis.

Research Questions

- How does China's approach to regional economic cooperation differ from that of other major actors in Central Asia?
- What are the main strengths, weaknesses, opportunities, and threats in China–Central Asia economic engagement?
- In what ways do institutional and theoretical frameworks shape the prospects for sustainable regional cooperation?
- Does China create dependency or development in Central Asia?
- How is Russia's declining influence reshaping the regional order?
- Are Central Asian states successfully balancing competing powers?

Methodology

This study adopts a qualitative, theory-informed approach that combines documentary research with a dual-perspective SWOT analysis. Data were drawn from primary sources, including official Chinese policy documents, BRI progress reports, SCO declarations, and Central Asian national development strategies, as well as secondary sources such as academic literature and think-tank reports from the OSCE Academy, Center for Strategic and International Studies, Civic Idea, and other empirical studies published between 2019 and 2025.

To ensure analytical rigour and balance, the research employs a dual-perspective SWOT framework. This approach treats SWOT not merely as a descriptive checklist but as a structured analytical tool grounded in theories of regionalism (Börzel, 2011), complex interdependence (Keohane & Nye, 1977), and the geopolitics of connectivity (Sidaway, 2019).

Application of the Dual-Perspective SWOT

- China's Perspective: China is positioned as the critical actor (primary initiator and investor). Factors were identified through systematic analysis of Beijing's strategic objectives, including energy security, market expansion, geopolitical influence, and the development of its western regions, particularly Xinjiang.

- Central Asia's Perspective: The five Central Asian republics are positioned as the critical actors. Factors were derived from their national priorities, such as resource utilisation, infrastructure development, technology transfer, and the safeguarding of economic and political sovereignty.

Both perspectives were developed through triangulation of multiple sources to capture asymmetries in power, resources, and interests. The analysis extends beyond traditional SWOT by incorporating a TOWS matrix, which generates strategic options through cross-referencing internal factors (Strengths and Weaknesses) with external factors (Opportunities and Threats). These include:

- S-O (Maxi-Maxi): Leveraging strengths to exploit opportunities
- S-T (Maxi-Mini): Using strengths to minimise threats
- W-O (Mini-Maxi): Overcoming weaknesses by exploiting opportunities
- W-T (Mini-Mini): Minimising both weaknesses and threats

Where possible, quantitative indicators (e.g., debt-to-China ratios, investment volumes, and trade shares) were integrated to enhance objectivity and reduce subjectivity.

This methodological design addresses common criticisms of SWOT analysis by ensuring transparency, theoretical grounding, and evidence-based evaluation, thereby providing a more balanced and nuanced understanding of China-Central Asia regional economic cooperation.

Theoretical Framework

This article is anchored in the frameworks of regionalism and international political economy, drawing on theories of regional economic integration (Börzel, 2011), complex interdependence (Keohane & Nye, 1977), and the geopolitics of connectivity (Sidaway, 2019). By applying these perspectives, the article analyses how China's Belt and Road Initiative (BRI) and its participation in the Shanghai Cooperation Organisation (SCO) represent both economic and strategic regional integration. The dual SWOT analysis is conceptually informed by these approaches, highlighting the interplay of economic interests, power relations, and regional dynamics.

Developing countries worldwide have adopted a range of Regional Economic Cooperation (REC) models, a process that can be analysed through the lens of regionalism and international political economy theories. Central Asia, the continent's geographic centre, participates in several such agreements, including the Organisation of Turkic States, the Eurasian Economic Union (EEU), and the Belt and Road Initiative (BRI). However, as regional integration theories suggest, economic cooperation in Central Asia is complicated by each country's different

approaches and by the interplay of state interests, power asymmetries, and institutional dynamics. Natural resources and markets draw the attention of regional powers to Central Asia, reflecting the region's centrality in the geopolitics of connectivity. Meanwhile, Central Asian countries seek investment to develop their industries. Various economic strategies have gradually improved the region's development prospects and increased its global influence, in line with the concept of complex interdependence (Keohane & Nye, 1977).

China's influence in Central Asia has increased due to its proactive economic policies. China and Central Asian states have signed several intergovernmental agreements on economic cooperation. These focus particularly on trade, mutual investment protection, banking cooperation, transport development, the elimination of double taxation, combating tax evasion, and coordination in the petroleum sector. Through these agreements, China aims to increase its regional influence, especially using the Belt and Road Initiative. For China, BRI is strategically significant, while Central Asian countries benefit economically from participating in these projects.

Assessing Chinese development assistance is difficult because information is often unclear and not transparent. China does not publish official reports or define development assistance; instead, it uses terms such as South-South cooperation and strategic partnership. These reflect China's intent to promote growth, grounded in its own philosophy and culture, and demonstrate China's focus on achieving success. Analysing these practices through the international political economy perspective highlights how China's approach differs from traditional aid paradigms, emphasising strategic interests and regional power relations. The following SWOT analysis provides a qualitative assessment of China's strategy in Central Asia and its potential impacts, informed by these theoretical considerations.

SWOT Analysis of Regional Economic Cooperation between China and Central Asia

The SWOT analysis in this study is explicitly grounded in key theoretical frameworks, including regionalism (Börzel, 2011), international political economy, and the geopolitics of connectivity (Sidaway, 2019). These theories provide a robust lens for interpreting the dynamics of China-Central Asia cooperation.

Theories of regionalism help contextualise how economic integration is shaped by both formal institutions (such as the Shanghai Cooperation Organisation and BRI Belt and Road Initiative) and informal regional dynamics. International political economy frameworks illuminate power asymmetries, economic strategies, and cross-border flows of capital, goods, and influence, revealing how national interests and external pressures interact. The geopolitics

of connectivity perspective highlights how infrastructure projects and transport corridors serve as instruments of strategic influence and great-power competition.

In this article, each SWOT component is interpreted through these theoretical lenses:

- Strengths are not just assets or advantages, but institutional, geopolitical, and economic features that reinforce regional integration or strategic positioning;
- Weaknesses refer to structural and institutional limitations that impede integration, create dependency, or expose vulnerabilities;
- Opportunities that arise from shifts in regional power balances, new institutional arrangements, or evolving patterns of interdependence; and
- Threats as risks associated with great-power competition, dependency traps, institutional inertia, or the volatility of regional and global systems.

By embedding the SWOT within these theoretical foundations, this article moves beyond mere description to offer a critical, theory-driven interpretation of China-Central Asia regional economic cooperation.

I. China as the Critical Factor: SWOT Analysis of Regional Economic Cooperation with Central Asia

This section analyses the dynamics of regional economic cooperation from China's viewpoint, positioning China as the critical factor (primary actor) and the five Central Asian countries as the key regional partners and recipients of investment (Table 1).

Table-1
SWOT Analysis- China's Perspective on Regional Economic Cooperation with Central Asia

Category	Key Factors
Strengths	Early establishment of diplomatic relations and mutual trust at leadership level SCO as an effective platform for dialogue and security cooperation Historical Silk Road legacy providing cultural and economic foundation Strong alignment between China's domestic Western Development Strategy and regional initiatives
Weaknesses	Cultural and linguistic differences with Central Asian societies Limited technological and efficiency edge compared to advanced economies SCO's weak performance in advancing economic cooperation (focus remains largely on security)

Opportunities	Strong demand for industrial development and infrastructure in Central Asia Abundant natural resources and raw materials beneficial for Chinese industry Russia's economic difficulties (due to Western sanctions and Ukraine conflict) creating space for greater cooperation
Threats	Intense geopolitical competition from Russia, USA, EU, India, Turkey, and Iran Risk of regional conflicts spilling over into China's Xinjiang region Perception of Chinese "debt-trap" diplomacy and expansionist ambitions

Table-2
SWOT Strategic Options

	Opportunities	**Threats**
Strengths (S)	**S-O Strategies** Build economic cooperation based on existing diplomatic trust and SCO platform Expand summit-level initiatives for deeper Sino-Central Asian engagement Leverage Silk Road narrative and natural resources for win-win industrial cooperation	**S-T Strategies** Use diplomatic relations and SCO to counter negative perceptions and manage competition from other powers
Weaknesses (W)	**W-O Strategies** Address cultural and linguistic gaps through joint educational and people-to-people programmes Diversify investments beyond extractive sectors to reduce vulnerabilities	**W-T Strategies** Minimise risks through greater transparency, corporate social responsibility, and local labour integration Strengthen SCO's economic pillar to reduce over-reliance on security-focused cooperation

If we consider the primary actor as China and the focus as the regional economic cooperation between China and the Central Asian countries:

1. Strengths

i) Diplomatic Relations and Boundary Resolution: China was among the first countries to establish diplomatic ties with Kazakhstan, Tajikistan, and

Kyrgyzstan, and resolved boundary disputes with these countries at an early stage.

China established diplomatic ties with the five Central Asian nations in 1992, following the dissolution of the Soviet Union. Remaining border disputes were settled through bilateral agreements in the late 1990s and early 2000s, thereby enabling closer cooperation.

ii) Historical Foundation of the Silk Road: There is a historical foundation for trade on both sides of the ’Silk Road’ tale, which has become popular between China and Central Asia.

The inhabitants of Central Asia have a long history with the 'Silk Road'. Historic Silk Road cities remain visible in Central Asia, and one major achievement for the peoples of China and Central Asia was the transport of Chinese silk to the West through the region (Garlick, 2020). China believes that this historical legacy facilitates the development of new trade routes in the area. Related initiatives, such as summit-level gatherings, are also important for strengthening regional cooperation.

iii) Role of the SCO and BRI: The Shanghai Cooperation Organisation (SCO) has been crucial to regional security since its establishment.

The Shanghai Cooperation Organisation has played a crucial role in regional security since its founding (Lukin, Novikov, Puzanova, & Yenikeyeff, 2025). The SCO has become a security institution that advances China's regional interests. The Belt and Road Initiative require cooperation and consensus from all member states.

In 2015, at the 14th SCO Summit in Zhengzhou, regional economic development through cooperation was identified as a key priority. The SCO signed several agreements between 2001 and 2003 through the Shanghai Convention on the Suppression of Terrorism, Separatism, and Extremism, in cooperation with the five Central Asian nations (Wang & Kong, 2019).

The Chinese government established a North-West development strategy in 2000. The Third and Twelfth Five-Year Plans for Western Development were adopted by the State Council in February 2012, marking the continuation of development efforts in the western region.

The Northwest Region's development strategy, particularly its ability to support the rapid expansion of the Xinjiang Autonomous Region, has accelerated China-Central Asian collaboration. Furthermore, the Xinjiang Autonomous Region's transport development is linked to the development of transport corridors under the BRI (Joniak-Lüthi, 2020).

2. Weaknesses

i) Economic and Investment Risks: Although China's economic development has been steady over the past 20 years, it still lags behind developed countries in certain respects.

While China's science and technology sectors are competitive with Western countries, China's domestic economy will face new pressures as regional economic cooperation expands. China encounters two main types of investment risk in Central Asia: internal and external. Externally, China faces competition from other regional powers, the potential for political unrest, challenges posed by the Taliban regime in Afghanistan, religious extremism, and limitations on anti-corruption measures. Internally, Chinese companies' investments are concentrated mostly in the mining and oil sectors, thereby increasing sectoral risk exposure. Disputes between entrepreneurs are hard to resolve due to the lack of a shared regional legal system.

Also, because Chinese companies are relatively new to the region, they need greater international exposure and familiarity with local agencies and communities. These factors could undermine the long-term success of Chinese investments in Central Asia.

ii) Cultural and Linguistic Barriers: Language and culture are two areas where China and Central Asia differ significantly. The inhabitants of Central Asia often remain unfamiliar with Chinese culture and social norms.

Russia has significantly impacted Central Asia through historical links. Despite its desire to deepen its involvement in the region, China finds it challenging to expand its soft power influence due to language and cultural divides among the people.

iii) Regional Security Concerns: Several factors continue to influence regional security dynamics. Despite increasingly strong ties with regional leaders, local populations are wary of certain aspects of China's policies and economic presence in Central Asia, which can complicate China's activities and public diplomacy.

Ongoing public demonstrations against Chinese projects, especially in Kazakhstan and Kyrgyzstan, have been reported in recent years (OSCE Academy, 2020; Roberts & Moshes, 2025).

Researchers have identified three key security challenges: first, the presence of terrorist, separatist, and extremist groups, which the SCO is working to address; second, political instability within some Central Asian states, which may restrict China's actions; and third, the influence of other strong regional powers, as Central Asian governments maintain strategic relations with India, Turkey, Iran, and Western countries, leading to possible conflicts of interest.

iv) Limitations of the SCO's Economic Role: The Shanghai Cooperation Organisation has yet to fully realise its role in regional economic cooperation. The SCO still has to strengthen economic cooperation among its members and realise its goals. Several shared objectives were established by the 2003 Multilateral Economic and Trade Cooperation Programme to guarantee the unrestricted flow of money, technology, goods, and services by 2020 (Lukin, Novikov, Puzanova, & Yenikeyeff, 2025).

International standards indicate that the SCO's economic bodies still need improvement. They depend on funds provided by each member state for each project, as they lack independent funding sources.

The SCO member nations continue to confront numerous obstacles to investment and trade, and they are more willing to engage in business dealings with non-Eurasian partners than with one another. While the region frequently discusses economic linkages inside the SCO, there will still be difficulties, particularly between China and Russia. Though it has yet to experience substantial economic success, the SCO has been crucial to the region's security.

3. Opportunities

i) Changing Geopolitical Environment: Western sanctions against Russia and changes in global oil prices create new opportunities for China to expand economic cooperation in the region.

Russia and China compete in the region even as they grow closer politically and economically in several areas, including energy, currency exchange, and critical infrastructure and transportation projects (Shakhanova & Garlick, 2020). China has an opportunity to increase its economic clout in the region, spurred by Western sanctions on Russia. China wants to promote a new economic initiative by capitalising on Russia's economic difficulties stemming from the Russia-Ukraine conflict (Eurasian Research Institute, 2021).

ii) Natural Resources and Energy Security: The region is rich in natural resources and raw materials, which benefits China's industrial and energy requirements.

Since establishing the Shanghai Cooperation Organisation in 2001, China's relations with Central Asia and its economic cooperation with Central Asia have deepened considerably. Oil, uranium, and non-ferrous metals are abundantly available in Kazakhstan and Uzbekistan, two Central Asian countries rich in mineral resources and energy. China's strategic reserves and economic growth depend on these resources. Furthermore, 60 per cent of China's energy imports come from West Asia. In addition, the Central Asian land route is strategically significant for energy transportation, while the Pacific maritime route is not appropriate for this kind of transit. China has been investing

increasingly in Central Asia in recent years. According to the International Trade Union Confederation, by 2018, Chinese enterprises controlled an estimated 40 per cent of Kazakhstan's gas and oil reserves, and China had invested over $40 billion in the region overall (ITUC, 2020). China's energy demand is primarily met from Central Asia, as documented by the OSCE Academy (2020).

iii) Russia-China Cooperation: Russia, an influential player in the region, supports the expansion of economic cooperation with China.

Russia has a variety of complex foreign policy objectives in Central Asia, including economic and cultural attractiveness and geopolitical security. Concerns about regional security are crucial to Russia's interactions with Central Asia. To guarantee Russia's supremacy in Central Asia, it must regain its strategic influence. Russia's influence is seen in its economic and political hegemony in Central Asia. Russia demonstrates its military might in Central Asia by maintaining military installations in four countries. Nonetheless, due to the Russia-Ukraine conflict and the China-US trade war, Russia and China's shared interests led them to work together for regional cooperation in Central Asia. A joint declaration on the establishment of the EEU and the Silk Road Economic Belt was signed by China and Russia in 2015 (Shakhanova & Garlick, 2020; Lu, Huang, & Lu, 2019). China and Russia are united in opposing external forces that influence the region, as they share common interests.

4. Threats

i) External Power Competition- Challenges Posed: Major countries still dominate Central Asia's contemporary security architecture. Russia's hegemony over Central Asia will not be challenged for the foreseeable future. It is not in the interests of the US to withdraw its troops from Central Asia. Turkey, the US, and Russia share common historical values with the Turks in the area, and the Turks are highly regarded. Major nations are actively involved in the area. Consequently, Central Asia's foreign policy will remain unchanged, and China will find it challenging to advance in many domains. This could lead to rivalry between China and other major regional powers.

ii) Regional Conflicts and Security Risks: Conflicts in the region could affect China's western region. Since the Central Asian nations, such as Russia, the US, Europe, India, Iran, and Turkey, have different approaches, reaching a consensus on a common framework for economic cooperation is challenging (Cooley, 2012). Russia founded the CSTO and currently has Kyrgyzstan, Tajikistan, and Kazakhstan as members. In 2012, Uzbekistan withdrew from the organisation. Uzbekistan and the US have strong military ties, as evidenced by Uzbekistan's acquisition of 300 armoured vehicles from the US in 2015. Consequently, China's western region will be impacted if there is a confrontation between them.

The Turkic language and Muslim culture of some ethnic groups in Northwest China are shared by those in Central Asian countries.

II. Central Asia as the Critical Factor: SWOT Analysis of Regional Economic Cooperation with China

This section shifts the analytical lens to the Central Asian republics, treating them as the primary actors (critical factors) and evaluating their strengths, weaknesses, opportunities, and threats in the context of deepening economic engagement with China as the major external partner and investor.

Table-3
SWOT Analysis of Regional Economic Cooperation between Central Asia and China: Central Asian Perspective

Category	Key Factors
Strengths (S)	Energy and Natural Resources Lands suitable for agriculture Geographical location on the Eurasian continent is the centre connecting the West and the East.
Weaknesses (W)	There is a lag in industrial development. Some of the countries in the region have small populations and land areas. Several global powers have economic initiatives in the region, and political decision-making is challenging for the nations in the area.
Opportunities (O)	The advancement of production using Chinese technology. The construction of transportation networks with Chinese funding. Getting into the Western and Eastern Markets.
Threats (T)	The risk posed by Chinese immigration. Local production may be restricted by the regional market's reliance on Chinese production. The threat of relying too much on Chinese loans and investments.

Table-4
Strategic Options Derived from the SWOT/TOWS Analysis

	Opportunities	Threats
Strengths (S)	**S-O Strategies** Collaboration with China on processing natural resources and energy. Using Chinese investment to build a transportation network	**S-T Strategies** Dependence of energy and natural resources on Chinese production. Dependence of agricultural lands on Chinese enterprises.

	that connects the East and the West. Use Chinese technology to advance the agriculture industry.	Due to the East-West network's reliance on Chinese goods, domestic production will decline.
Weaknesses (W)	**W-O Strategies** The region's development of grain production and the introduction of efficient agricultural technologies. Restricting one another while preserving equilibrium between China and other powerful outside actors.	**W-T Strategies** The local market's reliance on Chinese production. There is a conflict among local citizens and increased Chinese immigrants. The danger of relying on Chinese intervention to make political decisions.

Analyse Central Asia as the main body, the object being the regional economic cooperation between Central Asia and China:

1. Strengths

i) Central Asian countries are rich in natural resources (oil, gas, and minerals): Natural resources constitute an important component of national economies, particularly in many developing countries around the world. In the Central Asian countries, these resources also play a crucial role. Kazakhstan possesses a significant mineral resource base within Central Asia. Among CIS countries, Kazakhstan ranks first in zinc, tungsten, and barite; second in silver, lead, and chromite; third in copper and fluorite; fourth in molybdenum; and sixth in gold. Turkmenistan is a natural gas-rich country that supplies approximately 5 per cent of world's natural gas. Oil, gas, coal, and uranium are abundant in Uzbekistan. Moreover, in terms of natural gas reserves and production, Uzbekistan ranks 14thand 11th, respectively.

ii) The land resources of the Central Asian countries are favourable for the development of agriculture: During the Soviet era, Central Asian nations served as major grain-producing regions, and the region's crops were mainly supplied to neighbouring areas. China, therefore, wishes to increase agricultural cooperation with the region. By 2024, executives from prominent Chinese corporations pledged to provide over $600 million to Kazakhstan's agricultural sector. Kazakhstan requested that China expand its wheat imports, and China complied. China is interested in importing livestock and grain products.

iii) Geographical advantages of the location: The region connects East and West across the Eurasian continent, while also linking North and South within the

heart of the continent. Numerous efforts have been made to reestablish commercial and transportation routes throughout Central Asia and the Caucasus since the fall of the Soviet Union. The objective of reconnecting landlocked countries with their neighbours and former trading partners is to transform Central Asia into a land corridor linking Europe and Asia. Following the EU's joint summit in Baku in 1998, which was themed "Restoration of the Historical Silk Road", the phrase "New Silk Road" appeared in several projects. The US initiated the New Silk Road (NSR) initiative in 2010. China began operations in the region three years later as part of its economic effort, introducing the Silk Road Economic Belt, a component of the One Belt One Road initiative (Garlick, 2020). The significance of the region's strategic location on the Eurasian continent has been demonstrated by the actions of the region's major nations (CSIS, 2022).

2. Weaknesses

i) Manufacturing development in Central Asia is lagging, and the domestic market relies on imports: In terms of political and economic development since independence from the Soviet Union, the Central Asian countries display considerable diversity in culture, ethnicity, and economic structure. Turkmenistan and Uzbekistan still need to transition to a market economy, although Kazakhstan and Kyrgyzstan have made significant strides towards market reforms. The transition of Tajikistan to a market economy is presently underway. Significant structural distortions and microeconomic inefficiencies accompanied the Soviet era's forced industrialisation, which was implemented rapidly and focused heavily on military requirements.

Many Central Asian sectors thus lost their previous customers and could not compete in new markets following the fall of the Soviet Union. Declining oil prices and rising commodity prices have significantly affected Kazakhstan's economy. Since oil and gas accounted for more than 70 per cent of export revenues in 2016-2018, oil prices remain a major determining factor. Kazakhstan's domestic consumption relies on imports from China and Russia (Zhuang, 2020). Under the Soviet regime, Kazakhstan's mining sector advanced steadily, but the handicraft sector did not keep pace. Product development and diversification are essential to Central Asia's economic growth.

ii) In terms of land area and population, some countries in the region have relatively small populations: While the demographic distribution of Uzbekistan in the region is consistent with a robust domestic economy, the demographic structure of several other Central Asian countries is comparatively less favourable. Uzbekistan is cautious about its reliance on Russia for international relations. Nonetheless, Russia retains influence in some nations (particularly Kazakhstan and Kyrgyzstan) due to the uneven demographic distribution across

the region and the size of the Russian population. The issue of Chinese immigration is a subject of public concern and political debate in several Central Asian countries, with some local media and political figures raising fears about the potential long-term impact on national identity and labour markets. However, empirical evidence of large-scale Chinese migration or direct threats to security remains limited (Roberts & Moshes, 2025).

iii) External powers consider the region their strategic zone, making political decision-making difficult: One of the geopolitical areas on which the world's most powerful nations are focusing is Central Asia (Kavalski, 2010). Rich energy resources are available in Central Asia and the Caspian region; the region possesses a strategically important location, surrounded by nuclear-armed states such as Iran, China, India, and Russia; additionally, the Afghanistan crisis remains in close proximity. Because of this, nations continue to compete for access to significant mineral resources and geopolitical influence at the regional and global levels. Maintaining geopolitical balance, particularly between China, the US, the EU, and Russia, is one of Central Asia's most important tasks in ensuring regional security and stability. Over the last ten years, the region's economic endeavours have highlighted its strategic location as a bridge linking East and West. Consequently, balancing the economic interests of major powers has made political decision-making increasingly complex for Central Asian states.

3. Opportunities

i) Chinese production is more developed than in Central Asia, especially in manufacturing; Central Asian countries can increase output by introducing technology: During the Soviet era, a central authority under the Soviet government managed the entire economy of Central Asia. Because of this, the region's primary industries are energy and agriculture, while processing and manufacturing sectors lagged behind global industrial development. However, China is close to the region. This geographical proximity creates significant opportunities for industrial growth and cooperation. Mining, oil refining, and heavy industries comprise China's industrial sector. Light manufacturing and handicraft-based processing industries also play an important role. China's large-scale industrial output and relatively inexpensive manufactured goods have made it globally competitive. China's industrial cooperation strategy has garnered favour in Central Asia due to the diversification of production resulting from economic reforms in the region. A cooperation plan between the Silk Road Economic Belt and Kazakhstan's Nurly Zhol economic programme was agreed upon by the governments of China and Kazakhstan in 2016 (Shakhanova & Garlick, 2020). Furthermore, China's regional economic cooperation initiatives include the establishment of diversified industrial enterprises and manufacturing projects across Central Asia.

ii) Development of a transport network in the region through Chinese investment: Due to their landlocked status, all five Central Asian nations must build solid commercial connections with the outside world. As a result, external connectivity is essential for economic growth. The construction of a relatively advanced road network in the area during the Soviet era significantly advanced the local economy and society. However, although the transport network reached remote areas, it frequently crossed the borders of other Soviet republics.

There are limited direct transportation linkages with neighbouring countries like China and Iran; all highways flow to Russia. Consequently, the region's economy could not effectively interact with neighbouring markets. The two largest economies in the world, China and Europe, are connected by Central Asia, which lies between them. Even though shipping by sea is now preferred, the convenience, speed, and security of road and rail transit will make it more effective. Nearly 10 per cent of trade between China and Europe is expected to occur on land, compared to the present 1-2 per cent share (OSCE Academy, 2020). Developing the transport network and linking the East and West are two of China's primary objectives in its regional economic endeavours.

China and the nations of Central Asia have partnered to create transport networks. For instance, China has assisted in building a container terminal in Lianyungang and provided Kazakhstan with access to a seaport. Tajikistan has established North-South transport links through Chinese loans under the SCO framework. Chinese financing and companies have also contributed to the completion of key road projects in Kyrgyzstan, thereby improving its internal transportation infrastructure (OSCE Academy, 2020). The Silk Road Economic Belt project continues to provide regional countries with opportunities to expand and modernise their transport infrastructure, as documented in multiple studies (Garlick, 2020; OSCE Academy, 2020).

4. Threats

i) The threat of an increase in Chinese immigrants (Roberts & Moshes, 2025): The distribution of people in Central Asia is uneven, and because of the region’s proximity to China, concerns over "Chinese expansion" are periodically voiced in public discourse, particularly in Kazakhstan, Kyrgyzstan, and Tajikistan (Roberts & Moshes, 2025). Professor Liu Tao described the "Theory of Chinese Expansion" in his study, reflecting anxieties among some political figures and segments of the public. According to statements attributed to former Kazakh President Nursultan Nazarbayev and other political commentators, China aims to influence Kazakhstan's national security, increase investment, and gain a strategic economic edge. Some analysts have cited China's assertive approach to investment and negotiations over transboundary waters (such as the Ili and Irtysh rivers) as factors exacerbating local concerns. However, available data indicate that actual Chinese immigration figures remain relatively low and claims of a

direct threat to national security are generally unsupported by independent research (Roberts & Moshes, 2025).

ii) The risk that the regional market will become dependent on Chinese production, thereby limiting domestic production: China's drive for regional economic cooperation is perceived by many as a geopolitical and economic venture. Scepticism has grown amid China's increasing economic domination and expanding investment presence in Central Asia, as it is likely to increase Beijing's geoeconomic and political influence in the region. Chinese-made goods predominate in the region even though Central Asian nations have committed to building Beijing's transport network. As Chinese goods continue to dominate regional markets, concerns have emerged that domestic industries may struggle to compete, thereby increasing economic dependence on Chinese production.

iii) The risk of dependence on Chinese debt and investment: According to scholars and regional experts, Chinese influence in Central Asia is expected to grow. Due to China's generous loans, debt dependency has become an increasingly important concern in the region. Approximately 40 per cent of Kyrgyzstan's public debt and 48 per cent of Tajikistan's external debt are owed to China (Civic Idea, 2022). Although the full effects of this debt dependency on regional economies and political decision-making are unknown, it may influence the foreign policies of these countries in the decades to come. According to experts on international debt, China may have greater strategic leverage and economic influence in the region due to its growing debt and investment.

Table-5
Comparative SWOT Analysis of China-Central Asia Regional Economic Cooperation (Dual Perspective)

Category	China's Perspective	Central Asia's Perspective
Strengths	Early diplomatic ties & border resolutions (1990s) Historical Silk Road legacy and the SCO platform for security & dialogue Strong financial & technological capacity Alignment of the BRI with the Western Development Strategy	Abundant natural resources (oil, gas, uranium, and minerals) Strategic Eurasian transit location Agricultural land potential
Weaknesses	Cultural & linguistic barriers Limited SCO economic effectiveness Heavy focus on extractive sectors Perception of limited transparency	Weak industrial & manufacturing base Small domestic markets & landlocked geography Limited institutional & regulatory capacity

Opportunities	Access to vast energy & mineral resources Russia's economic constraints (following post-2022 sanctions) Demand for infrastructure & connectivity	Chinese capital, technology & infrastructure investment Integration into global value chains via BRI Potential for industrial upgrading & technology transfer
Threats	Geopolitical competition (from Russia, US, EU, India, Turkey, Iran) Regional instability affecting Xinjiang Anti-Chinese sentiment & protests	Debt dependency (for example, approx. 40 % of Kyrgyzstan's public debt & approx. 48% of Tajikistan's external debt owed to China) Crowding out of local industries by Chinese goods Social tensions & perceived loss of sovereignty

Source: Author's compilation based on Garlick (2020), Civic Idea (2022), OSCE Academy (2020), and Roberts & Moshes (2025).

Table-6
Strategic Options (SWOT Matrix): Summarising the Two Perspectives

	Opportunities	**Threats**
Strengths	**S-O Strategies** China: Leverage diplomacy &the SCO to expand high-quality BRI projects CA: Use resource wealth to negotiate technology transfer & better terms	**S-T Strategies** China: Use the SCO & bilateral ties to manage great-power competition CA: Diversify partnerships to maintain strategic autonomy
Weaknesses	**W-O Strategies** China: Invest incultural/ educational programs, as well as CSR initiatives CA: Attract targeted Chinese investment for industrial & agricultural modernization	**W-T Strategies** China: Improve transparency & local content rules CA: Enforce safeguards in investment agreements & strengthen regional coordination

SWOT Analysis of Regional Economic Cooperation between China and Central Asia

To systematically evaluate the dynamics of China-Central Asia Regional Economic Cooperation (REC), a dual-perspective SWOT analysis grounded in theories of regionalism, complex interdependence (Keohane & Nye, 1977), and the geopolitics of connectivity (Sidaway, 2019) is employed. Table 5 presents a

comparative overview, contrasting China's strategic outlook as the primary investor and initiator with the perspectives of the Central Asian states as resource-rich but institutionally weaker partners.

From China's perspective, key strengths include long-established diplomatic relations, the resolution of border disputes in the 1990s, and the institutional platform provided by the Shanghai Cooperation Organisation (SCO). These advantages are reinforced by the alignment between the Belt and Road Initiative (BRI) and China's Western Development Strategy. However, weaknesses such as cultural and linguistic barriers, coupled with the SCO's limited success in translating security cooperation into meaningful economic integration, constrain deeper engagement. Opportunities arise from Central Asia's rich natural resources and Russia's relative economic decline following Western sanctions, while threats stem primarily from great-power competition and local backlash against perceived Chinese dominance.

From Central Asia's perspective, strengths lie in abundant energy and mineral resources, Kazakhstan alone ranks among the top CIS countries in several strategic minerals, and in its critical geographic position as a land bridge between East and West. Nevertheless, structural weaknesses, including lagging industrialization and small domestic markets, make the region heavily dependent on external investment. While Chinese financing offers significant opportunities for infrastructure development and technology transfer, major threats include rising debt burdens (notably, 40% of Kyrgyzstan's public debt and 48% of Tajikistan's external debt owed to China), the potential crowding out of local industries, and concerns over sovereignty and demographic change.

The SWOT matrix above (Table 6) summarises and translates these findings into strategic options, highlighting the need for both sides to move beyond resource-for-infrastructure deals toward more balanced, transparent, and mutually beneficial cooperation. Overall, the dual SWOT reveals a classic asymmetric interdependence: China possesses capital and technology, while Central Asia holds critical resources and geographic advantage. Converting this complementarity into a sustainable partnership remains the central challenge.

Conclusion and Policy Recommendations

Theoretical and Conceptual Implications

The SWOT analysis presented in this article reveals a complex and multidimensional picture of China's regional economic cooperation in Central Asia. From China's perspective, the most significant strategic advantage lies in the three decades of established diplomatic relations with Central Asian states, which have created a reliable foundation for bilateral and multilateral cooperation agreements. However, despite this diplomatic groundwork, China's regional economic initiatives face structural limitations within the SCO framework, which

has historically prioritised security over economic integration. Moreover, cooperation remains heavily concentrated in the energy and natural resources sectors, while the advancement of BRI and EAEU coordination remains constrained by underlying trust deficits between China and Russia.

In terms of weaknesses and external risks, the presence of competing major powers in Central Asia introduces significant uncertainty. Other global and regional actors, including the United States, Russia, the European Union, India, Turkey, and Iran, are capable of launching rival economic initiatives that may undermine China's growing influence. Russia, in particular, retains considerable linguistic, cultural, and political leverage in the region, which it may deploy to counterbalance China's expanding footprint. At the same time, the financial and technological costs of large-scale regional investment carry risks for the Chinese economy, while language barriers and labour conflicts between Chinese and local workers remain persistent operational challenges. Competitors are also likely to push for limiting the SCO's mandate to security affairs alone, thereby restricting China's ability to use the organisation as a vehicle for economic cooperation.

From Central Asia's perspective, the region holds considerable strengths in abundant natural resources and a strategic geographic location. Central Asian countries stand to benefit significantly from Chinese investment in energy technology, agricultural modernisation, and transport infrastructure development. Chinese-financed connectivity projects offer the prospect of linking the region's landlocked economies to global markets, bridging eastern Chinese seaports with European markets in the west. Nevertheless, these opportunities carry serious risks. Central Asian economies face the danger of becoming structurally dependent on Chinese industrial output, with domestic production increasingly crowded out by cheaper Chinese goods. The growing presence of Chinese immigrants heightens social and political sensitivities, while long-term land leases with Chinese enterprises pose risks to agricultural sovereignty. Most critically, the accumulation of Chinese debt threatens to erode the political independence of Central Asian governments, making autonomous decision-making increasingly difficult in the years ahead.

In sum, while China's regional economic cooperation in Central Asia offers genuine development opportunities for both sides, its long-term success will depend on addressing structural imbalances, building mutual trust, and ensuring that the benefits of cooperation are shared equitably rather than concentrated solely in China's strategic and economic interests.

Policy Recommendations and Implications for Regional Governance

- China and Central Asian states should prioritise greater transparency in investment, lending, and project implementation. Open data and clear reporting can help build trust and mitigate fears of debt dependency or hidden conditionalities.

- Local participation and stakeholder engagement are essential for sustainable cooperation. Both sides should design mechanisms for meaningful consultation with local communities, civil society, and national parliaments, especially regarding large-scale infrastructure, migration, and resource projects.
- Regional governance frameworks like the SCO and EEU need further institutional strengthening to ensure that economic cooperation delivers balanced benefits, supports regulatory harmonisation, and addresses social and environmental risks.
- Central Asian states should continue and deepen their strategies of balancing among major powers to maximise their bargaining position, enhance autonomy, and promote diversified development.
- Both sides should invest in capacity building, knowledge sharing, and technical training to ensure that local economies and institutions can absorb and benefit from new investments.

Future Research Directions

- More granular, country-specific studies are needed to understand the heterogeneous impacts of China's engagement across the five Central Asian republics.
- Comparative research on the effectiveness of different governance models and the long-term developmental outcomes of BRI projects could offer valuable lessons for policymakers.
- Future work should also examine the evolving role of non-state actors, digital connectivity, and climate adaptation within the China–Central Asia cooperation agenda.

By integrating these recommendations and research directions, policymakers and scholars can help shape a more equitable, participatory, and sustainable model for regional economic cooperation in Central Asia.

References

Börzel, T. A. (2011). Comparative Regionalism: European Integration and Beyond. In T. A. Börzel& T. Risse (Eds.), The Oxford Handbook of Comparative Regionalism. Oxford University Press.

Civic Idea. (2022, December 1). China in Central Asia: Debt-trap policy and dependency in Tajikistan and Kyrgyzstan. https://civicidea.ge/en/china-in-central-asian-debt-trap-policy-and-dependency-in-tajikistan-and-kyrgyzstan/

Cooley, A. (2012). Great games, local rules: The new great power contest in Central Asia. Oxford University Press.

CSIS. (2022). Central Asia: Analysis, research, & events. Centre for Strategic and International Studies. https://www.csis.org/regions/russia-and-eurasia/central-asia

Eurasian Research Institute. (2021). The risks posed by high government debt in Central Asia. https://www.eurasian-research.org/publication/the-risks-of-the-high-government-debt-for-central-asia/

Garlick, J. (2020). The regional impacts of China's Belt and Road Initiative. Journal of Contemporary China, 29(126), 1–16. https://doi.org/10.1177/1868102620968848

ITUC. (2020). Belt and Road Initiative in Central Asia. International Trade Union Confederation. https://www.ituc-csi.org/IMG/pdf/belt_and_road_initiative_in_central_asia.pdf

Joniak-Lüthi, A. (2020). Road construction in Xinjiang and the BRI's fragile connectivity across Central Asia. Political Geography, 79, 102–159.

Kavalski, E. (2010). The new Central Asia: The regional impact of international actors. World Scientific.

Keohane, R. O., & Nye, J. S. (1977). Power and Interdependence: World Politics in Transition. Little, Brown and Company.

Lu, N., Huang, M., & Lu, S. (2019). How the Belt and Road Initiative can help strengthen the role of the SCO and deepen China's cooperation with Russia and the countries of Central Asia. India Quarterly, 75(1), 1–15. https://doi.org/10.1177/0974928418821484

Lukin, A., Novikov, D., Puzanova, O., & Yenikeyeff, S. (2025). The Shanghai Cooperation Organisation amidst the rising international tensions. Journal of Eurasian Studies. https://doi.org/10.1177/18793665251357320

OSCE Academy. (2020). China's Belt and Road Initiative in Central Asia: Ambitions, risks and realities. OSCE Academy in Bishkek. https://www.osce-academy.net/upload/file/BRI_08_07.pdf

Roberts, S., & Moshes, A. (2025). In the shadow of the dragon: Chinese soft power in central Asia. International Affairs, 101(4), 1441–1462. https://doi.org/10.1093/ia/iiae344

Shakhanova, G., & Garlick, J. (2020). The Belt and Road Initiative and the Eurasian Economic Union: Exploring the Greater Eurasian Partnership. Journal of Contemporary China, 29(123), 1–16. https://doi.org/10.1177/1868102620911666

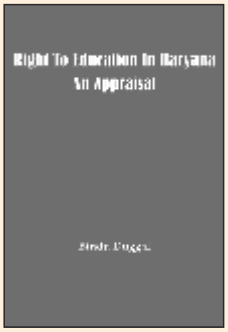
Sidaway, J. D. (2019). The geopolitics of connectivity, regions, and corridors. Dialogues in Human Geography, 9(1), 34–38. https://doi.org/10.1177/2043820619832015

Wang, J., & Kong, D. (2019). Counter-terrorism cooperation between China and Central Asian states in the Shanghai Cooperation Organisation. China Quarterly of International Strategic Studies, 5(1), 65–79.

Zhuang, W. (2020). A critical analysis of the Belt and Road Initiative in Central Asia. International Journal of Managerial Studies and Research, 8(8), 42–52. https://arcjournals.org/pdfs/ijmsr/v8-i8/5.pdf

Right to Education in Haryana
An Appraisal

Bindu Duggal



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