

MAN & DEVELOPMENT

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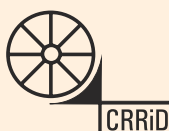
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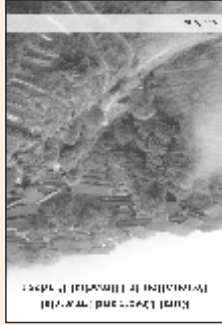
*Internal Migration and Demographic Shifts in
Punjab: A Longitudinal Analysis (1981–2011)*



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Rural Credit and Financial Penetration in Himachal Pradesh

Satish Verma



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In addition, the book fills the void in the scant literature on banking in Himachal Pradesh.

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Editorial

We are pleased to present this issue of *Man & Development*, which brings together five carefully researched papers that examine key facets of India's ongoing socio-economic transformation. Spanning fiscal policy, agricultural entrepreneurship, skill education, healthcare costs, and migration patterns, the papers offer fresh perspectives on some of the most pressing challenges and opportunities facing the nation today.

Leading the issue, Tamanna and Sonu Madan present a comprehensive comparative study of fiscal performance between Special Category and Non-Special Category States over more than three decades. Using a carefully constructed Composite Fiscal Performance Index, they show how Special Category States maintain relatively stronger and steadier outcomes, while Non-Special Category States display wide variation, with Odisha emerging as a standout success story of sustained reform.

Vinod Kumar Vidyarthi and Shivangi Shubham examine the growing agri-startup ecosystem and the pivotal role played by the Government of India, RBI, and NABARD. Their analysis highlights key initiatives such as RKVY-RAFTAAR, the Agriculture Infrastructure Fund, and NABVENTURES, which are driving innovation and investment, though gaps in long-term financing and smallholder inclusion still need attention.

Shikha Goyal and Neetu Gaur evaluate the rollout of the National Skills Qualifications Framework in Haryana's government schools through the experiences of vocational teachers. Their findings on job satisfaction levels provide valuable ground-level insights and actionable recommendations for strengthening skill development at the school level.

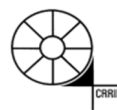
K. Malathi and R. Mariappan analyse out-of-pocket healthcare expenditure across Indian states using panel data, revealing significant regional disparities, and underscoring the pressing need for stronger financial protection mechanisms.

Rounding off the issue, Gurwinder Singh Badal, Rudhita Goel, and Adarsh Sharma offer a longitudinal view of internal migration and demographic shifts in Punjab between 1981 and 2011, shedding light on patterns that continue to influence the state's social and economic landscape.

Taken together, these contributions reflect both the complexities of India's transformation and the potential of well-designed policies and reforms.

We hope they spark meaningful dialogue among researchers, policymakers, and development practitioners.

Our sincere thanks go to the authors for their scholarly contributions, the peer reviewers for their thoughtful feedback, and the CRRID team for their dedicated support in bringing this issue to readers. We continue to encourage young scholars from across the country to submit their work to the journal.



FISCAL PERFORMANCE OF INDIAN STATES: AN IN-DEPTH ANALYSIS OF SPECIAL AND NON- SPECIAL CATEGORY STATES

Tamanna¹ and Sonu Madan²

Abstract: The paper provides an analysis of the fiscal performance of Special Category States (SCS) and Non-Special Category States (NSCS) in India. The results reveal consistent and growing variations among the states, with Special Category States generally exhibiting superior and more stable fiscal performance, whereas Non-Special Category States display greater heterogeneity due to differences in governance quality, effective revenue collection, fiscal performance management, and targeted fiscal adjustments. Long-lasting fiscal resilience cannot be achieved solely based on the size of the economy, it also depends on institutional ability, sound policy decisions, and the effective utilisation of fiscal resources. The devolution criteria should also be revisited to reward high-performing Non-Special Category States for continuing their reform efforts, while Special Category States, despite their fiscal constraints, continue to receive full support.

Keywords: Special Category States, Non-Special Category States, Fiscal Performance, Fiscal Sustainability, Fiscal Federalism, Composite Fiscal Performance Index.

1. Introduction

State finance refers to the manner, in which state governments utilise their financial resources, including the methods by which they raise revenue, the expenditures they incur, and the management of debt and fiscal commitments. The increasing role of states regarding development and welfare provision has become more visible in recent decades (Kurian, 1999). This trend has been intensified with the growing involvement of states in delivering welfare schemes

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and development programmes. Here, budgetary balance, sustainability of debt, performance in terms of revenue, and quality of expenditure (Kurian, 1999) provide a complete picture of fiscal health at the state level.

Some factors contribute to the high level of variation in the financial performance of states in India, including geographical and socio-economic differences. These differences manifest in spending patterns, debt-to-Gross Domestic Product ratios, tax revenues, and budget deficits. Such disparities arise from variations in taxation powers, population size, geographic features, and historical economic trajectories, which have consistently led to differences in fiscal capability and performance among the states. An interstate budgetary imbalance has emerged in India, characterised by discrepancies in revenue capacities and expenditure outcomes within the Indian fiscal environment (Ghosal, 2010, 2011).

The central government uses fiscal transfers, grants, and shared tax revenue to address horizontal imbalances and support low-income states (Rao, 2017). Although fiscal transfers can help reduce disparities, they require a more nuanced approach that balances revenue potential on the one hand and expenditure needs on the other (Dabla-Norris et al., 2010). The level of inequality among Indian states in fiscal aspects largely depends on differences in per capita revenue and expenditure, which are directly linked to variations in Gross State Domestic Product (GSDP) through differentiated fiscal resources for development and welfare activities.

Special Category Status (SCS) was a designation aimed at assisting recipient states by offering additional privileges, such as tax exemptions, a higher proportion of central funding, priority treatment of projects, debt relief, and grant-to-loan ratios (Bhattacharjee, 2016). The Planning Commission and the Finance Commission provided preferential treatment to Special Category States and gradually increased their share of resource devolution (Bhattacharjee, 2014). This status has been granted to eleven states, namely, Assam, Nagaland, Jammu and Kashmir, Mizoram, Manipur, Tripura, Sikkim, Arunachal Pradesh, Himachal Pradesh, Meghalaya, and Uttarakhand, since 1969, based on their disadvantaged economic conditions and isolation. The states face challenges such as low infrastructure, limited natural resources, and underdevelopment (Singh, 2015; Saikia et al., 2022a, b).

Non-Special Category States are those that do not receive special funding or concessions from the central government. In general, these states possess more robust economic foundations and higher fiscal capacity, although fiscal outcomes vary among them. Non-Special Category States include Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal (Raju, Y. N., et al., 2024).

The current research examines the evolution of intergovernmental fiscal transfers in India, particularly the role of Special Category Status (SCS) as a potent policy instrument in addressing regional inequalities, including horizontal disparities among states, in the post-2014 period (Bhattacharjee, 2018). The independent analysis of SCS and NSCS allows for better control of structural differences in fiscal capacity, revenue dependence, and debt sustainability, thereby providing deeper insights into their fiscal dynamics. Moreover, this study contributes to the existing body of knowledge by assessing fiscal performance based on Special Category States and Non-Special Category States (NSCS) for the years 1990-91 and 2023-24.

2. Literature Review

The fiscal performance of Indian states has been extensively examined by scholars, resulting in a substantial body of literature employing various methodological approaches. According to Mohanty and Mishra (2016), good fiscal performance at the state level is one of the pillars supporting the country's macroeconomic balance. It is pertinent to note that a state's fiscal trajectory is not predetermined; it varies with changes in fiscal rules, institutional reforms, and policy shifts, especially those related to fiscal decentralisation and transfers. Regulatory measures, such as controls on deficits, expenditure priorities, and borrowing limits, play a significant role in determining financial performance. Kopits and Symansky (1998) emphasised that effective fiscal policies and good governance processes are crucial for enhancing the credibility and accountability of the financial affairs, not only at the national level but also at the sub-national level.

India should adopt a virtuous budgeting process to ensure long-term fiscal sustainability, enhance revenue collection, improve expenditure productivity, and effectively manage its debts. Measures such as those highlighted by Dabla-Norris et al. (2010) not only protect fiscal health but also align government expenditure and borrowing with overall developmental and macroeconomic objectives. In the context of self-sufficient development, the economic foundation of special category states remains quite weak, resulting in persistent reliance on intergovernmental fiscal transfers. Their fiscal structure differs significantly from that of Non-Special Category States, which enjoy more favourable treatment, such as a larger share of central assistance for centrally sponsored schemes. Additionally, SCS receive significant concessions in excise and customs duties, as well as income tax and corporate tax rates (Singh & Arora, 2024).

Reddy and Reddy (2019) suggest that NSCS are characterised by low spending, and SCS exhibit high spending but limited revenue-generating ability. Factors such as distance and proximity to international borders have contributed to low economic activity in SCS (Akram & Rath, 2020a, 2020b), thereby limiting

internal revenue mobilisation. One of the most significant contributions by Mohanty and Mishra (2017) was the development of a Fiscal Performance Index (FPI) for 17 non-special category states from 2003-04 to 2014-15. Their model integrated five main indices- Deficit, Revenue Efficiency, Expenditure Quality, Debt and Debt Sustainability, disaggregated into 11 indicators. Using the Relative Distance method and the Z-score method, the study highlighted significant interstate variation and an overall deterioration in fiscal health over the period, underscoring the utility of composite indices in assessing multidimensional fiscal outcomes.

Despite the significant support central transfers offer, they cannot fully resolve the fundamental developmental and institutional crises faced by low-income states. Addressing these requires a more inclusive policy framework- one that increases revenue collection, improves financial management, and aligns expenditures with social and developmental priorities (Reddy & Reddy, 2018; Rao, 2017), especially in states with structurally weak fiscal capacity. Based on this, Akram and Rath (2021) evaluated the fiscal efficiency of 21 Indian states between 1980-81 and 2017-18 on a multidimensional index based on Data Envelopment Analysis (DEA). Odisha emerged as the best performer in the recent years, whereas Punjab consistently ranked last. The authors emphasised the need for central support to the fiscally weaker states and the replication of best practices from counterparts with high performance, highlighting the aspects of efficiency-based fiscal reforms and transfer mechanisms.

Likewise, Verma (2019) has developed an index of fiscal performance based on nine fiscal indicators to assess the efficiency and effectiveness of states. The research confirmed the need for state-based approaches to improve the financial management, given the diverse fiscal capacities and administrative methods among states. A pioneering and widely cited study by Dholakia (2005) developed a Budgetary Performance Index based on eight indicators to assess the level of budgetary discipline. The results highlighted increasing inter-state inequalities, especially in the post-reform era, and attributed them to structural and policy failures, pointing to the long-term persistence of fiscal imbalances among Indian states.

State-specific fiscal outcomes have been observed by other scholars. Pethe and Lalvani (2005) examined the worsening fiscal condition in Maharashtra, attributing it to increased interest payments, unsustainable borrowing, and losses in the power sector. Dash (2011) compared the fiscal trend of Tripura between 1990-91 and 2009-10 and reported improvement after the enactment of the FRBM Act; however, Tripura still struggled with own-revenue collection and spending efficiency. Das (2013) provided a rule-based evaluation of the fiscal reforms in the FRBM Act and concluded that deficits declined, however, states tended to cut developmental expenditures to achieve fiscal goals,

raising concerns about the quality and structure of government spending. COVID-19 pandemic further weakened state finances, resulting in significant revenue declines and deficits.

A comparison of SCS and NSCS through independent analysis reveals disparities in fiscal capacity, income level, and dependency on central support (Das, 2005; Dholakia, 2005). Nevertheless, even with higher transfer, some states struggle to generate internal revenue and achieve fiscal independence (Reddy & Reddy, 2019). Their social and economic advancement requires state assistance, along with substantial investments to ensure continued development (Bhattacharjee, 2014; Ahluwalia, 2000).

Taken together, these studies underscore the relevance of effective institutional foundations, contextually tailored fiscal policies, and structural reforms for long-term fiscal sustainability. In this respect, the present study addresses several research questions: What are the best indicators for measuring fiscal performance at the state level, and how they can be effectively combined to form a strong Fiscal Performance Index? Is there a difference in fiscal performance between SCS and NSCS when compared using a multidimensional Fiscal Performance Index (MDFPI)? What are the critical factors influencing the fiscal performance ranking of states, and how do structural and policy variables over time influence these rankings?

3. Research Methodology

3.1 Research Objectives

The present study aims to fulfill the following objectives:

- To develop an overall Fiscal Performance Index (FPI) for selected states during the period 1990-91 to 2023-24.
- To compare and contrast Special Category States (SCS) and Non-Special Category States (NSCS) in terms of their Fiscal Performance Index (FPI) scores.
- To detect trends and categorise Indian states into high, medium, and low fiscal performance groups, and examine the determinants of these differences.

3.2. Research Instruments

3.2.1 Fiscal Performance Index (FPI): The Fiscal Performance Index (FPI) is an indicator initially theorised by Dholakia and Solanki (2001) to assess the fiscal well-being of the government or organisation. The index combines four sub-indices into single composite metric, providing a holistic and comparable perspective on fiscal health across states, regions, or time periods (Dholakia, 2005; Mohanty & Mishra, 2016; Bhide & Panda, 2002).

Two significant steps are followed prior to the construction of the four main sub-indices:

(a) First, all fiscal variables are normalised to overcome the variations in magnitude and units of measurement. These variables are commonly presented in ratio form with differing numerators and denominators, making simple arithmetic averages are inapplicable. (b) Second, normalisation is performed using the maximum and minimum values of each variable through a min-max scaling procedure.

3.3.2: Principal sub-indices: After the normalisation of fiscal variables, four main sub-indices are computed to represent different dimensions of fiscal performance: Deficit Index (DI), Own Revenue Effort Index (OREI), Expenditure Quality Index (EQI), and Debt Sustainability Index (DSI). These sub-indices are then weighted equally to determine the final FPI score. Equal weighting ensures transparency, neutrality, and comparability (Bhide & Panda, 2002; Dholakia, 2005; and Morris & McAlpin, 1982). This approach avoids implicit normative judgments about the relative importance of fiscal dimensions, allowing each dimension to contribute symmetrically to overall fiscal assessment.

3.3.2a: Deficit Index (DI): The Deficit Index indicates the government's ability to control its fiscal deficit within sustainable levels. DI provides a future analysis of fiscal prosperity, identifying possible risks associated with fiscal laxity. Since a higher fiscal deficit implies poorer performance, the value is inverted so that a higher DI indicates better performance. This inversion ensures directional consistency across all sub-indices used in constructing the composite FPI. The inversion of deficit-related indicators in the Deficit Index (DI) is a methodological necessity to maintain uniformity in interpretation. Without inversion, aggregation would yield misleading results, as some sub-indices would increase with improvement while others would decrease. This approach is standard in composite index construction and has been widely adopted in fiscal performance studies (Bhide & Panda, 2002; Dholakia, 2005).

$$DI_i = 1 - \left(\frac{FiscalDeficit_i}{GSDP_i} \right)$$

Where:

- Fiscal Deficit_i = fiscal deficit of state *I*
- GSDP_i = Gross State Domestic Product of state *I*
- DI_i captures the inverse of the fiscal deficit-to-GSDP ratio, such that higher values indicate better fiscal performance. After computing the raw deficit ratio, the index is normalised across states to ensure inter-state comparability.

For cross-comparison, DI is further normalized across all states using min-max scaling:

$$DI_i = \frac{D_i - \min(D)}{\max(D) - \min(D)}$$

Where:

D_i represents the inverted deficit ratio for state i , $\max(D)$ and $\min(D)$ denote the maximum and minimum values of the inverted deficit ratio across all states

3.3.2b: Own Revenue Effort Index (OREI): The Own Revenue Effort Index (OREI) measures a government's ability to generate revenue through its internal sources, including taxes and fees. A higher index indicates increased fiscal autonomy and reduced reliance on external flows of funds or debt. The inclusion of OREI in the composite index facilitates the measurement of sustainability in fiscal management, particularly in terms of internal revenue generation.

$$OREI_i^{raw} = \frac{\text{Own Revenue}_i}{GSDP_i}$$

Where:

$\text{Own Revenue}_i = \text{Own Tax Revenue} + \text{Own Non-Tax Revenue of state } i$

For cross-state comparison, the raw OREI values are normalised using the min-max scaling method:

$$OREI_i = \frac{OREI_i^{raw} - \min(OREI^{raw})}{\max(OREI^{raw}) - \min(OREI^{raw})}$$

After normalisation, OREI has a range of 0 to 1, where the higher the value reflects greater fiscal autonomy and internal revenue effort.

3.3.2c: Expenditure Quality Index (EQI): The Expenditure Quality Index (EQI) is a measure of the efficiency and effectiveness of public funds allocation and expenditure. Its incorporation into the composite index enables an assessment of whether government expenditure contributes to the long-term economic and social outcomes. In this study, the focus is on the composition of the expenditure rather than its magnitude alone.

$$EQI_i^{raw} = \frac{\text{RevenueExpenditure}_i}{\text{RevenueReceipts}}$$

In normalised form:

$$EQI_i = \frac{EQI_i^{raw} - \min(EQI^{raw})}{\max(EQI^{raw}) - \min(EQI^{raw})}$$

Where:

Revenue Expenditure = expenditure on health, education, infrastructure, social welfare, and other development-oriented sectors of the state.

Total Expenditure i = sum of revenue and capital expenditure of state i

A higher EQI value implies better prioritisation of development-oriented spending and improved quality of public expenditure.

Debt Sustainability Index (DSI): The Debt Sustainability Index (DSI) measures a government's ability to manage and repay debt without compromising fiscal or economic stability. Including DSI in the fiscal performance index ensures attention to the sustainability of borrowing practices and the government's capacity to meet obligations without excessive future debt accumulation.

$$DSI_i^{raw} = 1 - \left(\frac{\text{Outstanding Debt}_i}{GSDP_i} \right)$$

The debt ratio is reversed so that a larger debt burden indicates poorer fiscal sustainability. Consequently, higher values of DSI indicate enhanced performance.

$$DSI_i = \frac{DSI_i^{raw} - \min(DSI^{raw})}{\max(DSI^{raw}) - \min(DSI^{raw})}$$

After normalisation, the DSI_i ranges between 0 and 1, with a higher value (closer to 1) reflecting stronger debt sustainability.

The combination of DI, OREI, EQI, and DSI provides a comprehensive assessment of a government's fiscal performance.

$$FPI_i = \frac{1}{4} (DI_i + OREI_i + EQI_i + DSI_i)$$

The Fiscal Performance Index accurately reflects both the current fiscal efficiency and the potential for long-term stability and fiscal well-being.

4. Results and Analysis

A composite Fiscal Performance Index (FPI) was used to measure the fiscal performance of Non-Special Category States (NSCS) and Special Category States (SCS) from 1991-92 to 2023-24 (see Appendices 2 & 3). The performance of states is evaluated in four sub-periods:

- P1: 1991–92 to 1999–2000
- P2: 2000–2001 to 2009–2010
- P3: 2010–2011 to 2019–2020
- P4: 2020–21 to 2023–24

The final sub-period (P4: 2020–21 to 2023–24) is treated as a distinct shock phase, capturing the fiscal impact of the COVID-19 pandemic. Results for this period are interpreted with caution due to its shorter duration compared to earlier periods. This temporal segmentation allows the identification of long-term trajectories and short-term shifts in fiscal outcomes.

4.1 Fiscal Performance of Non-Special Category States

Non-Special Category States (NSCS) exhibit greater heterogeneity and volatility in fiscal performance compared to SCS. The mean FPI of NSC states is 37.5587, which is lower than that of SC Sat 49.8544, indicating structural constraints and greater reliance on own revenue efforts. The difference in mean FPI of SCS is found to be 12.29578 points higher than NSC states, which is statistically significant at the 1 per cent level of significance. The composite scores and rankings of NSCS and SCS in four sub-periods, along with their mean FPI, are reported in Table 1. The findings indicate considerable heterogeneity.

Table-1
Composite Fiscal Performance Index (FPI), Mean FPI and SD of Special Category States and Non-Special Category States during 1991–92 to 2023–24

States	CI (1991–92 to 1999–2000)	Rank (P1)	CI (2000–01 to 2009–10)	Rank (P2)	CI (2010–11 to 2019–20)	Rank (P3)	CI (2020–21 to 2023–24)	Rank (P4)	Mean FPI	SD
Non-Special Category States										
Andhra Pradesh	35.76	12	33.23	12	35.51	14	34.20	12	34.68	1.18
Odisha	35.32	13	42.29	3	46.13	2	45.10	1	42.21	4.87
Bihar	27.73	15	30.31	14	37.48	9	32.13	15	31.91	4.13
Goa	38.04	8	45.17	1	46.50	1	38.63	6	42.09	4.37
Gujarat	39.79	5	34.99	10	37.79	8	41.20	2	38.44	2.69
Haryana	41.85	1	42.65	2	41.88	3	38.87	5	41.32	1.67
Karnataka	41.03	3	39.29	5	39.86	5	39.77	4	39.99	0.74
Kerala	38.16	7	37.15	8	36.98	12	34.50	10	36.70	1.56
Madhya Pradesh	37.12	9	37.47	6	39.58	6	37.58	7	37.94	1.12
Maharashtra	41.65	2	37.28	7	39.03	7	40.48	3	39.61	1.89
Punjab	37.04	10	35.06	9	35.52	13	34.37	11	35.50	1.13
Rajasthan	38.50	6	33.64	11	37.34	10	33.77	13	35.81	2.48
Tamil Nadu	39.81	4	39.75	4	39.99	4	37.16	8	39.18	1.35
Uttar Pradesh	34.62	14	32.73	13	37.28	11	37.04	9	35.42	2.16
West Bengal	36.12	11	29.58	15	32.27	15	32.34	14	32.58	2.69
Mean FPI Non-Special Category States (NSCS) during 1991–92 to 2023–24= 37.5587										
Special Category States										
Arunachal Pradesh	50.87	4	45.65	7	53.10	5	51.98	4	50.40	3.30
Assam	53.50	1	55.44	1	56.75	1	55.18	1	55.22	1.34
Himachal Pradesh	51.78	2	49.21	4	55.27	3	53.39	2	52.41	2.57
Manipur	47.69	6	45.83	6	49.16	8	49.36	7	48.01	1.63
Meghalaya	50.88	3	50.17	3	53.36	4	50.71	5	51.28	1.42

States	CI (1991-92 to 1999-2000)	Rank (P1)	CI (2000-01 to 2009-10)	Rank (P2)	CI (2010-11 to 2019-20)	Rank (P3)	CI (2020-21 to 2023-24)	Rank (P4)	Mean FPI	SD
Mizoram	45.34	8	37.53	9	47.89	9	44.78	9	43.89	4.45
Nagaland	42.41	9	45.48	8	50.09	7	47.45	8	46.36	3.24
Sikkim	48.25	5	51.41	2	56.53	2	52.36	3	52.14	3.42
Tripura	46.53	7	47.35	5	51.82	6	50.21	6	48.98	2.47

Mean FPI Special Category States (SCS) during 1991-92 to 2023-24= 49.8544

Mean FPI differences between SCS and NSCS = -12.29578* (001)

Source: Authors' calculations based on official state-level fiscal and macroeconomic data obtained from the Reserve Bank of India, *State Finances: A Study of Budgets* (various issues, 1991-92 to 2023-24); *Handbook of Statistics on Indian States* (various issues, 1991-92 to 2023-24); and MOSPI/NSO *Gross State Domestic Product (GSDP)* series (1991-92 to 2023-24).

Notes: (i) CI denotes Composite Index value derived from Deficit Index (DI), Own Revenue Effort Index (OREI), Expenditure Quality Index (EQI) and Debt Sustainability Index (DSI).

(ii) Higher CI values indicate better fiscal performance.

(iii) Period averages are computed from annual index values.

(iv) The final period (P4) corresponds to the COVID-19 shock phase and is interpreted with caution.

(v) Mean FPI represents the average Composite Fiscal Performance Index value for each state over the entire study period (1991-92 to 2023-24).

(vi) SD denotes the standard deviation of annual FPI values, capturing inter-temporal volatility in fiscal performance.

(vii) Higher Mean FPI values indicate stronger overall fiscal performance, while higher SD values reflect greater variability over time.

(viii) significant at 1 per cent level of significance

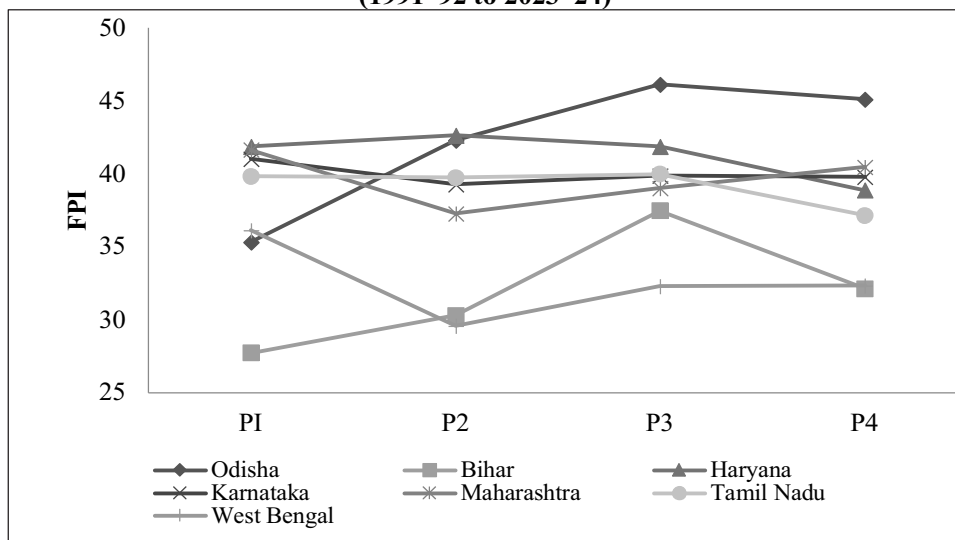
Rapid Improvement - Odisha: Odisha, with a 13th position in P1 (CI: 35.32), moved to 1st in P4 (CI: 45.10) with steady increases in deficit control, revenue mobilisation, and debt sustainability. This improvement is attributed to fiscal reforms in the early 2000s and better debt management, which represents the most dramatic turnaround among NSCS.

Stable Leaders - Haryana and Maharashtra: Haryana was in 1st place with P1 (CI: 41.85) and in 5th place with P4 (CI: 38.87). Maharashtra was resilient, ranking second in P1 (CI: 41.65) and was subsequently upgraded to third rank in P4 (CI: 40.48).

Stable Performers -Tamil Nadu and Karnataka: Tamil Nadu was stable in the middle (4th in P1 at CI 39.81; 8th in P4 at CI 37.16). The same case with Karnataka (3rd in P1 at CI 41.03; 4th in P4 at CI 39.77).

Declining or Weak States: Bihar and West Bengal. Bihar consistently ranked 15th in P1 (CI: 27.73) and maintained the same position in P4 (CI: 32.13). The main cause of this stagnation is weak revenue mobilisation and high fiscal dependence. West Bengal also dropped from 11th in P1 (CI: 36.12) to 14th in P4 (CI: 32.34), indicating inert debt stress and poor expenditure quality, which caused sustained fiscal vulnerabilities.

Figure-1
Trends in Composite Fiscal Performance Index (FPI) for Selected Non-Special Category States, Showing Improvers and Decliners across Sub-Periods (1991–92 to 2023–24)



Accordingly, it can be seen, that while certain NSCS have shown significant fiscal reforms as well as improvement in performance (especially Odisha), others continue to face structural weaknesses. This explains the high dispersion in the fiscal performances within the NSC group (Figure 1). These results demonstrate a divergence between states on the path towards reform-induced fiscal resilience (e.g., Odisha, Maharashtra) and those exhibiting persistent fiscal vulnerability (e.g., Bihar, West Bengal), rather than a uniform fiscal trend across Non-Special Category States.

Figure 1 illustrates the evolution of the Composite Fiscal Performance Index (FPI) over time among the selected Non-Special Category States, highlighting those with consistently improving performance and others experiencing relative fiscal erosion. In Odisha, the trend has been sharply upward, indicating sustained and uninterrupted improvement in fiscal discipline, revenue mobilisation, and debt sustainability. Bihar and West Bengal, on the other hand, exhibit somewhat poorer and less stable results, indicating that they remain structurally constrained. Other states, such as Maharashtra, Haryana, Tamil Nadu, and Karnataka, demonstrate relatively stable trends with moderate changes over time. The last sub-period (P4), attributed to the shock years of the COVID-19 pandemic, is characterised by an overall weakening or reduction in the values of FPI across the states, highlighting the negative fiscal effect of the pandemic and the need to pay careful attention to short-term trends.

4.2 Fiscal Performance of Special Category States

Special Category States (SCS) exhibit a comparatively higher average score on the Composite Fiscal Performance Index (FPI) as compared to the Non-Special Category States (NSCS). A few of the SCS with above-average FPI value exceeding 50 across all four periods (P1 to P4) experienced relatively strong and consistent fiscal performance. This improvement can be attributed to increased intergovernmental transfers and a more favourable expenditure composition. Table 1 presents the Composite Fiscal Performance Index (FPI) of Special Category States from 1991-92 to 2023-24, providing valuable insights into their fiscal dynamics.

Constant Leader - Assam: Assam has consistently maintained top position (1st rank) in all four periods, with composite scores ranging from 53.50 (P1) to 55.18 (P4). This sustained leadership reflects relatively better fiscal management and efficient utilisation of central transfers over time.

Significant Improvement - Sikkim and Arunachal Pradesh: Sikkim rose from 5th place in P1 (CI: 48.25) to 2nd place in P3 (CI: 56.53) and fell to 3rd place in P4 (CI: 52.36) in changing 5th place in P1 to 2nd place in P3 and then to 3rd place in P4, which can be seen as is an improvement in the revenue capacity and expenditure management. Moderate improvement was also observed in Arunachal Pradesh, with notable inter-period variance.

Stable Performers - Himachal Pradesh and Meghalaya: Himachal Pradesh remained highly rated in terms of average (2nd in P1 with CI 51.78; 2nd in P4 with CI 53.39), indicating that fiscal outcomes are likely to remain stable over the long term. Meghalaya (3rd in P1 with CI 50.88; 5th in P4 with CI 50.71) did not exhibit any stark performance, and the inter-period volatility was also not particularly high.

Weak, Relatively and Consistently Low Performance - Mizoram and Nagaland: Mizoram had fallen to 9th place in P1 (CI: 45.34) and 8th place in P4 (CI: 47.45), but Nagaland never managed to be higher than 9th in P1 (CI: 42.41) or 8th in P4 (CI: 47.45). These trends indicate persistent financial difficulties, despite increased central funding.

Figure 2 suggests that the overall trend in the FPI scores of SCS during the 1990s and 2000s shows a general increasing trend, followed by relative stabilisation in the later periods. This pattern demonstrates long-run stability by avoiding high volatility. Among the most significant improvements was that of Sikkim, where the FPI increased sharply from 48.25 in P1 to 56.53 in P3, reflecting effective fiscal consolidation during the middle periods. However, this positive trajectory was not uniform across all SCS. In Jammu and Kashmir, Nagaland, and Tripura, fiscal performance remained stagnant and more volatile, with FPI values generally trending 44 and 47. This indicates persistent challenges

in transforming central fiscal transfers into sustained gains in revenue collection and expenditure efficiency.

On the whole, SCS exhibit relatively stronger fiscal position and lower levels of fiscal stress compared to NSCS, though they display a high level of intra-category disparity. On the one hand, a cluster of states (such as Assam, Sikkim, Himachal Pradesh) demonstrates consistently good and stable fiscal performance. On the other hand, structural and fiscal constraints remain systematic and persistent in certain individual states (such as Nagaland, Tripura, Jammu & Kashmir), highlighting the heterogeneity within the of Special Category States.

Figure-2
Temporal Trends in Composite Fiscal Performance Index (FPI) of Special Category States across Sub-Periods (1991–92 to 2023–24)

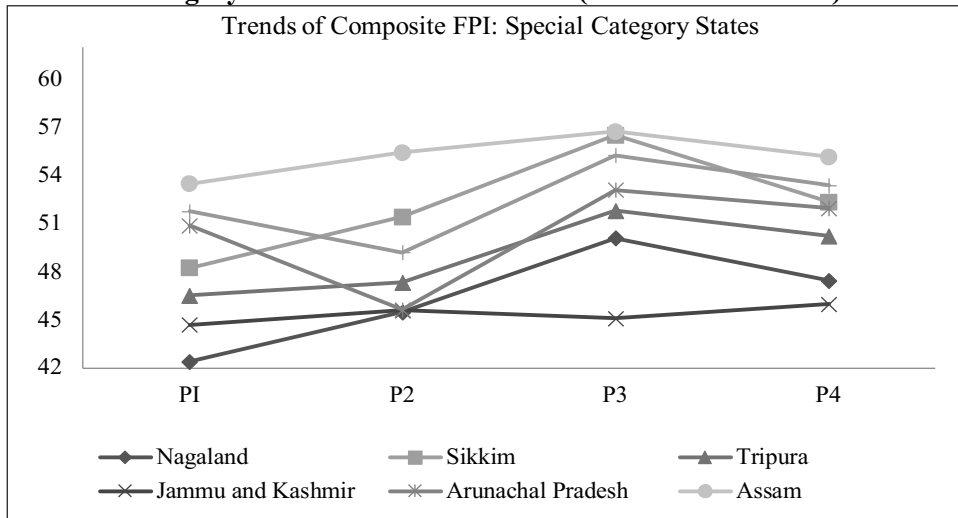


Figure 2 depicts the temporal evolution of the Composite Fiscal Performance Index (FPI) for Special Category States across the four sub-periods. The figure highlights relatively higher and more stable FPI values for several SCS, reflecting the role of sustained intergovernmental fiscal transfers and expenditure support. Assam, Sikkim, and Himachal Pradesh are the states that have performed very well with minimal volatility over the years. Conversely, Jammu and Kashmir, Nagaland, and Tripura exhibit higher fluctuations and lower FPI values, which indicate long-term structural and fiscal restraint. The last sub-period (P4), which reflects the years of the COVID-19 shock, exhibits a moderate softening of the FPI values in the vast majority of states, underscoring the pandemic's impact on state budgets and rendering the interpretation of short-term changes somewhat tentative.

4.3 Classification of States by Temporal and Regional Trends

Based on average composite scores, the states were classified into three groups:

High Performers (CI $\geq$ 45): The Special Category States are mostly dominated by Assam (55.22%), Himachal Pradesh (52.41%), Sikkim (52.14%), and Meghalaya (51.28%). The CI in Assam was maintained at 53, and in Sikkim at 56.53 in P3, indicating that the fiscal performance and results were relatively high and the situation remained stable over the years (Table 1).

Medium Performers (CI 35-44.99): Non-Special category states that are industrialised, such as Maharashtra (39.61), Karnataka (39.99), Tamil Nadu (39.18) and reform state Odisha (42.21). Haryana and Maharashtra started on a high (1st and 2nd in P1) but still dropped to 5th and 3rd in P4. On the other hand, Odisha improved its position to 13th in P1 (35.52) and first in P4 (45.10), which was due to long-term fiscal reforms and better debt management (Table 1).

Low Performers (CI < 35): States with a large population, Non-Special Category, which comprise mostly Bihar (31.91), West Bengal (32.58) and Andhra Pradesh (34.68). The CI of Bihar increased slightly between 27.73 (P1) and 32.13 (P4), but it was still one of the lowest-ranking states in various periods. In West Bengal, the CI decreased by 36.12 per cent (P1) to 32.34 per cent (P4), indicating that fiscal pressure and the lack of improvement persist over time (Table 1).

4.4 Conclusion and Policy Implications

The results indicate consistent and growing variations among Indian states, with Special Category States generally reporting superior and more consistent fiscal performance, whereas Non-Special Category States exhibit greater heterogeneity due to variations in governance quality and the intensity of reforms. Interestingly, the sustained development of Odisha represents a reform-driven fiscal transformation, mainly due to early fiscal correction through debt restructuring under the Twelfth Finance Commission, rigorous fiscal discipline following the FRBM framework, improved non-tax revenues, prioritisation of capital and development expenditure, and strengthened public financial management systems. In contrast, states such as Bihar and West Bengal have remained under persistent structural and fiscal constraints. The COVID-19 era represents a unique phase of fiscal stress, underscoring the relevance of resilience-driven fiscal structures. As identified in the analysis, long-lasting fiscal resilience cannot be achieved solely based on the size of the economy, it also depends on institutional capacity, sound policy decisions, and the effective utilisation of fiscal resources.

The analysis provides several policy implications. First, differentiated policies are needed, with a focus on mobilising own revenue and addressing spending inefficiencies. Second, greater attention to expenditure quality and

balanced debt management is essential to prevent fiscal slippage, particularly in medium-performing states (such as, Maharashtra, Karnataka, and Odisha), especially in the post-pandemic fiscal environment. Third, in low-performing states (such as, Bihar and West Bengal), revenue mobilisation through enhanced tax compliance must be strengthened to increase fiscal capacity and enable more effective governance, even with central assistance. Finally, the devolution criteria should be revisited to reward high-performing NSCS for continuing their reform efforts, while ensuring continued full support for fiscally constrained SCS.

Limitations of the Study

The research has some limitations. First, it relies solely on secondary fiscal data from authoritative sources; however, over time, these data may be subject to definitional changes, accounting revisions, and shifts in the base year. Second, the Fiscal Performance Index is a relative composite measure; its results depend on the selection of indicators, normalisation, and equal-weight aggregation. Hence, rankings ought to be viewed as relative and not absolute fiscal standards. Third, the period covering the COVID-19 shock (2020-21 to 2023-24) reflects an unprecedented fiscal disruption, which may amplify short-term stress and limit long-run general ability. Fourth, the exclusion of Union Territories, off-budget liabilities, and qualitative aspects of governance limits the comprehensive evaluation of fiscal risk. Finally, the analysis is descriptive and does not establish causal relationships between policy interventions and fiscal outcomes. However, future research could examine the impact of GST implementation on revenue autonomy and tax effort across states. Additionally, incorporating fiscal risks for disaster-prone and agrarian states would be useful for integrating climate shocks into assessments of debt sustainability and expenditure quality.

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Appendix-1
Major Sub-Indices of Non-Special Category States for the year 1991-92 to 2023-24

State	1991-92 To 1999-2000				2000-01 To 2009-10				2010-11 To 2020-21				2020-21 To 2023-24			
	DI	OREI	EQI	DSI	DI	OREI	EQI	DSI	DI	OREI	EQI	DSI	DI	OREI	EQI	DSI
Andhra Pradesh	52.45	14.98	24.65	50.98	52.84	15.30	27.71	37.09	55.12	12.34	24.89	50.40	50.70	9.27	27.93	48.88
Odisha	49.39	15.60	31.17	45.13	61.51	46.89	24.00	36.75	74.51	27.16	14.89	67.33	80.62	18.06	16.81	64.91
Bihar	47.31	9.92	20.79	32.89	59.46	4.75	22.52	34.49	71.14	5.21	16.71	56.79	50.07	4.93	22.18	51.35
Goa	60.72	27.46	18.62	45.35	56.74	54.73	22.46	46.76	65.80	49.05	18.18	52.98	66.18	19.09	19.27	49.99
Gujarat	58.15	18.31	24.13	58.57	55.17	8.38	31.10	45.31	62.49	9.25	23.18	57.04	66.84	13.64	24.80	59.52
Haryana	58.45	27.10	20.90	60.98	63.27	29.51	22.39	55.43	55.71	25.65	29.29	56.47	54.22	15.36	39.11	46.79
Karnataka	62.89	15.32	20.54	65.36	64.49	9.43	21.89	61.33	65.74	8.59	20.80	64.76	61.09	12.91	26.67	58.42
Kerala	56.80	14.33	24.13	57.37	53.15	21.57	26.98	46.91	53.40	18.08	24.93	51.21	52.41	13.41	28.86	43.30
Madhya Pradesh	57.36	15.66	19.77	55.68	61.94	13.73	24.55	49.64	68.40	9.46	19.98	61.03	59.35	9.48	24.22	57.26
Maharashtra	61.72	17.94	22.77	64.16	59.22	9.16	26.77	53.98	65.87	9.48	20.38	61.31	61.95	12.96	24.01	62.98
Punjab	50.57	23.11	30.60	43.88	49.78	23.45	30.04	36.96	51.97	15.96	30.72	42.48	47.41	11.03	44.05	34.97
Rajasthan	55.51	15.65	28.98	53.86	54.51	13.37	28.02	38.65	57.38	12.40	25.57	53.90	49.39	11.68	27.02	47.01
Tamil Nadu	58.66	14.51	21.11	64.98	63.30	14.75	22.12	58.83	60.53	14.22	24.73	60.77	52.22	13.31	32.53	50.58
Uttar Pradesh	50.92	11.32	29.93	46.33	54.45	10.32	29.73	36.42	69.25	9.54	17.71	52.59	68.63	7.74	18.81	52.98
West Bengal	51.06	10.47	31.62	51.35	40.12	10.08	43.79	24.32	54.46	8.87	26.01	39.77	53.50	7.28	27.59	41.00

Source: Authors' calculations based on official state-level fiscal and macroeconomic data obtained from the Reserve Bank of India, *State Finances: A Study of Budgets* (various issues, 1991-92 to 2023-24); *Handbook of Statistics on Indian States* (various issues, 1991-92 to 2023-24); and MOSPIN/NSO Gross State Domestic Product (GSDP) series (1991-92 to 2023-24).

Appendix-2
Major Sub-Indices of Special Category States for the year 1991-92 to 2023-24

States	1991-92 TO 1999-2000				2000-01 TO 2009-10				2010-11 TO 2019-20				2020-21 TO 2023-24			
	DI	OREI	EQI	DSI	DI	OREI	EQI	DSI	DI	OREI	EQI	DSI	DI	OREI	EQI	DSI
Arunachal Pradesh	75.16	4.04	35.16	89.10	57.09	7.72	41.05	76.75	70.53	14.77	36.69	90.43	72.21	13.91	34.92	86.87
Assam	56.29	34.61	39.57	83.53	56.87	41.50	40.53	82.87	55.90	41.19	37.89	92.01	48.03	40.18	42.83	89.69
Himachal Pradesh	43.00	32.90	52.21	79.01	41.58	39.50	52.34	63.41	52.04	46.31	42.71	80.02	46.64	43.06	44.44	79.43
Manipur	53.62	6.49	43.98	86.67	55.04	7.86	46.18	74.22	62.92	14.52	37.14	82.07	56.39	14.97	39.04	87.04
Meghalaya	54.94	17.14	40.17	91.28	54.77	21.49	40.08	84.34	54.77	31.46	38.09	89.12	49.57	26.62	40.69	85.95
Mizoram	55.05	4.61	37.95	83.76	37.29	5.82	43.73	63.30	55.97	12.91	38.09	84.58	49.40	12.78	28.00	88.95
Nagaland	34.69	6.53	46.82	81.58	54.25	7.20	40.56	79.89	58.52	21.38	37.15	83.32	54.04	15.26	37.62	82.88
Sikkim	48.62	17.17	39.58	87.63	64.43	25.14	35.52	80.55	59.37	37.68	37.75	91.33	49.70	30.16	41.66	87.91
Tripura	53.54	9.69	39.07	83.82	58.97	15.59	38.61	76.22	57.38	24.36	38.13	87.42	54.90	21.76	37.73	86.45

Source: ibid



GOVERNMENT, RBI, AND NABARD INITIATIVES IN TRANSFORMING THE AGRIBUSINESS START-UP ECOSYSTEM

Vinod Kumar Vidyarthi¹ and Shivangi Shubham²

Abstract: This paper analyses the evolving agri-startup ecosystem in India, with particular emphasis on the role of the Government of India, the Reserve Bank of India (RBI), and the National Bank for Agriculture and Rural Development (NABARD) in promoting rural entrepreneurship and innovation-led agricultural growth. Based on secondary data sourced from institutional publications of NABARD, RBI, and the Ministry of Agriculture & Farmers' Welfare, the study reviews key policy initiatives, financial instruments, and institutional mechanisms influencing the sector. The paper examines the outcomes of interventions such as RKVY-RAFTAAR, the Agriculture Infrastructure Fund, and the Agri Accelerator Fund, along with targeted equity and venture support through NABVENTURES and the AgriSURE Fund, in strengthening startup incubation, investment flows, and agricultural value chains. While the agri-startup ecosystem has demonstrated notable expansion, supported by increased agri-technology adoption and investor participation, structural constraints persist, particularly in relation to long-term financing, market fragmentation, and limited technology penetration among small and marginal farmers. The findings underscore the need for a coordinated ecosystem approach, enhanced capital deployment, and scalable technology-driven models to ensure inclusive and sustainable integration of smallholders into modern agricultural value chains.

Introduction

Agriculture is one of the most significant sectors of the Indian economy. It supports the livelihoods of most of the population in rural areas and contributes

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significantly to food and nutrition security in the country. As many as 65 per cent of rural households still depend directly or indirectly on agriculture for their livelihoods and it employed about 46 per cent of the working population (PLFS, 2024). Although the share of agriculture and allied sectors in the total gross value-added (GVA) of the country at current prices has generally declined over the past few years on account of the relatively higher growth performance of secondary and tertiary sectors, the agriculture and allied sectors continue to contribute approximately 17 per cent of India's GVA at current prices, underscoring their sustained macroeconomic relevance (MoSPI, 2026).

Encouragingly, consumer preferences are shifting towards high-value perishables, processed foods, and nutritionally dense produce, creating a fresh impetus to reconfigure India's agricultural architecture. The country's food processing industry, valued at US\$ 300 billion, is projected to grow at 10 per cent CAGR through 2028, underpinned by rising urban demand, export competitiveness, and supportive policy initiatives (IBEF, 2024). The growing integration of global economies presents an opportunity for increased vertical and horizontal integration of production clusters in developing countries with the global consumption market. India, as one of the leading global producers of many agricultural commodities, has immense potential to benefit from such integration, particularly in terms of increased value realisation for players in agricultural value chains.

Launched by the Government in 2016, Startup India initiative has laid a robust foundation for sustained growth of the startup ecosystem in the country. As of 10 December 2025, a total of 201335 startups has been recognised by DPIIT, and these start-ups have created over 21 lakh jobs across the country (Ministry of Commerce & Industry, PIB, 10 December 2025). Within this evolving landscape, agribusinesses and startups are playing a catalytic role. India today hosts 2096 agri-tech startups, offering innovations in precision farming, traceability, input optimisation, and climate-resilient models. These ventures attracted USD 500 million in funding in 2023, signalling robust investor interest in agri-innovation (AgFunder & Omnivore, 2024).

Despite these opportunities, the benefits of such developments are yet to be realised among small and marginal farmers sustainably. The integration of smallholder farmers in global agricultural value chains is constrained by factors such as small farm size, low productivity, a deteriorating natural resource base, impacts of climate volatility, access to technology and quality inputs, a shortage of and increasing cost of labour, huge wastage, lack of post-harvest storage and marketing infrastructure, and low processing levels (Improving agricultural value chains in Uttar Pradesh, Asian Development Bank, 2021).

Access to credit remains a core constraint. While the total agricultural credit disbursed in FY 2023–24 reached ₹25.5 lakh crore, and ₹28.7 lakh crore

had been disbursed in FY 2024–25 (NABARD, 2025), most of this is absorbed by input-linked short-term loans, with limited flow to early-stage rural enterprises.

Literature Review

Existing literature highlights that agri-startups play a crucial role in addressing inefficiencies in agricultural value chains by improving access to technology, finance, and markets (World Bank, 2022). Bhooshan and Kumar (2020) observe that while India has witnessed rapid growth in agri-innovation, scalability remains constrained by fragmented landholdings and limited risk capital. The Asian Development Bank (2021) notes that benefits of agribusiness development often bypass smallholders due to weak aggregation and infrastructure gaps. These insights underline the importance of institutional de-risking mechanisms, which this study evaluates.

Data and Methodology

The study adopts a descriptive and analytical research design using secondary data. Trend analysis and comparative assessment are used to evaluate funding flows, incubation outcomes, and institutional interventions supporting agri-startups. The study utilises secondary data drawn from official publications and institutional databases including the Annual Reports of NABARD (2019–2025), the Ministry of Agriculture & Farmers' Welfare (RKVY-RAFTAAR scheme), and Reserve Bank of India's data on agricultural credit (2023–2025). Agri-startup proliferation was analysed using PIB-published state-level startup listings and investment flow trends. Financial support data from RKVY-RAFTAAR and NABARD's AgriSURE Fund, Rural Business Incubation Centre (RBIC), and AIF initiatives were consolidated to assess spatial and temporal trends. The paper also incorporates updated policy announcements and budgetary documents to contextualise institutional responses.

Results and Discussion

Current Status of Agri-startups in India

Over the past two decades, the Government of India has launched a series of strategic interventions aimed at revitalising the agricultural sector through entrepreneurship, innovation, and infrastructure-led growth. These include flagship missions such as the Startup India Initiative, Atmanirbhar Bharat, PM Formalization of Micro Food Processing Enterprises (PMFME), and the Agriculture Infrastructure Fund (AIF).

Within this policy landscape, the Rashtriya Krishi Vikas Yojana (RKVY), originally launched in 2007 as a state-driven investment scheme in agriculture, has evolved into a dynamic platform supporting agri-entrepreneurship and value chain development. Rebranded as RKVY-RAFTAAR (Remunerative Approaches for Agriculture and Allied Sector Rejuvenation) in

2017, the scheme now emphasises innovation-led growth, especially through its Innovation and Agri-Entrepreneurship Development component.

Table-1
State-wise Agri-Startups in India

States and UTs	Total Number of Startups
Andhra Pradesh	61
Arunachal Pradesh	13
Assam	49
Bihar	48
Chhattisgarh	79
Goa	2
Gujarat	47
Haryana	84
Himachal Pradesh	33
Jammu & Kashmir	24
Jharkhand	7
Karnataka	211
Kerala	97
Madhya Pradesh	68
Maharashtra	226
Manipur	22
Meghalaya	2
Mizoram	25
Nagaland	2
Odisha	61
Punjab	52
Rajasthan	66
Tamil Nadu	137
Telangana	98
Tripura	13
Uttar Pradesh	86
Uttarakhand	32
West Bengal	17
Delhi NCR	41
Andaman and Nicobar	1
Chandigarh	3
Pondicherry	1
Total	1708

Source: 26 July 2024, PIB

This component facilitates a structured incubation pipeline for early-stage agri-startups through a network of Knowledge Partners (KPs) and RKVY Agribusiness Incubators (R-ABIs). Selected startups undergo rigorous mentoring, prototype validation, and business model refinement, and are eligible for financial assistance of up to ₹25 lakh. Start-ups are taking projects in various fields of agriculture and allied sectors like Precision agriculture including applications of Sensor, Artificial Intelligence (AI), Internet of Things (IoT), Information & Communication Technology (ICT), & drone, Farm Mechanisation, Post-Harvest, Management of Biomass, Food Technology & Value addition, Supply Chain and Agriculture logistics & agriculture inputs, Waste to Wealth & Green Energy in Agriculture & Organic Farming, Allied Sectors, etc. As of December 2025, the scheme had incubated 2096 startups across 30 States and Union Territories, collectively receiving more than ₹168 crore in support. RKVY-RAFTAAR has thus emerged as a cornerstone initiative bridging the gap between public policy and grassroots innovation in India's evolving agri-tech ecosystem.

The state-wise list of agriculture start-ups (as of July 2024) in the country supported under “Innovation and Agri-Entrepreneurship Development” programme of Rashtriya Krishi Vikas Yojana (RKVY) is given in Table 1.

So far, 6 Knowledge Partners (KPs) and 24 RKVY Agribusiness Incubators (R-ABIs) have been set up for training & incubation of agri-startups and implementation of this programme. A total of 1708 agri-startups in various fields of agriculture & allied sector have been supported with technical and financial assistance of ₹122.50 crore from 2019-20 to 2023-24 (Table 2).

Table-2
Financial Support to Agri-Startups during 2019-20 to 2023-24

Year	Total number of startups supported	Total fund released to startups (₹ in crore)
2019-20	58	3.13
2020-21	588	27.43
2021-22	277	20.34
2022-23	253	24.35
2023-24	532	47.25
Total	1708	122.50

Source: 30 July 2024, PIB

Agri-startups supported under the programme are at various stages of implementation from idea to scaling and growth stage. These agri-startups are working in different areas of agriculture & allied sectors such as precision agriculture, farm mechanisation and innovations, agri logistics & supply chain,

waste to wealth, organic farming, animal husbandry, dairy, fisheries, natural resource management, information and communication technology, block chain technology, artificial intelligence, internet of things, online or virtual platform, secondary agriculture, renewable energy, etc. The emerging technologies and products developed by Agri-startups are providing various affordable and innovative solutions by modernising farming techniques in agriculture and allied sectors in the country. These startups are leveraging cutting-edge technology, data analytics, and sustainable practices to address the various challenges faced by farmers using traditional farming methods in the country.

GoI is implementing “Agriculture Infrastructure Fund” scheme from 2020-21 onwards with an objective to provide medium to long term debt finance facility for investment in viable projects for post-harvest management and community farming assets through interest subvention and credit guarantee support to the eligible beneficiaries, including farmers, agri entrepreneurs, startups, etc.

The Agriculture Infrastructure Fund (AIF) has witnessed substantial uptake since its launch, reflecting strong demand for post-harvest and value-chain infrastructure financing. As per the AIF portal database on 19 January 2026, the scheme has registered over 3.05 lakh beneficiaries, with 3.01 lakh applications seeking loans amounting to ₹1.22 lakh crores. As of the latest update, a total of 1.50 lakh projects has been sanctioned, involving an aggregate sanctioned amount of ₹80,062 crores. Of this, Scheduled Commercial Banks (SCBs) have sanctioned ₹77,771 crores, accounting for nearly 97 per cent of total sanctions, while Cooperative Banks have sanctioned ₹2,291 crores, indicating relatively lower participation at the cooperative level.

On the disbursement front, 1.39 lakh projects have received disbursements, with total funds disbursed amounting to ₹58,858 crores. Disbursements by Scheduled Commercial Banks stood at ₹57,671 crores, whereas Cooperative Banks accounted for ₹1,186 crores.

Besides, the Ministry of Agriculture & Farmers' Welfare, GoI has approved the establishment of an Agri Accelerator Fund of ₹300 crores for three years starting from 2023-24 to support the agriculture start-up ecosystem. The Agri Accelerator Fund is designed to scale up start-ups with innovative technologies that have the potential to transform the agriculture sector.

RBI's Role in Supporting Agri-Startups

Enabling Digital Lending: The RBI Innovation Hub (RBIH), a wholly-owned subsidiary of the RBI, has collaborated with the National Bank for Agriculture and Rural Development (NABARD) to revolutionise digital agri-lending. They are integrating NABARD's e-Kisan Credit Card (eKCC) platform with the Public Tech Platform for Frictionless Credit (PTPFC).

Providing a Platform: The PTPFC allows for seamless and consented access to various data sources (like digital land records and satellite data) to make credit underwriting for farmers and agri-startups more efficient and transparent.

Regulatory Frameworks: An RBI paper highlighted that the Indian agritech sector is thriving with many "soonicons" and "minicons" (startups close to becoming unicorns) that benefit from government funding and state-backed digital infrastructure. The RBI also issues NBFC (Non-Banking Financial Company) licenses to eligible fintech firms like Agrosperity (KiVi), which specifically focus on rural and agricultural credit access.

Policy Initiatives: The RBI mandates Priority Sector Lending (PSL) requirements for banks, encouraging them to channel credit to key sectors including agriculture. It has also increased the limit for collateral-free agricultural loans to ₹2 lakh per borrower to improve access to credit for small and marginal farmers. Further, Loans up to ₹50 crores to Start-ups that are engaged in agriculture and allied services (RBI, 2025).

While the RBI plays a crucial enabling role in the financial ecosystem, startups typically apply for funding and support through government portals and partner institutions like NABARD and various agricultural universities serving as incubators.

Channels of NABARD's Startup Support Ecosystem

Strategic Investments and Venture Capital Support

NABARD as the development bank of the nation has a mandate to foster rural prosperity and strengthen the process of agriculture development in the country. At present, NABARD support the agri-startups through the network of Incubation Centres that have been promoted and, also through contributions to SEBI registered Alternate Investment Funds (AIF).

Agri SURE Fund: High-Impact Agri-Startups

Further, to strengthen the rural/agri-business startup ecosystem, a dedicated fund of ₹750 crore (Agri Fund for Start-Ups & Rural Enterprises'-AgriSURE Fund) has been created on 03 September 2024 to support and scale up operations of technology-driven agri-startups and rural enterprises. The fund's potential to create an ecosystem that enhances financing for the agriculture sector through innovative approaches, benefiting small and marginal farmers. The fund would be managed by Nabventures (a wholly owned subsidiary of NABARD). Out of the total ₹750 crores corpus of the fund under the "AgriSURE" scheme, ₹250 crores each will be contributed by the Ministry of Agriculture and Farmers' Welfare (GoI) and NABARD. The remaining ₹250 crore will be mobilised from institutions including private investors. The AgriSURE Fund has two

components, (i) Agri-SURE-Fund of Funds (FoF) Scheme and (ii) Agri-SURE-Direct Scheme.

Under this fund, the priority would be to promote investments in innovative, technology driven, high-risk, high-impact activities in agriculture and allied areas. It would also provide funding support to start-ups engaged in sectors like infrastructure development and employment generation in rural areas.

The aim of the fund would be to provide investments to start-ups unable to scale up their operations for want of access to equity and debt instruments to create new forward and backward linkages in the rural ecosystem. The overall goal of the fund is to support more than 85 startups with maximum ticket size of ₹25 crores in the next ten years (GoI, 2025).

NABARD has set up NABVENTURES, a wholly owned subsidiary, which through venture growth equity funds invests in early to mid-stage start-ups in agriculture, food-based businesses, and rural financial services to boost the investment ecosystem in the core areas of agriculture, food and rural livelihoods.

Besides investments in startups through NABVENTURES, NABARD is fostering innovation and Entrepreneurship in rural India through 3 channels:

A. Rural Business Incubation Centres (RBIC)

NABARD supported Agri-Business Incubation Centres provide business support services and resources, marketing, finance to agri-startups and agri-entrepreneurs to develop them into viable commercial entities which will result in both direct and indirect benefits accruing to the farmers. NABARD provides end-to-end assistance for establishing RBICs at agricultural universities and similar institutions.

As on 31 March 2025, 10 rural/agri-business incubation centres have been supported with grant assistance of ₹94.20 crores to nurture the startups working in irrigation, seed production, bio-pesticides, bio fertilisers, precision farming, agro-processing, sanitation, energy, health, etc. A total of 1775 incubates have been supported by these RBICs and 471 startups have been registered with the Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry. These incubates and start-ups are connected with 1511 FPOs, benefitting 5.5 lakh farmer members (NABARD, 2025).

B. Catalytic Capital Fund

After the initial funding has dried up, start-ups enter a stage called Death Valley, where there is a high probability that a start-up will wind up due to lack of steady revenue and scarce additional funding, leaving the start-up vulnerable to cash flow requirements. To support the Agri-Startups entering the Death Valley phase,

NABARD has set up Catalytic Capital Fund of ₹100 crore for supporting such rural and agri-startups.

C. Contribution to Alternate Investment Funds

NABARD is contributing to SEBI registered alternate investment funds to encourage entrepreneurship in existing or new activities for catering to agriculture and rural development, to facilitate development of income-generating sustainable units for replication by rural entrepreneurs, and to promote technological innovations and technology dissemination in agricultural and rural sectors. As on 31 March 2025, the total commitment to Alternative Investment Funds by NABARD stood at ₹1069 crore in 36 AIFs.

NABARD provides opportunities for synergies amongst agri-startups and takes up the role of a policy advocator for the agri-startups. Through events like the seminar on ‘Harnessing Opportunities: NABARD transforming Agri-Landscape’ it aims to provide a common platform to venture capitalists, industry experts, chief executive officers of incubation centres, agri-startup founders and incubatees for discussion on challenges and issues faced by agri start-ups.

In summary, NABARD contributes to the startup ecosystem in rural areas by following ways:

- NABARD is a partner for GoI in several important schemes for entrepreneurship development like Stand-up India and ACABC (Agri-clinic and Agri-business Centres) scheme.
- Through RBICs and Catalytic Capital fund, NABARD is extending support, early-stage funding to startups focused on agriculture and rural innovation.
- Through NABARD’s subsidiary, NABVENTURES, NABARD is investing in mid-stage start-ups in agriculture, food-based businesses, and rural financial services to boost the investment ecosystem in the core areas of agriculture, food and rural livelihoods.
- NABARD is also promoting entrepreneurship through awareness programmes like capacity building for adoption of technology, incubation support, and capacity building while also advocating policy reforms and regulatory support to create a conducive environment for startups.
- Recently NABARD has launched RuralTech CoLab, a unified portal that brings the rural tech start-up ecosystem together. The portal will provide a platform for fintech, agritech and digital capability partners to promote innovation and co-create smart, scalable and inclusive solutions.

Challenges faced by Agri-startups: Agri-startups are facing following Challenges (Sarkar *et al.*, 2025):

Farm Size vs. Productivity: Indian farms are uneven and small as 86 per cent of farms have less than 2 hectare consequential in notably low farm yields. Small and scattered landholdings impede scalability of technology.

Lack of Business Knowledge: Many individuals prefer stable jobs in the private or government sectors, which provide a steady income and a sense of security. As a result, most people are resistant to the idea of starting a new business, viewing it as a risky venture that may require a significant financial investment.

Lack of Seed Funds: Numerous promising business ideas fail to materialize due to insufficient funding necessary to develop them into viable prototypes. This inability to secure adequate financing is a major issue that prevents many innovative ideas from becoming a reality.

Lack of Mentorship and Limited Incubation Centres: There are very few mentors available to young entrepreneurs who need crucial technological guidance during the initial stages of their ventures. Additionally, the limited number of incubation centres hampers access to necessary support, funding, and knowledge essential for scaling up a business.

Limited Access to Markets: In India, the availability of regulated markets is quite low, and many existing ones suffer from poor management. The unstructured nature of markets, along with various unethical practices, poses challenges for new businesses aiming for long-term survival. As these nascent businesses develop their products, they often face high costs, which are difficult to cover, especially when consumers—largely from mid- to low-income brackets—tend to prefer established products at lower prices, making it harder for new entrants to compete.

Investor Reluctance towards High-Risk Ventures: Agriculture startups are often viewed as uncertain investments, with low returns in their early phases. Investors generally consider these sectors too risky after experiencing a significant drop in investments in Agri-startups since 2021.

Limited Knowledge of Available Technology: Many new entrepreneurs lack awareness of the latest technological advancements, which hinders their ability to adapt and stay competitive, often resulting in losses.

Conclusion and Policy Suggestions

The study indicates that recent policy initiatives and institutional interventions have the potential to significantly strengthen India's agricultural ecosystem by facilitating investments in post-harvest infrastructure, cold chain development, and market-linked assets. These measures are expected to support higher

productivity, reduction in post-harvest losses, improved logistics efficiency, enhanced price realisation for farmers, and more resilient agricultural value chains. However, sustained impact will depend on the continued promotion of indigenous, cost-effective, and scalable technologies and business models that are aligned with the broader objective of self-reliance in agriculture.

To move forward, equal and meaningful participation from all stakeholders of the ecosystem is required (Bhooshan and Kumar, 2020). Given that a significant proportion of technologies introduced by agri-startups have not yet undergone formal validation by research institutions, there is a need to prioritise structured mechanisms for technical evaluation and certification. Such mechanisms would enhance investor confidence and facilitate improved access to institutional finance. Further, banks and financial institutions may consider adopting a more focused approach towards financing agri-startups, particularly by expanding medium- and long-term credit support beyond traditional short-term lending instruments. Strengthening the incubation ecosystem through wider coverage of agricultural universities and research institutions would also contribute to improving the quality and scalability of agri-enterprise innovations. Enhanced coordination and knowledge-sharing among incubation centres can improve programme efficiency and outcomes. Active engagement of research institutions in mentoring and technical guidance will further support refinement and commercial viability of startup innovations. Collectively, these policy measures can contribute to building a robust, inclusive, and sustainable agri-startup ecosystem aligned with national agricultural and rural development priorities.

Limitations of the Study

This study relies on secondary data from official sources, which, while credible, may not fully reflect firm-level performance variations or informal sector dynamics within the agri-startup ecosystem. The analysis is descriptive in nature and does not establish causal links between policy interventions and startup outcomes. In addition, limited availability of longitudinal data restricts assessment of long-term startup survival and scalability. Future research may address these gaps through primary surveys and impact-based evaluation methods.

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ANALYSIS OF IMPLEMENTATION OF NATIONAL SKILLS QUALIFICATIONS FRAMEWORK (NSQF) IN GOVERNMENT SCHOOLS OF HARYANA THROUGH THE JOB SATISFACTION LEVELS OF VOCATIONAL TEACHERS

Shikha Goyal¹ and Neetu Gaur²

Abstract: The effective implementation of the National Skills Qualifications Framework (NSQF) depends significantly on the job satisfaction of vocational teachers. This study examines the satisfaction levels of 113 vocational teachers across 54 Government schools in Haryana, an early pilot state for vocational education reform. Using a structured questionnaire comprising fifteen items measured on a five-point Likert scale, the study adopts a descriptive analytical approach. The instrument demonstrated acceptable reliability (Cronbach's alpha = 0.70). Findings reveal that dissatisfaction is primarily associated with extrinsic factors such as salary, job security, fringe benefits, promotional opportunities, and inadequate infrastructure. Structural issues including contractual employment, salary delays, outsourcing disparities, and lack of adequate training resources further intensify dissatisfaction. In contrast, moderate satisfaction was observed regarding student discipline and peer relationships. The findings validate Herzberg's Two-Factor Theory, highlighting the dominant role of hygiene factors in shaping dissatisfaction. By positioning teacher job satisfaction as an evaluative lens for policy implementation, the study contributes to the growing discourse on frontline governance in education reform. The study underscores the need for policy-level reforms to strengthen vocational education implementation.

Keywords: Job satisfaction, Vocational teachers, NSQF, Haryana, Education policy, Skilling

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Introduction

Context

Education is essential for realizing one's full human potential and fostering the overall development of learners, including their ability to earn a livelihood and contribute to national development. Integrating skill development with the general education enhances employability, labour productivity, and national competitiveness, thereby promoting structural transformation and economic growth (Alexander et al., 2014). Therefore, high-quality and universally accessible vocational education is crucial for India to sustain its steady progress and leadership in economic growth, science, social justice, and equality. Given the increasing importance of vocational education in the current context, the National Education Policy (NEP) 2020 promotes vocational education as a necessary component of the education system. The National Skills Qualifications Framework (NSQF), a key initiative for introducing vocational education at school level, integrates formal schooling with a competency-based framework aimed at promoting skill development. A distinguishing feature of the framework is its provision of both horizontal and vertical mobility pathways, enabling progression within and between vocational and general education streams. The NSQF was notified by the Ministry of Skill Development and Entrepreneurship on 27 December 2013 with the objective of establishing a robust national ecosystem for skills development. To ensure standardisation of qualifications, vocational courses are designed to align training and education with industrial requirements. The framework assures quality by organizing qualifications into ten levels based on professional theoretical knowledge, technical knowledge, and skills. The learning outcomes for each level are clearly defined, regardless of whether the skill is acquired through formal or informal pathways (UGC, 2013).

Implementation Actors: Role of Vocational Teachers and their Expanded Responsibilities

The primary goal of vocational education is to prepare students to function effectively in diverse productive and service-oriented work environments, and vocational teachers play a pivotal role in achieving this objective. A vocational teacher or trainer facilitates the development of competencies (knowledge, skill, and attitude) in specific vocational or occupational subjects across and higher education levels. By integrating employability skills with theoretical and practical components, vocational educators equip students to work productively in both the organised and unorganised sectors, either as wage earners or self-employed individuals. In addition to subject-matter expertise, vocational instructors must possess sound pedagogical knowledge and effective communication skills. Their responsibilities extend beyond classroom teaching to include variety of managerial and administrative tasks, such as establishing collaborations with industries and organisations, assisting students with placements, encouraging

community engagement, ensuring optimal utilisation of available resources, managing the procurement and maintenance of tools and equipment, and organising supplies. Thus, a vocational teacher is required to function not only as an educator but also as a seasoned industry professional (R.K. Pathak, 2023). Despite their crucial role in policy implementation, vocational teachers often operate within environments where infrastructure and institutional support significantly influence educational outcomes. In the absence of adequate support, their efficiency may decline due to reduced job satisfaction.

Theoretical Foundation: Why Job Satisfaction Matters for Organisational Effectiveness?

Job satisfaction is generally defined as a positive emotional and affective state resulting from the appraisal of person's work experience. Moorman (1993) pointed that, from an affective point of view, it reflects an overall positive emotional evaluation, while from a cognitive perspective, it represents a rational assessment of working conditions. Job satisfaction reflects an individual's sense of accomplishment and success at work and is commonly associated with personal well-being and productivity. Recognition, performance, and enjoyment of work are vital components of job satisfaction. It is widely acknowledged as a key determinant of organisational performance. Studies indicate that job satisfaction significantly influences employee motivation, which in turn enhances productivity and organisational success (Locke and Latham, 1990; Ahmad and Khanna, 1992).

Job satisfaction is influenced by various factors, including personal attributes, job-specific characteristics, and career development opportunities (Hackman & Oldham, 1976; Chen et al., 2004). Brown (1990) emphasised that career choices are shaped by individual goals and expectations, which subsequently influence satisfaction levels. Judge & Church (2003) further conceptualised job satisfaction as a multifaceted construct encompassing affective (emotional), cognitive (evaluative), and behavioural components.

Teachers have a critical role in ensuring quality education by imparting knowledge and skills that enable students to contribute meaningfully to the economy. However, teachers' performance can be affected by several internal and external factors, which may hinder productivity and effectiveness. Teacher burnout has been linked to school-related social and organizational characteristics, as well as teacher efficacy (Malinen & Savolainen, 2016). Research indicates that a pleasant school atmosphere is associated with improved educational outcomes, enhanced learning motivation, decreased aggression, fewer suspensions, and numerous other favourable student outcomes (Cohen et al., 2009, Thapa et al., 2013). Positive school environments are also correlated with lower stress levels, greater teacher efficacy, and higher job satisfaction (Collie et al., 2012, Hoy and Woolfolk, 1993, Lee et al., 1991, Taylor and Tashakkori,

1995). Furthermore, fostering a healthy school climate has been identified as a potential strategy for improving teacher retention (Ingersoll, 2001; Skaalvik & Skaalvik, 2011).

Problem Statement: Structural Challenges and Research Gap

Existing research shows that factors such as salary, career advancement, administrative support, and working conditions significantly influence teachers' job satisfaction. Persistent dissatisfaction may weaken motivation and hinder the effective implementation of educational policies. While teacher job satisfaction has been widely studied in mainstream academic contexts, no study has examined NSQF implementation through the lens of teacher satisfaction. Furthermore, Haryana-specific empirical evidence remains limited, and contractual vocational teachers continue to be under-researched. The present investigation therefore represents one of the first empirical attempts to assess NSQF implementation through the job satisfaction of frontline implementers.

Under the National Skills Qualifications Framework (NSQF), vocational teachers operate at the intersection of education reform and outsourced employment structures, creating unique structural challenges that remain underexplored. As frontline implementers of NSQF, vocational teachers play a crucial role in translating policy into practice. Haryana, being an early pilot state for school-level vocational education, provides a relevant context for examining these dynamics. This study therefore investigates vocational teachers' job satisfaction in Government schools of Haryana and positions it as a proxy indicator of NSQF implementation effectiveness, integrating motivational theory with a policy implementation perspective.

Literature Review

Researchers have conducted various studies to outline the distinct dimensions of job satisfaction, assess the relative significance of each dimension, and examine their impact on employees' performance and efficiency.

Theoretical Perspectives on Job Satisfaction

Maslow (1954) proposed a five-tiered hierarchy of wants encompassing physiological needs, safety, love and belongingness, esteem, and self-actualisation. Several studies have examined job satisfaction from the standpoint of need fulfillment based on Maslow's theoretical framework (Kuhlen, 1963; Worf, 1970; Conrad et al., 1985).

The two-factor theory of job satisfaction was developed by Herzberg et al. (1959). They proposed that job satisfaction and dissatisfaction are distinct, at times, independent phenomena. According to their theory, intrinsic elements, such as, accomplishment, acknowledgement, the work itself, and responsibility, leads to job satisfaction. These elements were referred to as "motivators" because they

are inherent to the work experience. In contrast, extrinsic factors, referred to as "hygiene" factors, such as, working environment, administration, supervision, pay, policy, and interpersonal relationships, are primarily associated with job dissatisfaction. This theory has served as a foundational framework for assessing job satisfaction.

Determinants of Job Satisfaction Across Sectors

Clark (1997) argued that employee dissatisfaction may arise when individuals are unhappy with their assigned tasks, lack clarity regarding workplace rules and rights, or perceive insufficient trust from upper management in decision-making processes. Such situation can lead to feelings of isolation and alienation, preventing employees from developing a sense of ownership toward the organisation. Clark further emphasised that organisations cannot afford high employees turnover due to dissatisfaction, as recruitment and training of new staff involve substantial costs.

Several studies across different professional sectors have examined the variables influencing employee job satisfaction, many of which are also applicable to the education sector. Parvin and Kabir (2011), in a study conducted within the pharmaceutical industry, found that employee satisfaction is largely influenced by working conditions, compensation, and opportunities for career advancement. Similarly, research in the tourism sector reported positive associations between job satisfaction, pay, and supervision (Yew, 2008). Raziq and Maulabakhsh (2015) emphasised that upper management should create a work environment that maximises employees' potential and competencies in order to enhance productivity. Fair compensation was identified as a crucial factor in boosting employee morale and promoting job satisfaction. Herzberg (1959) and Maslow (1954, 1987) also highlighted that the fulfillment of employees' basic needs, including adequate and equitable wages, plays a significant role in shaping satisfaction levels.

Job Satisfaction in the Educational Context

In the educational context, similar determinants have been observed. Ingersoll (2001) found that teacher job satisfaction and retention are strongly influenced by school organisational conditions, including administrative support and autonomy. Klassen and Chiu (2010) reported that teacher self-efficacy, workload stress, and years of experience significantly affect job satisfaction. Skaalvik and Skaalvik (2011) identified workload pressure, emotional exhaustion, and limited professional autonomy as key predictors of reduced teacher satisfaction. Furthermore, positive school climate and supportive leadership have been shown to enhance teacher well-being and job satisfaction (Collie, Shapka, & Perry, 2012). These findings collectively suggest that both structural (salary, policies,

work conditions) and psychological (autonomy, recognition, efficacy) factors play a vital role in shaping teachers' job satisfaction.

Vocational Teachers and Policy Context

While much of the existing literature on job satisfaction focuses on general employees or teachers in mainstream academic settings, relatively limited attention has been given to vocational teachers, particularly those working within policy-driven frameworks such as the National Skills Qualifications Framework (NSQF). Vocational teachers operate at the intersection of education and industry, where they are expected to balance pedagogical responsibilities with skill-based training aligned to market demands. This dual responsibility may intensify workplace pressures compared to conventional teaching roles.

In the Indian context, vocational teachers appointed under NSQF often face unique challenges, including contractual employment, wage disparities, limited promotional avenues, and job insecurity due to outsourcing arrangements. These conditions correspond closely with the hygiene factors identified by Herzberg (1959), suggesting a strong likelihood of dissatisfaction if such structural concerns remain unaddressed. At the same time, intrinsic motivators, such as student achievement, skill development outcomes, and professional recognition, may positively influence their commitment and engagement.

Given that teacher satisfaction is closely linked to motivation, retention, and instructional effectiveness, understanding the job satisfaction of vocational teachers, particularly in states like Haryana where the framework was introduced at an early stage, becomes essential for evaluating the successful implementation of NSQF. Moreover, the intersection of contractual employment conditions, industry alignment responsibilities, and institutional constraints under NSQF remains underexplored. Dissatisfaction stemming from systemic and/or policy-level constraints may undermine the intended objectives of the framework. Therefore, there is a need for a focused empirical investigation into the job satisfaction levels of vocational teachers under NSQF to assess how policy design and implementation practices influence their professional experiences and, consequently, the effectiveness of the framework.

Figure-1
Conceptual Framework of the Study

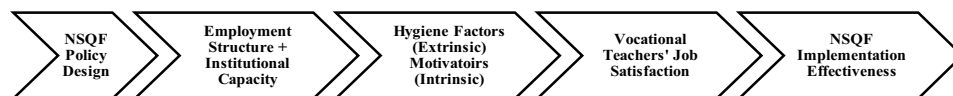


Figure 1 summarises the conceptual framework of the study. It conceptualises vocational teachers' job satisfaction as a mediating variable between NSQF policy design and implementation effectiveness. Employment

structure and institutional capacity influence both extrinsic (hygiene) and intrinsic (motivator) factors, consistent with Herzberg's Two-Factor Theory. These factors collectively shape teachers' overall job satisfaction. In turn, the level of job satisfaction affects the effectiveness and sustainability of NSQF implementation at the school level.

Objectives of the Study

Drawing upon the theoretical foundations of job satisfaction and the identified research gap concerning vocational teachers under policy-driven frameworks, the present study aims to examine the implementation of the National Skills Qualifications Framework (NSQF) in Government schools of Haryana through the lens of vocational teachers' job satisfaction. The specific objectives of the study are:

- To assess the overall level of job satisfaction among vocational teachers appointed under the NSQF in Government schools of Haryana,
- To examine the intrinsic and extrinsic factors influencing the job satisfaction of vocational teachers,
- To analyse the impact of employment conditions on vocational teachers' satisfaction levels,
- To evaluate the adequacy of institutional infrastructure and resources required for effective delivery of vocational education under NSQF,
- To assess how vocational teachers' job satisfaction reflects upon and influences the effective implementation of NSQF at the school level, and
- To suggest policy-level measures aimed at improving vocational teachers' job satisfaction and strengthening the implementation of NSQF.

Methodology

Research Design

The present study adopts a descriptive and analytical research design to examine the implementation of the National Skills Qualifications Framework (NSQF) in Government schools of Haryana through the job satisfaction levels of vocational teachers. Since the study aims to assess satisfaction levels and analyse influencing factors rather than establish causality, a quantitative survey-based approach was employed.

Study Area and Sample Design

The study selected Haryana as the study area because it was among the first northern Indian states where the Ministry of Human Resource Development launched the pilot project of the National Vocational Education and Qualification Framework (NVEQF) in government schools during the academic session 2012-13. The framework was subsequently formalised as NSQF in December 2013. A multi-stage sampling technique was adopted:

Stage I: Four districts (Ambala, Faridabad, Jhajjar, and Rohtak) were selected from the eight pilot districts based on the maximum number of schools offering vocational courses up to the session 2014–15.

Stage II: A total of 54 Government schools (rural and urban) offering NSQF courses at Levels I–IV (Classes IX–XII) were included in the study.

Stage III: Vocational teachers from these schools constituted the final respondents. Each school typically had two vocational teachers (one teacher per vocational course). One school in Faridabad had seven vocational courses, resulting in a total sample size of 113 vocational teachers.

Figure-2
Sample Design

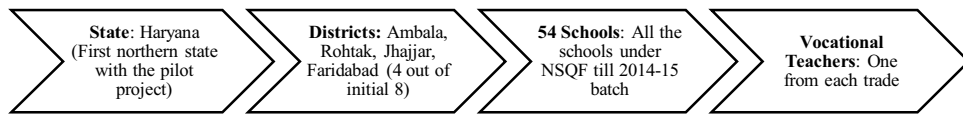


Figure 2 summarises the sampling framework, which ensures representation across institutional types, geographical locations, and varying levels of NSQF implementation.

Selection of Variables and Parameters

In alignment with the study objectives, job satisfaction was conceptualised as a multidimensional construct comprising both intrinsic (motivators) and extrinsic (hygiene) factors, consistent with Herzberg’s Two-Factor Theory. This framework guided the identification and categorisation of variables.

Based on an extensive review of literature and theoretical grounding, five major parameters comprising fifteen sub-parameters were identified: administration, workload and responsibilities, infrastructure and resources, recognition and compensation, and student response. The categorisation of parameters into intrinsic and extrinsic factors enables subsequent interpretation through Herzberg’s Two-Factor framework.

Administration parameter captures institutional support mechanisms, including prompt redressal of operational issues, individual grievance handling, and the provision of feedback in the form of appreciation or corrective measures.

Workload and responsibilities parameter assesses the time allocated to lectures and practical training across levels, the extent of clerical and administrative duties, and the availability of preparation time for instructional activities.

Infrastructure and resources parameter evaluates the availability and adequacy of well-equipped laboratories, the timely supply of NSQF curriculum books (provided exclusively through administrative channels), and access to functional computers with internet connectivity.

Recognition and compensation parameter includes opportunities for promotion, salary increments, fringe benefits such as travelling allowances and Employee State Insurance (ESI) coverage, and job security.

Student response parameter examines student interest in vocational training and discipline levels, reflecting intrinsic aspects of teaching engagement.

Although employability outcomes represent an important dimension of vocational education, they were excluded from this analysis due to limited direct placement data, as relatively few students pursue immediate employment after completing Class XII. Each sub-parameter was operationalised through measurable statements using a structured questionnaire (Table 1), ensuring direct correspondence with the study objectives and theoretical framework.

Table-1
Parameters and Sub-parameters used for Measuring Job Satisfaction

S. No.	Parameter	Sub-Parameter
1.	Administration	i) Support from administration e.g. addressal of teachers concerns regarding NSQF ii) Teacher relationships with administration e.g. personal grievances of the teachers iii) Feedback or reinforcement (punishment or appreciation) other than pay
2.	Workload and responsibilities	iv) Lecture and training hours per day v) Time spent in clerical and administrative work vi) Daily time for preparation for class
3.	Infrastructure and resources	vii) Equipment Availability viii) Supply of Books ix) Computers with Internet connection in NSQF labs
4.	Recognition and Compensation	x) Opportunity for promotion or advancement xi) Salary xii) Fringe Benefits like Travelling allowances, paid leaves etc. xiii) Job Security
5.	Student response	xiv) Student interest xv) Student discipline

Note: Initially, additional parameters such as external support were included in the data collection instrument. This dimension captured parental cooperation and local community engagement, particularly in facilitating field visits and establishing linkages with industry experts. However, preliminary analysis indicated weak correlations between these sub-parameters and overall job satisfaction. Consequently, they were excluded from the final analytical framework to maintain conceptual coherence and statistical robustness.

Instrument Development and Data Collection

Primary data were collected through a structured questionnaire designed specifically for this study. The instrument consisted of 15 statements measured on a five-point Likert scale, ranging from 1 (very dissatisfied), 2 (dissatisfied), 3 (neither satisfied nor dissatisfied), 4 (Satisfied), and 5 (very satisfied). The questionnaire was administered during field visits conducted in the academic year 2019-2020 (pre-pandemic period). Participation was voluntary, and responses were recorded confidentially.

Reliability of the Instrument: To ensure statistical robustness, the reliability of the instrument was first assessed before proceeding to descriptive analysis. Cronbach's alpha was computed to assess internal consistency of the 15-item scale. The reliability coefficient of 0.70 indicates acceptable internal consistency for exploratory research (Table 3). This reliability testing supports the credibility of findings related to Objectives 1 and 2. This approach aligns with established practices where Likert-scale responses are treated as approximately interval-level for parametric descriptive analysis.

Data Analysis Techniques: The collected data were analyzed using the following statistical tools:

1. Cronbach's Alpha – to test internal consistency of the scale.
2. Descriptive Statistics (Mean and Standard Deviation) – to assess satisfaction levels across parameters.
3. Interval Classification Method – to interpret mean scores meaningfully.

The maximum possible score for overall job satisfaction was 75 (15×5), and the minimum possible score was 15 (15×1). These composite scores were used to evaluate the overall level of satisfaction and its implications for NSQF implementation.

Profile of Respondents

Demographic variables such as gender, educational qualifications, school location (rural/urban), institutional type (model/non-model), and years of experience were recorded to contextualise the findings. On average, respondents had completed approximately five years in their current position, allowing for informed assessment of job satisfaction under NSQF implementation. The demographic profile of the teachers is provided in Table 2.

The percentage of female respondents was 44.2 per cent whereas male respondents are 55.8 per cent. Over 41.6 per cent of vocational teachers had professional post-graduate degree, while 12.4 per cent has professional graduate degree. An equal percentage of vocational teachers have graduate and post-graduate degree i.e. 17.7 per cent. 8.8 per cent teachers were only diploma holders. A miniscule per cent of 0.9 were post-graduate diploma holders and

Ph.D. holder. Almost 60 per cent of the teachers were from schools in rural area where as rest 40 per cent (approx.) were that from urban area. Teachers from model schools (English medium) were 29.2 per cent and rest 70.8 per cent respondents were from non-model (Hindi medium) schools. The responses garnered shows that on an average vocational teacher have already spent 5 years in the current position. With an average tenure of five years, respondents possessed adequate experience to provide informed assessments of NSQF implementation.

Table-2
Profile of Respondents (N=113)

S. No.	Variables	Sub parameter	Per cent
1.	Gender	Female	44.2
		Male	55.8
2.	Education level	Professional Graduate	12.4
		Professional Post Graduation	41.6
		Graduate	17.7
		Post-graduate	17.7
		Diploma	8.8
		PG. Diploma	0.9
		Ph.D.	0.9
3.	Location	Rural	60.2
		Urban	39.8
4.	Type of institution	Model schools	29.2
		Non-Model schools	70.8
	Variables	Mean	Standard deviation
5.	No. of years in present position	5.009	1.6876

Source: Field survey

Results & Discussion

This section first evaluates the reliability of the Likert-scale instrument using Cronbach's alpha, followed by descriptive analysis through mean and standard deviation to examine vocational teachers' perceptions across sub-parameters. Reliability testing ensures internal consistency of the multidimensional job satisfaction scale before interpretative analysis. The internal consistency of the 15-item scale was assessed using Cronbach's alpha. The reliability coefficient obtained ($\alpha = 0.70$) indicates acceptable internal consistency for exploratory research, allowing the instrument to be used for further analysis (Table 3).

Table-3
Reliability Coefficient for the Scale

Scale	Reliability coefficient (Cronbach's alpha)
Satisfied	0.70

Source: Field survey

To facilitate systematic interpretation of mean scores, an interval classification scale was constructed. The range of the scale was calculated as:

$$\text{Range} = \text{Highest number} - \text{Lowest number} = 5 - 1 = 4$$

From the range, further interval is calculated by dividing range with the highest number.

$$\text{Interval} = \frac{\text{Range}}{\text{Highest number}} = \frac{4}{5} = 0.80$$

Although Likert responses are ordinal in nature, they were treated as approximately interval-level for descriptive statistical analysis, consistent with established social science practice. Based on the interval value (0.80), satisfaction categories were defined as shown in Table 4. Mean values were interpreted according to the corresponding interval classification.

Table-4
New interval scale

S. No.	Likert	New Interval scale
1.	Very dissatisfied	1-1.79
2.	Dissatisfied	1.80-2.59
3.	Neither satisfied nor dissatisfied	2.60-3.39
4.	Satisfied	3.40-4.19
5.	Very satisfied	4.20-5.0

Descriptive statistics (Table 5) reveal a clear pattern of dissatisfaction concentrated primarily within recognition and compensation. The lowest mean scores were recorded for job security (1.56), fringe benefits (1.63), and promotion opportunities (1.69), all categorized as “very dissatisfied.” Salary (2.12) also falls within the dissatisfied range. The relatively low standard deviations for job security (0.61) and fringe benefits (0.68) indicate strong agreement among respondents, suggesting systemic rather than isolated dissatisfaction.

Infrastructural concerns further contribute to negative perceptions. Supply of books (2.38) and equipment availability (2.58) fall within the dissatisfied category, reflecting operational constraints in delivering practice-oriented vocational education. Administrative support (2.58) and time spent on clerical work (2.58) similarly indicate organisational strain. Higher variability in lecture hours (SD = 1.52) and equipment availability (SD = 1.44) suggests institutional disparities across schools.

In contrast, student discipline (3.88) is categorised as ‘satisfied’, while student interest (3.03) and teaching-related workload parameters remain largely neutral. These findings suggest that intrinsic aspects of teaching and student engagement are comparatively stable.

Table-5
Descriptive Statistics and Interpretation (N=113)

S. No.	Statement	Mean	Standard deviation (SD)	Interpretation
1.	Support from administration	2.58	1.16	Dissatisfied
2.	Teacher relationships with administration	2.80	1.13	Neutral
3.	Feedback or reinforcement other than pay	2.97	0.70	Neutral
4.	Lecture and training hours in time-table	3.32	1.52	Neutral
5.	Time spent in clerical and administrative work	2.58	1.03	Dissatisfied
6.	Daily time for preparation	2.74	1.32	Neutral
7.	Equipment Availability	2.58	1.44	Dissatisfied
8.	Supply of Books	2.38	1.39	Dissatisfied
9.	Computers with Internet connection	3.07	1.37	Neutral
10.	Opportunity for promotion or advancement	1.69	0.69	Very Dissatisfied
11.	Salary	2.12	0.94	Dissatisfied
12.	Fringe Benefits	1.63	0.68	Very Dissatisfied
13.	Job Security	1.56	0.61	Very Dissatisfied
14.	Student interest	3.03	0.64	Neutral
15.	Student discipline	3.88	0.66	Satisfied

Source: Field survey

Overall, the dominance of dissatisfaction in hygiene factors, salary, job security, and working conditions, combined with relatively intact intrinsic motivators, confirms Herzberg's proposition that the absence of hygiene conditions produces dissatisfaction, but their presence alone does not ensure motivation.

Further examination of the interval distribution indicates that dissatisfaction under NSQF in Haryana is structurally concentrated in two domains: employment design and institutional capacity.

Contractual appointments and outsourcing arrangements have resulted in variations in salary structures despite identical responsibilities. Respondents reported irregular salary disbursement, lack of transparency in deductions, and inconsistent implementation of promised annual increments. The low mean scores for job security, fringe benefits, promotion opportunities, and salary substantiate that dissatisfaction is rooted in structural employment conditions rather than individual-level grievances.

Similarly, infrastructural gaps undermine the practical orientation central to vocational education. Irregular supply of materials, inadequate equipment maintenance, delayed textbooks, and limited digital infrastructure constrain

effective skill delivery. In several instances, teachers reported reliance on personal devices to compensate for institutional deficiencies.

Administrative workload further intensifies implementation strain. Dual accountability structures, reporting to both government authorities and outsourcing agencies, combined with rigid timetable expectations and clerical obligations reduce preparation time and increase professional fatigue.

Overall satisfaction scores ranged from 25 to 56 out of a possible 75, with nearly half of respondents clustered between 35 and 45, indicating low to moderate satisfaction. While extreme dissatisfaction is not universal, persistent structural shortcomings meaningfully suppress overall job satisfaction levels.

These empirical findings gain contextual reinforcement from the month-long protest by vocational teachers demanding regularisation and implementation of promised increments (*The Tribune*, 2024). The protest provides real-world corroboration of the structural dissatisfaction identified in the empirical finding and underscores immediate implementation concerns.

Taken together, the evidence suggests that dissatisfaction arises less from the intrinsic nature of teaching and more from systemic and administrative constraints. Teacher job satisfaction therefore emerges not merely as an organisational variable but as an indirect indicator of policy execution effectiveness under NSQF.

Key Findings and Policy Implications

Although nearly half of the respondents reported moderate overall satisfaction, the findings show that implementation constraints cluster around employment design and institutional capacity. Addressing these foundational concerns requires systemic reforms rather than incremental financial adjustments.

Standardisation of employment structure: The current contractual and outsourcing framework misaligns employment arrangements with long-term policy objectives. Variations in salary structures, delayed payments, limited career progression pathways, and job insecurity contribute significantly to dissatisfaction. Standardising recruitment processes, compensation structures, service conditions, and promotional avenues across districts would reduce institutional fragmentation. Stabilisation of employment conditions is essential to address hygiene-factor deficiencies and ensure sustained professional commitment.

Institutional infrastructure strengthening: Infrastructural disparities across schools undermine the practice-oriented objectives of vocational education. Inadequate equipment, irregular supply of books, and limited digital connectivity constrain effective skill delivery. Targeted investment in laboratory

modernization, timely material provision, and maintenance systems is necessary to align school-level capacity with NSQF's industry-oriented goals.

Rationalisation of workload and reporting: Dual reporting structures and excessive clerical responsibilities reduce instructional preparation time and contribute to professional fatigue. Streamlining administrative processes, clarifying accountability mechanisms, and minimising non-teaching duties would allow vocational teachers to focus on pedagogical and training responsibilities.

Capacity building and professional identity: Beyond structural reforms, vocational teachers require sustained professional development and institutional recognition. Structured training programs, industry linkages, and formal integration within the school system can strengthen professional identity. Recognising vocational educators as integral contributors to education reform would enhance intrinsic motivation and long-term retention.

Conclusion, Limitations, and Future Scope

The study assessed job satisfaction among vocational teachers in Government schools under NSQF in Haryana to identify gaps in policy implementation. The findings suggest that dissatisfaction arises primarily from structural and policy-level factors rather than from the intrinsic nature of teaching itself. While student interaction and classroom engagement generated relatively neutral to positive responses, systemic weaknesses in employment conditions and infrastructure significantly influenced overall satisfaction levels.

However, the study has certain limitations. First, the analysis is based on self-reported perceptions of vocational teachers and does not directly measure teacher performance or student learning outcomes. Second, the cross-sectional design limits the ability to capture changes in satisfaction over time. Third, although fourteen vocational courses are operational in Haryana, the study does not undertake course-specific analysis, which may reveal discipline-based variations in infrastructural needs and satisfaction levels. These limitations provide scope for future research.

This study contributes to the literature by positioning vocational teachers' job satisfaction as an evaluative lens for assessing education reform implementation within a policy-driven framework. The NSQF was introduced to reduce dropout rates, bridge skill gaps, enhance employability, and promote inclusive development, particularly for students from marginalised backgrounds. Yet, the evidence from Haryana suggests that unless teacher-related structural concerns are addressed, the long-term sustainability of vocational reforms may be compromised. Ensuring the professional satisfaction of vocational teachers is therefore not only an organisational necessity but a strategic policy imperative for strengthening skill-based education and advancing human capital development.

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EMPIRICAL ANALYSIS OF OUT-OF-POCKET HEALTHCARE EXPENDITURE: A STATE-LEVEL PANEL DATA ANALYSIS IN INDIA

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Abstract: Out of Pocket Health Expenditure is spending from one's own pocket in order to meet their health expenses. Many countries have very less out-of-pocket health expenditure and this is mainly because the government allocates more funds for health sector and also spends more for health insurance for their people. This paper examines the trends of out-of-pocket expenditures and also its determinants for selected Indian states using the Pooled Ordinary Least Square, Fixed Effect and Random Effect models for the period 2014-15 to 2022-23. There are a number of health schemes initiated by the government of India, and a few states have remarkably decreased the Out-of-Pocket Health Expenditure. The estimated results of panel regression indicate that when the public share of total health spending increases, both the per capita out-of-pocket burden and the percentage share of OOPE decreases significantly. The findings of the study will be helpful for policymakers to formulate and implement effective policies at the state level regarding health expenses to the people.

Keywords: Out of pocket expenditure, Health schemes, Indian states, Panel data analysis

Introduction

In recent years the term Out-of-Pocket Expenditure (OOPE) has been considered an important aspect, as it deals with people's spending on their health from their own pockets and not depending on any government schemes or insurance. OOPE means the amount of money a person pays directly from their own funds for a service or good without any reimbursement from insurance or other service.

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When a person pays from their pocket for the health services, it is mainly the costs that are incurred which may not be reimbursed, whereas in case of health insurance, there is always reimbursement for any kind of health services for a person. There are few countries which provide free health care facilities for their people. Countries like Canada, Australia, UK, France, etc. provide free health care services for its countries people (*Times of India*, Aug 25, 2024).

Health insurance provides financial protection for all people, be they poor or rich. It is important that all the countries should take care of their people's health by providing affordable medical facilities. Most importantly, it should help people through proper health insurance schemes so that they need not pay from their own pockets. More than the health issues, the cost incurred for the medical expenses make them even more weak, sick and depressed, and this burden is especially high among the poorer section. This is not the case with rich people, as they can afford to pay more, but the poorer section of people, are not in a position to bear the burden of enormous medical expenses, and due to this, many do not even visit hospitals for treatment. Hence, health insurance plays a very important role in the lives of the poor people.

Post-COVID pandemic, many countries have increased public expenditure on health to protect their people from dreadful disease and also from spending from their own pockets. In India, there has also been a slight increase in expenditure towards health. However, when compared with other countries, it is definitely much less. India, with its huge population, has to allocate an enormous amount for its healthcare facilities. It is only in recent years that there have been a number of schemes and health insurance policies for the people. The real issue in India is the large number of states and the unequal distribution of funds that are allotted for health services. To have a clear understanding, OOPE data are shown for selected southern and northern states separately in this study.

Given this brief background, the rest of the paper is organised as follows: Section II contains a brief description of the literature on the determinants of health care expenditures. In Section III, we explain the econometric methodology and sources of data that are used in the empirical work. Results and discussion are given in Section IV, findings of the study in Section V, and finally, Section VI provides the summary and conclusions.

Review of Literature

This section briefly reviews about the international and national empirical studies on out-of-pocket healthcare expenditure. You & Kobayashi (2011) examined the determinants of OOPE in China using the Heckman sample selection bias model. The study found that about 24.6 per cent of respondents reported recent illness, 80.6 per cent of whom sought care, and 82.3 per cent of those who sought care reported the amount of health spending. People spent more on healthcare as they

aged, especially those over 65 years. The estimated coefficients of health insurance and labour insurance programs were positive, except for commercial insurance. Fan et al. (2012) examined the impact of the state Aarogyasri health insurance on out-of-pocket health expenditures in Andhra Pradesh. The results showed that Aarogyasri health insurance reduced catastrophic health expenditures in households below the poverty line and significantly reduced inpatient out-of-pocket health expenditure. However, Aarogyasri was not benefiting Scheduled Caste and Scheduled Tribe households as much as the rest of the population.

Archana et al. (2014), in their work on OOPE in rural areas, assessed households where health services are available free of cost, and the results were quite contrary to what Mahak and Rajesh studied. According to Archana, the majority (58.1%) of the households did not incur health expenditure. The study stated that 75.5 per cent preferred public healthcare facilities, and hence OOPE is less. Ebaidalla & Ali (2019) examined the determinants of OOPE and catastrophic health spending incurred by Sudanese households using 2009's National Baseline Household Survey (NBHS) data. The results show that household's income, educational achievement of the household head, household size, and numbers of household members over 65 years old are the most important factors influencing out-of-pocket health expenditure. The results indicate that the presence of elderly and children among the household members increases the risk of incurring catastrophic health expenditures. Panikkasrry (2020) differs from the other authors, as they used IHDS household-level survey data. In this study, they conducted a mean comparison test and found that a significant difference exists in the consumption bundles of households. This difference is seen between households with medical expenditure and those without medical expenditure. To study the impact of OOPE on the consumption bundle, the author estimated Engel curve with Seemingly Unrelated Regression Equation (SURE).

Ebaidalla & Mustafa (2021) investigated the factors that influence OOPE by applying a dynamic panel data method to a sample of 40 SSA (Sub-Saharan Africa) countries over the period 1995-2014. The results indicated that economic factors such as per capita income, trade openness, and inflation have significant effects on out-of-pocket health expenditure. The results also show that the expansion of urbanisation increases OOPE, and morbidity factors such as the prevalence of anaemia and tetanus among children under five also boosted OOPE. Institutional quality had a significant negative effect on OOPE, indicating that improved institutional quality decreased OOPE. Sirag & Mohamed Nor (2021) investigated the association between OOPE and poverty using a sample of 145 countries from 2000 to 2017 and employing the dynamic panel threshold method. The results showed the validity of the estimated threshold models, indicating that only beyond the turning point of about 29 per cent did out-of-pocket health spending, lead to increased poverty.

Nanda & Sharma (2023) examined the economic impact of OOPE across 17 disease categories in India using a Logit Model. The study used data from the National Sample Survey (2017–18) of Household Social Consumption. The study found that OOPE and the associated financial burden were higher among households where members sought care in private healthcare facilities compared with those treated in public facilities across most disease categories. The high burden of OOPE necessitates the need to increase health insurance uptake and consider including outpatient services under the purview of health insurance. Kaladharan & Manayath (2024) examined the effects of various factors on OOPE per capita in emerging economies using panel data from the World Health Organization and employing fixed, random, and dynamic models. The estimated results showed that domestic general government health expenditure and gross domestic product were associated with an increase in OOPE. Government schemes, compulsory contributory healthcare financing schemes, and voluntary health insurance programs were closely associated with a reduction in OOPE.

Research Gap and Objective of the Study

The available literature reveals that no Indian study has made an attempt to examine the determinants of OOPE across Indian states using the latest data and time series econometric techniques. The present study differs from existing studies in using the demographic, economic, health expenditure, insurance related variables, the latest data sources, and econometric techniques. The specific objectives of this study are to compare out-of-pocket payments for healthcare expenditures across Indian states and to investigate the determinants of out-of-pocket healthcare expenditures across Indian states using panel data techniques covering the period 2014-15 to 2022-23. The present study fills this noticeable gap in the Indian health economics literature. This empirical analysis may be helpful for policymakers to formulate and implement effective policies at the state level.

Theoretical Framework

Grossman's model on demand for health is also known as the human capital model because Grossman believed health to be a human capital. For this reason, investments in human capital are vital to ensure productivity. However, when, access to healthcare is constrained for households with low incomes, it leads to poor health capital, which could have negative externalities. A healthy working population is necessary for the economic growth of a nation.

Healthcare, when left to the care of private service providers, can be exclusionary by virtue of their profit-driven business model. Only those who are financially well-disposed can make use of the service. In addition, the ability to pay for and access efficient healthcare is determined by income levels. In a developing country like India, per capita income is far below the global levels,

and this prevents many from accessing formal healthcare, or they have to bear significant expenditures personally. The paper follows the justification given by the Grossman's model theory that health, being a form of human capital, is essential. Hence the government should prioritise spending more on the health sector so that all the people in the country are in a position to get free services or face very little burden when spending for their medical needs, which will in turn decrease the OOPE in India.

Methodology

Source of Data

This study uses annual time-series data over the period 2014-15 to 2022-23 for a sample of 20 Indian states, namely Assam, Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, Telangana, and Himachal Pradesh. The present study is limited to these 20 Indian states based on the availability of balanced panel datasets. A balanced panel dataset means that each subject has the same number of observations. State-wise out-of-pocket expenditure (OOPE), out-of-pocket expenditure per capital (OOPEPC), total health expenditure (THE), percentage of total health expenditure (PTHE), states' population (SPOP), real gross state domestic product per capita (RGSDPPC), and government health expenditure (GHEPC) are collected from National Health Accounts of India. The percentage of households with health insurance covered (PIC) is collected from National Health Accounts Estimates for various years and the National Family Health Survey of India. The percentage of elderly population aged 65 and above is collected from India Ageing Reports for various years, Government of India. The size of the population is collected from Population and Vital Statistics from the Census of India. Finally, the amount of money spent under Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) is collected from the Minister of State in the Ministry of Health and Family Welfare, Government of India. All the above available variables are included in this panel analysis to determine the factors that influence out-of-pocket health expenditure (OOPE). To avoid estimate of spurious regression, the Gross State Domestic Product (GSDP) and the Gross State Domestic Product Per Capita (GSDPPC) are price-deflated. The dependent and independent variables used in this study are measured based on the existing studies and are reported in Table 1.

THE: As the total cost of care in a state rises-driven by technological advancements or medical inflation OOPE typically increases, unless public funding keeps pace. A higher GHEPC indicates better-funded public facilities, which reduces the need for citizens to seek expensive private-sector alternatives. Conversely, as income levels rise by the RGSDPPC individuals often demand higher-quality private care, inadvertently driving up OOPE. Demographic factors

also play a critical role; a larger SPOP places immense strain on public infrastructure, and if the public supply remains fixed, the resulting excess demand spills over into the private sector. Furthermore, an aging population (Age ≥ 65) faces higher morbidity and chronic disease rates, increasing the frequency and intensity of medical visits. Finally, regarding insurance schemes like Ayushman Bharat (AB), higher claim amounts signify that the government is successfully absorbing costs that would have otherwise been a direct financial burden on the individual.

Table-1
Description and measurement of variables

Variable Notation	Description of Variables	Variable Measured
Dependent Variables		
OOPE	OOPE (Out-of-Pocket Expenditure) is defined as the direct payments made by individuals or households to healthcare providers at the time of service.	Natural logarithm of Rs. Crore
OOPEPC	Per capita value for OOPE is arrived by dividing total OOPE by the population for respective state.	Natural logarithm of Rs. Crore
POOPE	POOPE is defined as percentage ratio between OOPE and THE $(OOPE \div THE) * 100$.	Percentage
Independent Variables		
THE	THE refers to Total Health Expenditure of a State/ UT includes health expenditure by all government agencies (Union/State/Local Bodies) including quasi-governmental organisations and donors in case funds are channelled through government organisations), all household health expenditures, all expenditures by Enterprises.	Natural logarithm of Rs. Crore
PTHE	PTHE is defined as percentage ratio of Total Public Spending on Health to the Total Expenditure of the Government.	Percentage
GHEPC	GHEPC is defined as the total expenditure on health by all government agencies (central, state, and local), including social health insurance and external grants channelled through the government, divided by the total population of a state.	Natural logarithm of Rs. Crore
RGSDPPC	RGSDPPC stands for Real Gross State Domestic Product Per Capita. The total value of all real goods and services produced within a state's boundaries The total GSDP is divided by the state's population.	Natural logarithm of Rs. Crore
PIC	PIC is defined as Percentage of Insurance Coverage of households with at least one member covered by a health scheme or health insurance.	Percentage
PA ≥ 65	Percentage distribution of persons aged 65 years & above by state. Elderly Population (aged 60 years and above) in India.	Percentage
SPOP	SPOP is defined as size of states' population across the Indian states.	Natural logarithm of Rs. Crore
ln AB	Ayushman Bharat (AB) is measured as the amount of money spent under Ayushman Bharat –Pradhan Mantri Jan Arogya Yojana	Natural logarithm of Rs. Crore

Panel Data Analysis

This study employs panel data techniques, including the Pooled Ordinary Least Squares Model (POLSM, also known as the Constant Coefficients Model), the Fixed Effects Model (FEM), and the Random Effects Model (REM, also known as the Error Components Model (ECM)). These approaches are considered the most suitable for studies involving multiple entities (such as individuals, firms, states, or countries) over multiple time periods (Bliese et. al., 2020). The dataset combines time-series data covering the period from 2015 to 2023 with cross-sectional observations of the entities (states).

Pooled OLS Model

The following specifications provide a starting point for analysing the relationship between OOPE and the independent variables using panel regression models. By pooling all observations, the out-of-pocket expenditure panel regression model can be specified as

$$Y_{it} (\text{OOPE}_{it} / \text{OOPEPC}_{it} / \text{POOPE}_{it}) = \alpha + \beta X_{it} + u_{it} \quad (1)$$

Where $i = 1, 2, \dots, N$ (Number of cross sectional states), $t = 1, 2, \dots, T$ (Number of time period for variables), Y_{it} is dependent variable, α is intercept, $X_{it} = 1 \times k$ vector observations on the explanatory variables, $\beta = k \times 1$ vector of parameters which is determined on the explanatory variables and u_{it} is the error term.

Fixed Effects Model

The Fixed Effect Model (FEM), also known as the "within" estimator, is used when there is a need to control for unobserved variables that vary across entities but remain constant over time. This model essentially subtracts the mean of each variable over time for each entity (de-meaning process), thereby removing all time-invariant variables. As a result, only the effects of variables that change over time can be estimated. Assumption: The unobserved effect μ_i is allowed to be correlated with the independent variables X_{it} . The FEM can be specified as

$$Y_{it} (\text{OOPE}_{it} / \text{OOPEPC}_{it} / \text{POOPE}_{it}) = \beta X_{it} + \mu_i + v_{it} \quad (2)$$

Where, μ_i : (The Fixed Effect): Represents all time-invariant characteristics of individual.

Random Effects Model

The Random Effects Model (REM) is used when the unobserved differences across entities are assumed to be random and uncorrelated with the independent variables. The REM can be specified as

$$Y_{it} (\text{OOPE}_{it} / \text{OOPEPC}_{it} / \text{POOPE}_{it}) = \alpha + \beta x_{it} + \mu_i + v_{it} \quad (3)$$

Or often written as

$$y_{it} = \alpha + \beta x_{it} + u_{it} \quad (4)$$

Where, $u_{it} = \mu_i + v_{it}$. μ_i is treated as a random error component rather than a fixed intercept. Unlike Fixed Effects, the Random Effects model can estimate the effects of time-invariant variables. Assumption: The crucial assumption is that u_{it} is not correlated with X_{it} .

Hausman Test

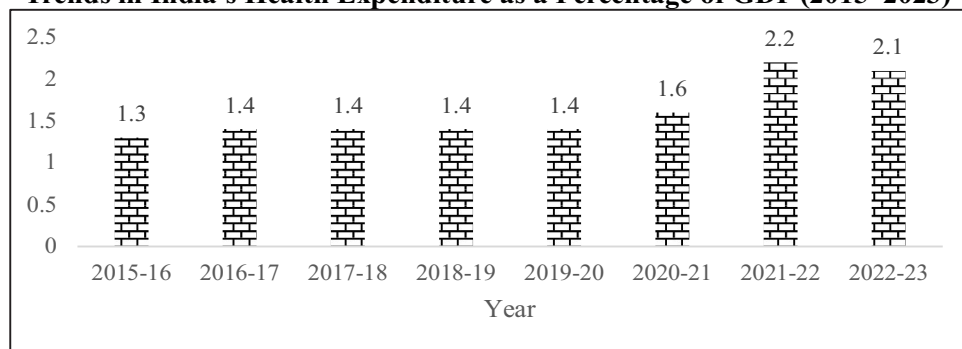
To choose between the FEM and REM, the Hausman test is applied. The null hypothesis is that the REM is appropriate, while the alternative hypothesis is that the FEM is appropriate. If the Hausman test rejects the null hypothesis, the FEM is preferred; otherwise, the REM is preferred.

Results & Discussion

Descriptive Statistics

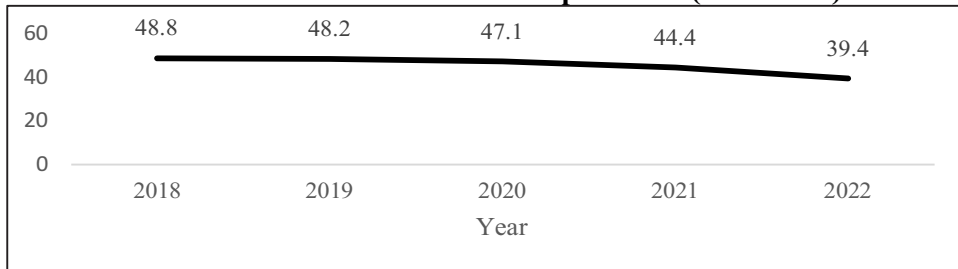
A descriptive analysis is conducted in this study prior to the econometric analysis of determinants of out-of-pocket health expenditure across the Indian states. According to Economics Survey Report 2022-23, health expenditure as percentage of GDP increased from 1.3 per cent in 2015 to 2.1 per cent in 2022-2023. Figure 1 illustrates the gradual increase in health expenditure over the years in India. It is very important for a country to allocate more funds to the health sector than to other heads. Especially in the developing country like India, with its ever-increasing population, the health sector must be given top priority. The data indicate a gradual increase in government health expenditure, and consequently, OOPE has declined in recent years in India. The majority of poor and the middle-class people spend a considerable amount on health from their own pockets, resulting in a persistently high percentage of OOPE in India.

Figure-1
Trends in India's Health Expenditure as a Percentage of GDP (2015–2023)



Source: Data Retrieved by authors based on Economic Survey, 2022-23

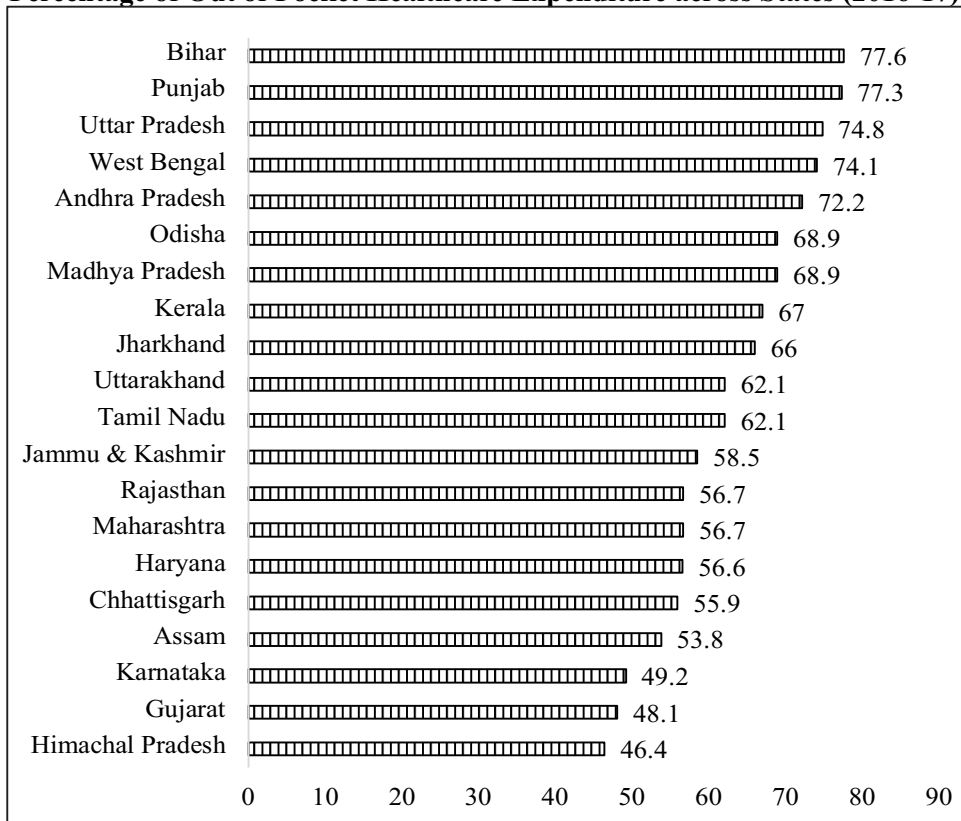
Figure-2
Trends in India's Out of Pocket Expenditure (2018–2022)



Source: Data Retrieved from National Health Accounts Estimates for India, 2021-22

State-Wise Out-of-Pocket Expenditure Analysis

Figure-3
Percentage of Out of Pocket Healthcare Expenditure across States (2016-17)

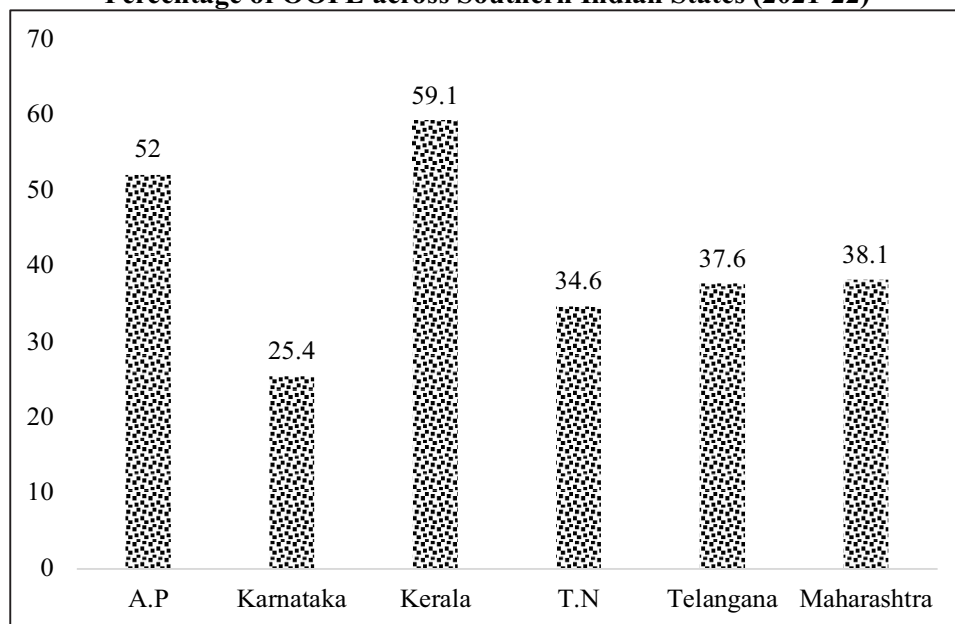


Source: Data Retrieved from National Health Accounts Estimates for India, 2016-17, Ministry of Health and Family Welfare, New Delhi

Even though the overall data depict a significant decline in OOPE in India, the scenario varies considerably across states. Figure 3 shows the overall OOPE percentage during the year 2016-17. It is quite evident that Uttar Pradesh had the highest OOPE in India during the year 2016-17. Several other states, such as Rajasthan, Bihar, and Madhya Pradesh also recorded high percentages of OOPE. By 2021-22, due to various policies and schemes taken by the government, there was a considerable decline in OOPE, and this impact is clearly visible in the states, as shown in Figure 3, which classifies northern and southern states separately.

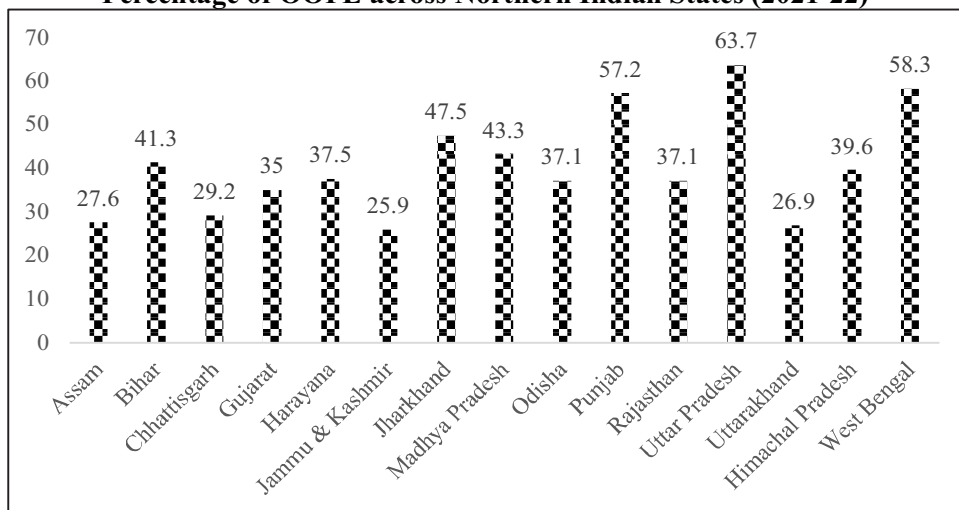
Among the southern states, OOPE is very high in Kerala (59.1%) and lowest in Karnataka (25.4%). In the northern states, Uttar Pradesh has a very high percentage (63.7%), while Jammu and Kashmir has the lowest OOPE (25.9%). The primary reason for Uttar Pradesh's high OOPE is the high cost of private healthcare and inadequate infrastructure facilities. Overall, considering all the states during 2021-22, Karnataka has the lowest OOPE at 25.4 per cent, while Uttar Pradesh has the highest at 63.7 per cent. The main reasons for Uttar Pradesh's high OOPE are its large population, inefficient healthcare system, low per capita income, and lack of inadequate infrastructure facilities.

Figure-4
Percentage of OOPE across Southern Indian States (2021-22)



Source: Data Retrieved from National Health Accounts Estimates for India, 2016-17, Ministry of Health and Family Welfare, New Delhi

Figure-5
Percentage of OOPE across Northern Indian States (2021-22)



Source: Data Retrieved from National Health Accounts Estimates for India, 2016-17, Ministry of Health and Family Welfare, New Delhi

Among the southern states, Kerala has the highest OOPE at 59.1 per cent. It is somewhat surprising that, despite Kerala's better medical facilities, OOPE remains very high. The main reasons include a rapidly growing aging population and widespread reliance on private hospitals for superior healthcare facilities. Another notable factor is that medical technologies and diagnostic procedures in Kerala are very costly, contributing to the high percentage of OOPE in the state.

Econometric Analysis

The estimated descriptive statistics are presented in Table 2. The summary statistics reveal that OOPE remains a heavy financial burden, with a mean value of 9.14 and a per capita average of 7.67. Most notably, individuals bear, on average, 53.12 per cent of total health costs directly, although this varies significantly across the sample, ranging from a minimum of 25.42 per cent to a maximum of 82.29 per cent. Government contribution to percentage of total health expenditure (THE) averages 37.76 per cent, while the mean GHEPC stands at 7.31.

Socioeconomic drivers show a mean log population of 22.19 and a mean RGSDPPC of 20.73, while the elderly demographic (Age > 65) averages 7.86 per cent. Insurance coverage shows the highest level of disparity, with a mean of 46.70 per cent but a wide range between 4.20 per cent and 157.00 per cent, while the value for Ayushman Bharat (AB) claims averages 21.94 for the 90 available observations.

Table-2
Summary of Descriptive Statistics for the Full Sample

Variables	Mean	Std. Dev.	Min	Maxi	Count
Dependent Variables					
ln OOPE	9.14	0.91	7.20	11.16	180
ln OOPEPC	7.67	0.44	6.69	8.97	180
POOPE	53.12	13.59	25.42	82.29	180
Independent Variables					
PTHE	37.76	12.12	15.40	71.00	180
lnSPOP	22.19	0.80	20.40	23.84	180
ln RGSDPPC	20.73	0.52	19.24	21.74	180
ln GHEPC	7.31	0.50	5.82	8.63	180
PIC	46.70	27.70	4.20	157.00	180
PA > 65	7.86	1.47	3.80	12.18	180
ln AB	21.94	1.35	17.78	24.23	90

Source: Authors' own computation

In Table 3, the correlation matrix reveals several key relationships between health expenditure and socioeconomic factors. OOPE shows a very strong positive correlation with population, and a moderate negative link with AB, suggesting that as total healthcare insurance benefits and program coverage rise, so does OOPE decreases. Conversely, OOPEPC is strongly positively associated with Age above 65 and RGSDPPC, indicating that older populations and wealthier states tend to have higher individual spending levels.

Table-3
Estimated Results of Correlation Matrix

Correlation	lnOOPE	lnOOPEPC	POOPE	PTHE	lnSPOP	lnRGSDPPC	lnGHEPC	PIC	PA ≥ 65	lnAB
ln OOPE	1.000									
ln OOPEPC	0.214	1.000								
POOPE	0.453	0.332	1.000							
PTHE	-0.198	-0.534	-0.502	1.000						
ln SPOP	0.829	0.098	-0.004	-0.095	1.000					
ln RGSDPPC	0.118	0.561	0.401	-0.123	0.273	1.000				
ln GHEPC	0.037	0.271	-0.436	0.617	0.169	0.515	1.000			
PIC	-0.073	-0.113	-0.238	0.118	0.053	0.244	0.238	1.000		
PA ≥ 65	0.182	0.615	0.035	-0.133	0.175	0.454	0.406	-0.060	1.00	
ln AB	0.510	0.221	0.091	-0.232	0.573	0.571	0.232	0.102	0.352	1.00

Source: Authors' own computation

Notably, THE and GHEPC exhibit a strong negative correlation with the share of OOPE in total health expenditure (-0.502 and -0.436, respectively), confirming that higher public health investment effectively reduces the private financial burden on citizens. Insurance coverage (PIC) shows a weak negative correlation with both total and per capita OOPE, while AB shows its strongest internal correlation with population size and state income.

The regression results across the POLS (in Table 4), FEM (in Table 5), and REM (in Table 6) provide a robust analysis of the drivers of OOPE. Across all models, real gross state domestic product per capita (RGSDPPC) generally exerts a positive and significant influence on out-of-pocket spending, particularly in the POLS and REM specifications, where higher state income correlates with increased per capita spending and a higher share of OOPE in total expenditure.

Table-4
Estimated Robustness Results of POLS

Model Specification	POLS			
	(I)	(II)	(III)	(IV)
Variable	Dependent Variable			
	ln OOPEPC	POOPE	POOPE	ln OOPE
Independent Variable	Coefficient	Coefficient	Coefficient	Coefficient
ln RGSDPPC	0.486* (7.845)	14.570* (8.883)	12.394* (10.404)	0.720 (4.230)
ln GHEPC	-0.017** (-0.270)			
PIC	-0.0003** (-0.358)	-0.012* (-0.441)		-0.010*** (-3.922)
PTHE		-0.604* (-9.949)	-0.859* (-15.02)	
PA ≥ 65		1.988* (3.531)		0.211* (3.255)
ln SPOP			7.570* (9.076)	
ln AB				-0.470* (8.086)
Intercept	-2.277** (-2.022)	62.86* (11.295)	75.61* (16.031)	12.687* (3.827)
R ²	0.315	0.507	0.638	0.521
Adjusted R ²	0.303	0.496	0.632	0.498
Number of observations	180	180	180	89

Source: Authors' own computation

Note: *, ** and *** symbolises significance at 1, 5, and 10 per cent, respectively. The t-statistics are in parentheses.

Conversely, public health expenditure acts as a critical buffer; GHEPC and percentage of THE consistently show negative and statistically significant

coefficients. This indicates that as government health expenditure per capita and the public share of total health spending increase, both the per capita out-of-pocket burden and the percentage share of OOPE decrease significantly.

Demographic and protective factors also play a decisive role in these financial dynamics. The elderly population ($PA \geq 65$) and total population (POP) typically show positive coefficients, suggesting that aging societies and larger population bases drive up the total volume of out-of-pocket spending due to increased healthcare demand. The coefficient of population has a significant positive effect on POOPE.

Table-5
Estimated Robustness Results of FEM

Model Specification	Robustness Checks of Fixed Effect Model			
	(I)	(II)	(III)	(IV)
Variable	Dependent Variable			
	ln OOPEPC	POOPE	POOPE	ln OOPE
Independent Variable	Coefficient	Coefficient	Coefficient	Coefficient
ln RGSDPPC	0.0403 (0.378)	8.348* (2.272)	-7.660* (-2.710)	0.879* (4.982)
ln GHEPC	-0.080*** (11.585)			
PIC	-0.002** (-2.135)	-0.0511** (-1.782)		-0.003 (-3.278)
PTHE		-0.853* (-14.472)	-0.762* (-11.83)	
PA ≥ 65		-0.034* (0.035)		-0.105* (2.660)
ln SPOP			21.691* (2.492)	
ln AB				-0.0504* (-3.623)
Intercept	8.995* (2.025)	56.264* (3.610)	22.15* (3.602)	25.315* (7.231)
R ²	0.858	0.867	0.870	0.794
Adjusted R ²	0.838	0.848	0.852	0.793
Number of observations	180	180	180	89

Source: Authors' own computation

Note: *, ** and *** symbolizes significance at 1, 5, and 10 per cent, respectively. The t-statistics are in parentheses.

Holding other factors constant, the estimated econometric results suggest that a 1 per cent increase in SPOP raises POOPE by 7.5 per cent, 21.7 per cent, and 7.8 per cent in the POLSM, FEM, and REM models respectively. Similarly, a 1percent increases in $PA \geq 65$ leads to an increase in POOPE of 1.98 per cent, 0.03 per cent, and 0.65 per cent across the same models. These finding align with is

similar with those findings of You & Kobayashi (2011) and Ebaidalla & Ali (2019). Conversely, a 1 per cent increase in PIC decreases POOPE by 0.012 per cent, 0.05 per cent, and 0.04 per cent in the POLSM, FEM, and REM models, respectively. Overall, the estimated results across all models indicate that POOPE maintains a statistically significant inverse relationship with SPOP, PIC, PTHE, and GHEPC.

Table-6
Estimated Robustness Results of REM

Model Specification	Robustness Checks of Random Effect Model			
	(I)	(II)	(III)	(IV)
Variable	Dependent Variable			
	lnOOPEPC	POOPE	POOPE	lnOOPE
Independent Variable	Coefficient	Coefficient	Coefficient	Coefficient
ln RGSDPPC	0.131 (1.446)	11.64* (4.092)	9.192* (4.559)	0.766* (4.982)
ln GHEPC	-0.101** (-2.096)			
PIC	-0.0014*** (-1.520)	-0.0451*** (-1.675)		0.0027 (2.642)
PTHE		-0.813* (-15.086)	-0.790* (-15.904)	
PA ≥ 65		0.6539 (0.799)		0.121* (3.210)
ln SPOP			7.836* (4.259)	
ln AB				-0.0512* (-3.766)
Intercept	5.626* (3.268)	17.87* (5.785)	11.304* (8.144)	22.848* (7.501)
R ²	0.336	0.676	0.689	0.389
Adjusted R ²	0.301	0.669	0.684	0.360
Number of observations	180	180	180	89

Source: Authors' own computation

Note: *, ** and *** symbolises significance at 1, 5, and 10 per cent, respectively. The t-statistics are in parentheses.

Meanwhile, financial protection mechanisms such as insurance coverage (IC) and Ayushman Bharat (AB) demonstrate a mitigating effect. Specifically, in AB shows a consistent negative relationship with OOPE in the FEM and REM models, signifying that claims under this scheme successfully reduce the private financial burden on households. The estimated results suggest that AB significantly predicts POOPE, with a 1 per cent increase in claims from AB insurance scheme leading to a 0.5 per cent decrease in POOPE in all models. The FEM yielded the highest explanatory power, with R-squared values reaching as

high as 0.794, suggesting that state-specific characteristics are crucial in explaining variations in health spending.

Table-7
Estimated Results of Housman Test

Specification	Test Summary		Chi-Sq. Statistic	Chi-Sq. df.	Prob.	Best Model
I	Cross-section random		11.768835	3	0.0082	FEM
	Cross-section random effects test comparisons:					
	Variable	Fixed	Random	Var (Diff.)	Prob.	
	ln RGSDPPC	0.040366	0.131202	0.003118	0.0021	
	ln GHEPC	-0.080394	-0.101708	0.000216	0.1473	
	PIC	-0.002093	-0.001415	0.000000	0.0284	
	Test Summary		Chi-Sq. Statistic	Chi-Sq. df.	Prob.	
II	Cross-section random		6.204454	4	0.0744	FEM
	Cross-section random effects test comparisons:					
	Variable	Fixed	Random	Var (Diff.)	Prob.	
	P THE	-0.853624	-0.813810	0.000569	0.0951	
	ln RGSDPPC	8.348772	11.641542	5.408755	0.1568	
	P IC	-0.051194	-0.045189	0.000097	0.5431	
	PA ≥ 65	0.034548	0.653901	0.264922	0.1810	
III	Test Summary		Chi-Sq. Statistic	Chi-Sq. df.	Prob.	FEM
	Cross-section random		6.193940	3	0.0025	
	Cross-section random effects test comparisons:					
	Variable	Fixed	Random	Var (Diff.)	Prob.	
	P THE	-0.762047	-0.790419	0.001679	0.4887	
	ln RGSDPPC	7.660333	9.192183	3.921809	0.4392	
	ln SPOP	21.691310	7.836601	72.357265	0.1034	
IV	Test Summary		Chi-Sq. Statistic	Chi-Sq. df.	Prob.	FEM
	Cross-section random		28.067078	4	0.0000	
	Cross-section random effects test comparisons:					
	Variable	Fixed	Random	Var (Diff.)	Prob.	
	ln AB	-0.050470	-0.051235	0.000009	0.7993	
	PIC	-0.003556	0.002784	0.000000	0.0028	
	PA ≥ 65	0.105191	0.121204	0.000138	0.1729	
ln RGSDPPC	0.879499	0.766854	0.007463	0.1923		

Source: Authors' own computation

Diagnostic Tests

The null hypothesis (H_0) assumed that the REM is appropriate, while the alternative Hypothesis (H_a) assumed the FEM is appropriate. The Hausman Test results across all four specifications indicate that the Fixed Effect Model (FEM) is the most appropriate statistical framework for this analysis. According to the test summary, the Chi-square statistics for Specifications I, III, and IV yield

probability values significantly below the 0.05 threshold (0.0082, 0.0025, and 0.0000, respectively), leading to the rejection of the null hypothesis (H_0) that the Random Effect Model (REM) is appropriate.

Even in Specification II, where the probability is 0.0744, the FEM is still identified as the preferred model for maintaining consistency in the estimates. This selection suggests that state-specific, time-invariant characteristics are correlated with the independent variables, making the FEM more reliable for capturing the impact of factors like income (RGSDPPC), public health expenditure, and insurance coverage on out-of-pocket spending.

Table-8
Estimated Diagnostic Test for Section of Appropriate Fixed Effect Model

Specification	Effects Test	Statistic	d.f.	Prob.
I	Cross-section F	31.699698	(19,157)	0.0000
	Cross-section Chi-square	283.705848	19	0.0000
II	Cross-section F	22.380421	(19,156)	0.0000
	Cross-section Chi-square	236.751680	19	0.0000
III	Cross-section F	14.779204	(19,157)	0.0000
	Cross-section Chi-square	184.594953	19	0.0000
IV	Cross-section F	369.887229	(17,67)	0.0000
	Cross-section Chi-square	405.156267	17	0.0000

Source: Authors' own computation

The diagnostic tests presented in Table 8 confirm the presence of cross-sectional dependence in the data across all four model specifications. For every specification, the Breusch-Pagan LM, Pesaran scaled LM, and Pesaran CD tests all yield probability values of 0.0000. Because these p-values are below the standard 0.05 threshold, the null hypothesis of cross-sectional independence is rejected. This suggests that shocks or unobserved factors in one state likely influence others, justifying the use of robust estimation techniques (such as the robust Fixed Effect Model) to ensure that the standard errors and coefficients remain valid and unbiased.

Based on the preference for the FEM identified in the Hausman Test, the following conclusions and policy recommendations are derived. The analysis confirms that increasing public health expenditure is the most effective strategy for reducing private financial burdens. Since GHEPC and percentage of THE show a significant negative relationship with out-of-pocket spending, the government should focus on raising the public share of health expenditure to lower the current average OOE ratio of 53.12 per cent. Furthermore, because higher state income (RGSDPPC) and an aging population (Age > 65) are

associated with rising costs, targeted financial protection is essential for these groups. The success of Ayushman Bharat (AB) in lowering OOPE suggests that expanding the depth and reach of such insurance schemes can effectively mitigate the "income effect" that drives up healthcare costs in wealthier or more populous states. Strengthening insurance coverage, which currently shows high disparity across states, will be vital to creating a more equitable health financing system.

Key Findings of the Study

Descriptive analysis indicated that public healthcare financing in India increased in recent years, and OOPE gradually declined. Among the northern states, Uttar Pradesh has the highest OOPE (63.7%) and Jammu and Kashmir has the lowest (25.9%). Among the southern states, Kerala has the highest OOPE at 59.1 per cent, and Karnataka has the lowest at 25.4 per cent.

Furthermore, the findings confirm that GSDPPC, SPOP, and Age above 65 have significant positive impact on OOPE in all the POLSM, FEM, and REM models. This suggests that an increase in all these is associated with an increase in the proportion of healthcare expenses paid out-of-pocket across the states. The adjusted R-squared values demonstrate that the variables included in the FEM model account for over 70 per cent of the variation in OOPE.

Limitations of the Study

The study relies solely on the secondary sources drawn from different datasets, which may be subject to reporting errors and bias. This study is limited to selected Indian states, and the Union Territories are excluded due to unavailability of data. The study does not discuss the impact of various policies and schemes in detail, so it may not fully capture the differential effects, hence, differences across states may vary. Also, the period covered in this study is from 2014-15 to 2022-23, which is used for comparative analysis across the selected states of India. Prior to the mentioned years, the exact data required for OOPE are not available for the states included in the study.

Summary & Conclusions

In recent years, the Government of India has initiated number of health insurance schemes for the benefit of the general public. From the study, it is evident that the gradual increase in government health expenditure has declined out-of-pocket expenses to some extent. The data on OOPE across Indian states show that Uttar Pradesh has the highest OOPE, while Karnataka has the lowest. State governments must take serious steps to improve health insurance coverage and increase their spending towards the health sector so that OOPE decreases among the people. Karnataka has demonstrated this by allocating more funds to health, resulting in a gradual decline in OOPE. In spite, of the fact that the central government has initiated a number of health insurance schemes, the role of state

governments is very important in bringing down OOPE so that people do not feel the burden of spending more from their own pockets. Even though there is a decline in OOPE in recent years, not all states are showing progress, and inequality is observed in some states with high OOPE. From this study, the policy recommendation for the government is to allocate more funds exclusively for health sector in these states such as Uttar Pradesh, Punjab, and West Bengal in the northern region, and Kerala and Andhra Pradesh in the southern region. An overall improvement in health expenditure by both state and central governments is the need of the hour to reduce the OOPE in India.

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INTERNAL MIGRATION AND DEMOGRAPHIC SHIFTS IN PUNJAB: A LONGITUDINAL ANALYSIS (1981–2011)

Gurwinder Singh Badal¹, Rudhita Goel², and Adarsh Sharma³

Abstract: Internal migration significantly influences the demographic structure of every country, occurring at varying rates across different regions. This paper seeks to explore the dynamics of internal migration, focusing on the factors driving migration flows with a particular emphasis on the Indian state of Punjab. Using census data spanning four decades (1981–2011), the analysis reveals that internal migration accelerated notably during the 1990s. Furthermore, inter-state (long-distance) migration grew faster than intra-state (short-distance) migration during the same period. To gain deeper insights, trends and determinants of internal migration have been examined by analysing key parameters such as migration types and streams. The study incorporates an overview of migration patterns, including intra-state and inter-state migration distribution, which provides a detailed understanding of the shifting dynamics of internal migration in Punjab. The paper also delves into the primary consequences of this migratory influx on Punjab's demographic structure. In addition, it proposes an alternative public policy framework to address the socio-economic challenges arising from internal migration, thereby contributing to a more inclusive and sustainable approach to managing migration-induced issues.

Keywords

Migration inflow, inter-district, intra-district, inter-state, economic development, reasons, causes and consequences.

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Introduction

The migration of human beings is as old as the history of humankind itself. Human migration is generally defined as the movement of an individual or group of persons from one geographic location to another one/s, either permanently or temporarily, due to various reasons such as getting better work/employment, attaining better educational opportunities, joining new/old family obligations, forced or persecuted ones (International Organisation of Migration, 2011). At times, migration may consist of an individual or group/s of people moving firstly to a new place/region/state within the country and secondly, to a foreign country which is not his/her/their usual place of residence. The former is generally termed internal migration, migration within the geographical jurisdiction of a country, and the latter is known as international migration, migration beyond the geographical jurisdiction of a country (United Nations, 2016). In other words, human migration encompasses any movement of people as an individual or in a group/s, whatever the composition of the group/s, its length of stay, its consequences at origin/destination, and various causes of migration (push-pull factors). It includes economic migrants, displaced persons, refugees, and persons moving for multiple purposes, including family reunification.

Across the world, internal migration is considered a normal phenomenon, which seems to result from a country's faster, uneven sectoral and regional development. Internal migration is closely associated with a country's demographic and socio-economic developments, which needs to be examined and probed by researchers and policymakers from various perspectives. That is why there has been growing interest of demographers, sociologists, economists, and state policymakers in assessing its causes, impacts/consequences, and interactions along with its diverse contours (Harris and Todaro, 1970; Alwang and Siegel, 1999; Ellis, 2000; Schmook and Radel, 2008; Qin, 2010).

Review of Literature

Mainstream growth economists (Lewis, 1954; Harris and Todaro, 1970; Todaro, 1978; Stark and Lucas, 1988; Greenwood, 1997; Lucas, 1997; Taylor, 1999) have argued that R-U migration and economic development are intimately related to each other, especially in the underdeveloped countries (UDCs). Such migration flows were considered a normal economic phenomenon for economic growth in these countries because the surplus labor employed in the agriculture sector has to be shifted to more remunerative employment/jobs in the urban industrial and service sectors. R-U migration process, therefore, has been considered to be economically and socially beneficial both to the households and the society because such migration may help the human resources or persons employed in the low-paid economic activities of agriculture and allied (Lewis 1954; Ranis and Fei, 1961). Further, R-U migration will also become an essential tool for raising rural incomes through remittances and for having labour productivity gains due to

the rise in the per capita land holdings; both of these facts are documented in the history of present-day developed countries (Greenwood, 1997; Lucas, 1997).

Contrary to these perceptions, the number of R-U migrants in the UDCs generally exceeds the absorption capacity of modern industrial and other urban sectors. As a result, the increasing number of migrants on a large scale leads to the mushrooming growth of job-seekers, who are either employed in the informal sector of urban economy or remain unemployed or underemployed. Due to this phenomenon, urban areas have been witnessing rising unemployment and underemployment rates, the growth of slums, overcrowded housing, and a relative shortage of public amenities in these urban centres. Further, bulk of new entrants - unskilled or semi-skilled added to the urban labour force were found seeking/getting employment of their own (self-employment) or got work in small-scale individual/family-owned enterprises. These self-employed persons engaged themselves in a wide array of activities ranging from hawking/street vending, letter writing, knife-sharpening and junk collecting to the selling of fireworks, snake charming, drug peddling, prostituting, etc. Many others found to be getting jobs as mechanics, carpenters, barbers, small artisans and personal maid/male servants. Only, a few migrants who have some sort of skills were able to get better jobs in the formal sector.

An overview of many migration studies (Harris and Todaro, 1970; Todaro, 1978; Oberai and Singh, 1983; Oberai, 1987; Singh, 1991; Bhagat and Mohanty, 2008) opined that economic growth of any economy/region certainly generates more employment opportunities for the labour and also enhances labour's mobility within the country/region. Such labor movements within the country/region are known as internal migration. In the LDCs, internal migration, particularly R-U migration stream, led to growth of urbanisation and related problems of sharing scarce civic amenities. Kuznets's theory of structural changes which predicted a significant shift of rural labour to industrial sites located in or near by urban settings came true (Kuznets, 1966), more favourably in India. For instance, 205 lakh people in India, which accounted for 30 per cent of India's urban growth, moved from the rural to the urban areas in the 1990s (Registrar General of India, 2005).

Data Sources and Methodology

The study is based on the secondary data gathered from the four population censuses conducted during 1981, 1991, 2001, and 2011. The migration data in India showed that internal migration is counted by two ways: (i) by place of birth and (ii) by place of last residence. A person is considered as a migrant by place of birth if the place at which he/she is being enumerated is different from his/her birthplace. However, such measures could not give a correct picture of migration currently because he/she could have migrated several times during his/her life. On the other hand, a person is considered as a migrant by place of last residence,

if the place in which he/she is being enumerated during the current census is different from his/her place of immediate last residence. Such migration would give a better picture of latest/current migration cases and past migration if he/she migrated more than once.

Depending on the origin and destination, internal migration, further, can be classified into two categories, firstly based on migration distance such as the short distance, medium distance and long distance migrants and secondly, based on rural-rural migration, rural-urban migration, urban-urban migration and urban-rural migration. Former stream specifically R-U migration has attracted a growing interest of intellectuals, scholars and policymakers because the economic, political, social and cultural consequences of such migrants at their places of origin and destination are largely unexplored in the developing economies (Oberai and Singh, 1983; Singh, 1991).

It is said that migration by place of last residence would certainly reveal a better picture of patterns and trends of migration going-on in a country/region. Moreover, migration by place of last residence also captures the returned migrants correctly, if any (RGI, 2001). Geographically, internal migration can be of three types: a person could have moved (a) from another village or town in the same district (intra-district); (b) from another district of the state (inter-district); and from another state/s of India (inter-state). In this paper, internal migration in Punjab by place of last residence has been examined and the relevant data were taken from the migration tables of population censuses of 1981, 1991, 2001 and 2011.

Internal migration in India during the past four decades showed a rising trend. In 1981, out of 6653 lakh of India's total population, 1919 lakh people (28.83%) were migrants by place of last residence. Further, an absolute number of internal migrants increased from 2318 lakh (27.64%) in 1991 to 3145 lakh (30.57%) out of total population of 8386 lakh in 1991 and 10286 lakh in 2001 respectively and then again the number of internal migrants increased with significant number of 4557 lakh (37.63%) out of 12108 lakh total population in 2011. Interestingly, out of 4557 lakh internal migrants in 2001, 2775 lakh (60.89%) migrants were migrated within the district (Intra-District) of enumeration, 1181 lakh (25.91%) migrants found to be moving between districts (Inter-District) and remaining 542 lakh migrants (11.89%) were migrated within the state (Inter-State) of enumeration. Similarly, data shows majority of migrants move from rural to urban areas.

These figures clearly indicate two important things: firstly, internal migration in India still continues to be considerably high; and secondly, inter-state R-U migration stream acquired a dominating position amongst three other types of migration streams (rural-rural, urban-urban and urban-rural). And, this R-U migration stream has become an important tool for fuel rising urbanisation in

India (Oberai and Singh, 1980). Considering these aspects, this paper has been devoted to examining the dynamics of internal migration in Punjab, one of the highly developed states of India, from different perspectives such as types, streams and reasons behind such migration.

Pattern of Internal Migration in Punjab

Punjab economy, undoubtedly, has witnessed many dramatic improvements in the agricultural production and productivity with the advent of Green Revolution since the mid-1960s. Success of Green Revolution strategy resulted in a substantial rise in state's per capita income and a great momentum in establishing small and medium industries in the state. In the agriculture sector, application of HYV seeds, agro-chemicals, better credit facilities, assured irrigation through canals and electric tube wells in the state gave a big push to grow multiple crops. This successful and sustained agricultural transformation not only increased per capita income of people living in the state compared to the people living in other states of India (Gill, 1989), but also attracted the poor people from the poorer states to come here as the migrants (Sidhu et al., 1997).

In the subsequent years, rising agricultural productivity and small scale industrialisation gave a tremendous push to the growth of service sector in the state. At the initial stages, both the growth of services and intensive agriculture raised demand for more manual labour in the state. And, shortage of manual labour in Punjab's agricultural sector was fulfilled by the migratory labour coming from the poor states of India such as UP, Bihar, and Rajasthan. A large number of migratory labourers employed in the agriculture, however, were seasonal in nature and, when the sowing/harvesting is finished, they returned to their places of origin (Ghuman et al., 2007). In the first decade of the new millennium (21st century), mechanisation of agriculture in Punjab started on an extensive scale. Most of work related activities in the agriculture sector, except the paddy transplantation and cotton picking, are mostly done by the machines. This process reduced the demand for manual labour to be employed in the agriculture sector to a nadir.

Further, growth of small scale industries in the state attracted migratory labour on a large scale to do manual and semi-skilled work at cheaper rates. Medium scale industries preferred to employ migratory labour for several reasons (Oberai and Singh, 1983). Although such migratory labour came to Punjab temporarily at the initial years, many stayed here permanently at the work places/factories, in rented houses. Many also built their own houses mostly in the urban areas. This process invariably affected the migration streams of an earlier phase of 1970s and 1980s when the rural-rural migration was the dominant pattern compared to the later phase of 1990s and 2000s when R-U migration began to dominate in the state (Ghuman, et al., 2007)

A perusal of data on internal migration in Punjab (Table 1.1) revealed some interesting results. First, total number of migrants by place of last residence, in absolute figures, increased from 59.08 lakh in 1981 to 69.60 lakh in 1991, 91.89 lakh in 2001 and 137.35 in 2011. In relative terms, however, proportion of total migrants to total population decreased marginally from 35.19 per cent in 1981 to 34.31 per cent in 1991, but again gained momentum in the next decades to reach at 37.72 per cent in 2001 and 49.51 per cent in 2011. Second, the proportion of internal migrants within total migrants increased from 88.49 per cent in 1981 to 92.99 per cent in 1991 and from 96.54 per cent in 2001 to 97.97 per cent in 2011. Furthermore, the proportion of emigrants (external migration) declined from 4.05 per cent in 1981 to just 1 per cent in 2011. It means that internal migration in the state has gained a dominant position.

Table-1.1
Distribution of Number of Migrants According to Place of Last Residence in Punjab (1981-2011)

	Total Census Population (lakh)	Number of Migrants (Lakh)				Within Migrants (%)		
		Grand Total	Internal	External	Unclass*	Internal	External	Unclass*
1981	1,67,88,915	59,08,654	52,28,312	6,80,104	238	88.49	11.51	0.00
%	100.00	35.19	31.14	4.05	0.00			
1991	2,02,81,969	69,60,431	64,72,343	4,74,298	13,790	92.99	6.81	0.20
%	100.00	34.31	31.91	2.34	0.07			
2001	2,43,58,999	91,89,438	88,71,043	3,18,391	4	96.54	3.46	0.00
%	100.00	37.72	36.42	1.31	0.00			
2011	2,77,43,338	1,37,35,616	1,34,56,654	2,77,287	1,675	97.97	2.02	0.01
%	100.00	49.51	48.50	1.00	0.01			

Note: *Unclassified.

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

An analysis of internal migrants by gender in Punjab showed (Table 1.2) that in absolute terms, the number of both male and female migrants increased across the different population censuses (1981, 1991, 2001 and 2011). Further, female migrants constituted a dominant proportion of total migrants identified in the state. For instance, 70.14 per cent of internal migrants were females compared to males' share of just 29.86 per cent in 1981.

Similarly, females constituted 73.37 per cent of internal migrants compared to 22.41 per cent of males in 1991. Again, in 2001 and 2011, females comprised 68.57 and 63.36 per cent of the internal migrants' shares, compared to 31.43 and 36.64 per cent of the shares held by males respectively. It is quite interesting to note that the share of male migrants began to increase during the last three population censuses, i.e., 1991, 2001 and 2011. For instance, in 1991, females consisted of 73.37 per cent share of internal migrants compared to 26.63

per cent share held by males; whereas in 2011, females cornered a subdued share of 63.36 per cent of internal migrants compared to 36.64 per cent share held by males.

Table-1.2
Gender Wise Distribution of Internal Migrants of Punjab (1981-2011)
(Number)

Census Year	Gender of Internal Migrants		
	Male	Female	Total
1981	15,61,064	36,67,248	52,28,312
%	29.86	70.14	100.00
1991	17,23,711	47,48,632	64,72,343
%	26.63	73.37	100.00
2001	27,87,954	60,83,089	88,71,043
%	31.43	68.57	100.00
2011	49,31,561	85,25,093	1,34,56,654
%	36.64	63.36	100.00

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

Further, distribution of internal migrants by gender and duration of residence at place of residence showed that 26.45 per cent of males and 28.10 per cent of females have reported 0-9 years' duration of residence in 2011 compared to nearly one-half of male migrants (49.20%) and more than one-third of female migrants (36.38%) in 1981.

Table-1.3
Distribution of Internal Migrants According to Gender and Duration of Residence at the Place of Residence (1981- 2011)
(Number)

Duration	1981		1991		2001		2011	
	Male	Female	Male	Female	Male	Female	Male	Female
Less Year	1,25,999 (8.07)	1,31,801 (3.59)	97,622 (5.66)	1,22,000 (2.57)	97,806 (3.51)	1,21,546 (1.99)	232,415 (4.71)	285,156 (3.34)
1-4	3,89,936 (24.98)	6,27,735 (17.12)	3,65,415 (21.20)	7,66,159 (16.13)	4,21,505 (15.12)	7,91,944 (13.02)	544,259 (11.04)	1,040,989 (12.21)
5-9	2,52,169 (16.15)	5,74,679 (15.67)	2,83,327 (16.44)	7,65,773 (16.13)	3,21,031 (11.51)	7,69,855 (12.66)	527,552 (10.70)	1,069,740 (12.55)
10-19	3,55,264 (22.76)	9,03,853 (24.65)	3,63,505 (21.09)	11,92,287 (25.11)	4,43,666 (15.91)	14,33,491 (23.57)	1,973,262 (40.01)	4,909,808 (57.59)
20+	3,63,763 (23.30)	13,63,707 (37.19)	3,83,803 (22.27)	17,28,928 (36.41)	4,51,278 (16.19)	21,57,745 (35.47)		
Duration	73,933	65,473	2,30,039	1,73,485	10,52,668	8,08,508	1654073	1,219,400
Not Stated	(4.74)	(1.79)	(13.35)	(3.65)	(37.76)	(13.29)	(33.54)	(14.30)
Total	15,61,064 (100.00)	36,67,248 (100.00)	17,23,711 (100.00)	47,48,632 (100.00)	27,87,954 (100.00)	60,83,089 (100.00)	4,931,561 (100.00)	8,525,093 (100.00)

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

A decline in proportionate shares of migrants having 0-9 year's duration in 2011 may be attributed to non-reporting of duration of migration by a large proportion of male migrants (33.54%) and female migrants (14.30%) in 2001. Males who reported 10-19 years as the migration duration at their last residence showed a declining trend from 22.76 per cent in 1981 to 21.09 per cent in 1991 and 15.91 per cent in 2001, whereas the share of females remained around 24/25 per cent during the three censuses of 1981, 1991 and 2001. Interestingly, proportion of internal migrants who came and settled here 20+ years ago also showed a declining trend for the both males and females over time period of study (Table 1.3).

Size and Growth of Internal Migrants' Inflow in Punjab (1981-2011)

For a number of years, Punjab enjoyed a better economic and dynamic position in terms of per capita income amongst all the major Indian states. This was largely due to the unprecedented growth of agriculture sector in the state that had created a greater demand for manual labour in the agriculture sector. Rising demand for labour in the agriculture sector attracted more migratory labour to be shifted to the state and get employment in the agricultural and allied activities. Many began working or getting employment in the urban areas and settled here permanently. Since the mid-1990s, however, overall growth of Punjab economy began to slow down, particularly due to the stagnated and marginal growth rate in the state's agricultural production. Further, widespread mechanisation and automation process in the agriculture sector reduced demand for manual labour in the state. Both these phases of agricultural development in the state impacted differently upon the growth of internal migration in the state, whereas in the former phase, more migration flows were moved to the rural areas; and in the latter period, more migration flows were attracted to the urban areas in the state (Singh and Singh, 2016).

Migration Type Wise Distribution of Internal Migrants of Punjab

The data in Table 1.4 revealed that in Punjab, total number of internal migrants rose from 52.28 lakh in 1981 to 64.72 lakh in 1991 and again rose from 88.71 lakh in 2001 to 134.56 in 2011; showing per annum CGRs of 2.16 per cent during the decade of 1981-91, 3.20 per cent during the decade of 1991-2001 and 4.25 per cent during the decade of 2001-11. Intra-district migration alone cornered a major proportion (53.24%) of total internal migrants in 1981, 52.65 per cent in 1991, 52.62 per cent in 2001 and 51.91 per cent in 2011; showing the CGRs of 2.04 per cent in the decade of 1981-1991, 3.20 per cent in the decade of 1991-2001 and 4.11 per cent in the decade of 2001-2011. Actually, most of the intra-district migrants were females who customarily change their parental households and joined their husband's households after the marriage. Further, the share of inter-district migration was marginally reduced to 29.60 per cent in 2011,

whereas this share was 30.04 per cent in 1991 and 29.78 per cent in 1981; revealing per year CGRs as 2.25 per cent in the decade of 1981-91, 2.36 per cent in the decade of 1991-2001 and 4.96 per cent in the decade of 2001-2011.

Table-1.4
Migration Type Wise Distribution of Internal Migrants of Punjab
(1981-2011)

Migration Type	Number of Internal Migrants				Compound Growth Rate %		
	1981	1991	2001	2011	1991-1981	2001-1991	2011-2001
Intra-district (Within District)	27,83,643 (53.24)	34,07,522 (52.65)	46,67,609 (52.62)	69,85,711 (51.91)	2.04	3.20	4.11
Inter-district (Between Districts)	15,57,177 (29.78)	19,44,539 (30.04)	24,54,312 (27.67)	39,82,644 (29.60)	2.25	2.36	4.96
Inter-state (between States)	8,87,492 (16.97)	11,20,282 (17.31)	17,49,122 (19.72)	24,88,299 (18.49)	2.36	4.56	3.59
Total Migrants	52,28,312 (100.00)	64,72,343 (100.00)	88,71,043 (100.00)	1,34,56,654 (100.00)	2.16	3.20	4.25
Total Population	1,67,88,915	2,02,81,969	2,43,58,999	2,77,43,338	1.91	1.85	1.31

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

On the other side, inter-state migration in Punjab showed a rising trend; up from 16.97 per cent in 1981 to 17.31 per cent in 1991 and 19.72 per cent in 2001 but a slight decline (18.49%) in 2011; showing very high CGR of 4.56 per cent in the decade of 1991-2001 compared to 2.36 per cent in the decade of 1981-91 (2.36%). The noteworthy point is that the CGRs across different types of internal migrants were high during the decade of 1991-2001 compared to the decade of 1981-91. This means that internal migration in the state, particularly of inter-state variety, increased considerably during the decade 1991-2001, coinciding with India's economic liberalisation policy, which was initiated in 1991, and Punjab's rising growth of urban economy. In Punjab, the rising trend of internal migration inflows, especially at the inter-state level, was largely due to the pull factors during 1991-2001, where the R-U migration stream began to dominate. Such rising trends were also found in other developed Indian states such as Haryana, Maharashtra, Gujarat and Delhi (Zachariah, Kannan and Rajan, 2012).

Intra-State Migration Stream Wise Distribution of Internal Migrants of Punjab

The data in Table 1.5 reveals significant trends in the intra-state migration stream-wise distribution of internal migrants in Punjab between 1981 and 2011.

Rural-to-rural migration consistently dominated the intra-state migration streams, accounting for 66.59 per cent in 1981, 65.41 per cent in 1991, and 64.07 per cent in 2001, but witnessed a substantial decline to 53.75 per cent in 2011. Its compound growth rate (CGR) decreased from 1.94 per cent during 1981-1991 to 0.80 per cent during 1991-2001, followed by a moderate increase to 2.86 per cent during 2001-2011. Rural-to-urban migration displayed a consistent share of around 15 per cent throughout the period, with its CGR peaking at 3.80 per cent during 2001-2011, reflecting the increasing urban pull factors. Urban-to-urban migration experienced the most dynamic growth, rising from 12.21 per cent in 1981 to 23.68 per cent in 2011. CGRs escalated from 3.01 per cent during 1981-1991 to 8.76 per cent during 2001-2011, underscoring urbanisation and inter-city migration trends. Interestingly, although initially marginal, urban-to-rural migration surged significantly to 8.28 per cent in 2011, with a remarkable CGR of 12.01 per cent during 2001-2011, indicating a possible shift driven by economic diversification and peri-urban expansion. Overall, the total intra-state migration stream registered a rising trend, with the CGR accelerating to 4.68 per cent during 2001-2011, demonstrating the dynamic nature of migration patterns influenced by socio-economic transformations and regional development within Punjab.

Table-1.5
Intra-State Migration Stream Wise Distribution of Internal Migrants in Punjab (1981-2011)

Intra-State Migration Stream	Number of Internal Migrants				Compound Growth Rate %		
	1981	1991	2001	2011	1991-1981	2001-1991	2011-2001
Rural to Rural %	28,80,619 (66.59)	34,91,307 (65.41)	37,82,652 (64.07)	50,16,093 (53.75)	1.94	0.80	2.86
Rural to Urban %	6,53,288 (15.10)	8,24,445 (15.45)	9,17,847 (15.55)	13,32,819 (14.28)	2.35	1.08	3.80
Urban to Rural %	2,63,866 (6.10)	3,11,589 (5.84)	2,48,680 (4.21)	7,73,048 (8.28)	1.68	-2.23	12.01
Urban to Urban %	5,28,357 (12.21)	7,10,540 (13.31)	9,54,488 (16.17)	22,09,809 (23.68)	3.01	3.00	8.76
Total Intra-State Migration Stream Migrants %	43,26,130 (100.00)	53,37,881 (100.00)	59,03,667 (100.00)	93,31,769 (100.00)	2.12	1.01	4.68

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

Inter-State Migration Stream Wise Distribution of Internal Migrants in Punjab

The data in Table 1.6 illustrates the inter-state migration stream-wise distribution of internal migrants in Punjab from 1981 to 2011, highlighting notable shifts in migration patterns over the decades. Rural-to-rural migration exhibited a fluctuating trend, with its share dropping significantly from 35.56 per cent in 1981 to 14.76 per cent in 1991 but recovering to 32.73 per cent in 2001 before declining slightly to 28.31 per cent in 2011. The compound growth rate (CGR) reflects a sharp decline of -10.13 per cent during 1981-1991, followed by a substantial increase of 17.55 per cent during 1991-2001 and a modest rise of 2.02 per cent during 2001-2011. Rural-to-urban migration, on the other hand, consistently expanded its share from 22.96 per cent in 1981 to 37.27 per cent in 2001, before slightly declining to 30.48 per cent in 2011. This stream exhibited a robust CGR of 15.38 per cent during 1991-2001, reflecting the increasing urban pull factors.

Table-1.6
Inter-State Migration Stream Wise Distribution of Internal Migrants in Punjab (1981-2011)

Inter-State Migration Stream	Number of Internal Migrants				Compound Growth Rate %		
	1981	1991	2001	2011	1991-1981	2001-1991	2011-2001
Rural to Rural %	3,11,129 (35.56)	1,06,916 (14.76)	5,38,392 (32.73)	6,57,732 (28.31)	-10.13	17.55	2.02
Rural to Urban %	2,00,900 (22.96)	1,46,632 (20.24)	6,13,135 (37.27)	7,08,266 (30.48)	-3.10	15.38	1.45
Urban to Rural %	96,285 (11.01)	1,11,840 (15.44)	87,350 (5.31)	1,49,241 (6.42)	1.51	-2.44	5.50
Urban to Urban %	2,66,536 (30.47)	3,58,924 (49.55)	4,06,169 (24.69)	8,08,149 (34.78)	3.02	1.24	7.12
Total Inter-State Migration Stream Migrants %	8,74,850 (100.00)	7,24,312 (100.00)	16,45,046 (100.00)	23,23,388 (100.00)	-1.87	8.55	3.51

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

Urban-to-rural migration, though smaller in share, remained relatively stable, with its share ranging from 11.01 per cent in 1981 to 6.42 per cent in 2011, and CGR peaking at 5.50 per cent during 2001-2011, indicating a

resurgence in rural economic opportunities or peri-urban expansion. Urban-to-urban migration displayed the most dynamic growth, with its share rising from 30.47 per cent in 1981 to a dominant 49.55 per cent in 1991, followed by a decline to 24.69 per cent in 2001 and a rebound to 34.78 per cent in 2011. Its CGR peaked at 7.12 per cent during 2001-2011, reflecting increased inter-city connectivity and urban economic opportunities. Overall, the total inter-state migration stream witnessed significant growth, particularly during 1991-2001, with a CGR of 8.55 per cent, followed by a more moderate 3.51 per cent during 2001-2011, showcasing the dynamic interplay of socio-economic factors shaping inter-state migration patterns in Punjab.

State Wise Distribution of Internal Migration Inflow in Punjab

In Punjab, the number of inter-state migrants increased from 8.87 lakh in 1981 to 11.20 lakh in 1991, 17.49 lakh in 2001, and 24.88 lakh in 2011. Annual CGR was just 2.36 per cent in the decade of 1981-91 compared to the annual CGR of 4.56 per cent in the decade of 1991-2001 (Table 1.7). For two decades, annual CGR was 3.55 per cent from 1981-2001. This implies that the inter-state migrant inflows to Punjab were higher in 1991-2001 than that of 1981-1991. Moreover, the data also revealed that there was a sharp rise in the migrant inflows from Bihar state to Punjab state. For example, annual CGR in the case of migration inflows from Bihar state was the highest during both the decades compared to the other states. Bihar state was followed by West Bengal and UP so far as the annual CGRs were concerned during both the time periods.

For examining structure of inter-state migration inflows, the data revealed (Table 1.7 and Figure 1.1) that in 1981, Haryana topped with 28.43 per cent share of inter-state migrants who came to Punjab, followed by UP with 25.24 per cent share, Rajasthan with 14.37 per cent share, Himachal Pradesh with 12.87 per cent share and Bihar having a share of 5.76 per cent. In 1991, Haryana topped again with 26.47 per cent share of inter-state migrants who came to Punjab, followed by UP with 9.84 per cent, and Bihar with 8.06 per cent. In the years 2001 and 2011, however, sequence was changed when UP gained first place with 32.04 per cent and 26.10 per cent share, followed by Haryana with 20.64 per cent and 21.93 per cent share, Bihar with 15.26 per cent and 14.17 per cent share, Himachal Pradesh with 9.45 per cent and 8.61 per cent share and Rajasthan with 7.77 per cent and 8.12 per cent share. The analysis clearly showed that Uttar Pradesh has emerged as the most important state that sends large number of migrants to Punjab. This is contrary to the widely held belief that the majority of migrants coming to Punjab are from Bihar (Ghuman et. al., 2007).

On the whole, Bihar, West Bengal, Madhya Pradesh, and Uttar Pradesh (in terms of growth rate) recorded higher annual CGRs of inter-state migrants inflows compared to other states during the decade 1991-2001. The relative

shares of migrant inflows in Punjab from these four States improved, but the share of migrants declined for the rest of the states included in the analysis.

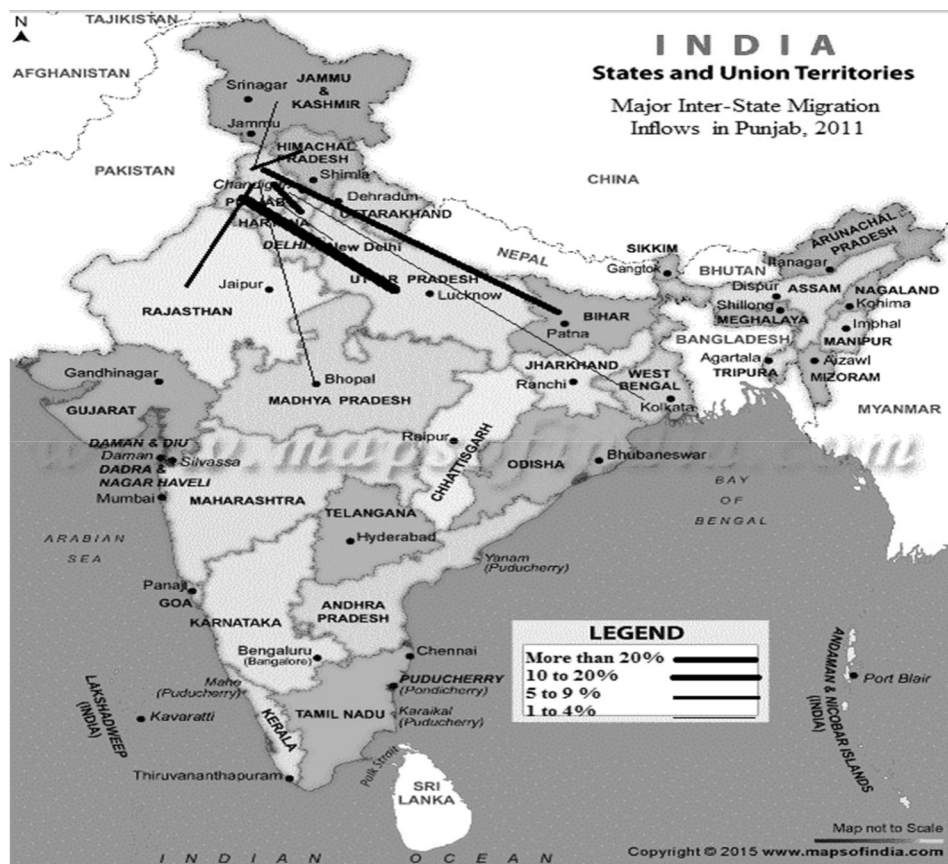
Table-1.7
State Wise Trends of Inter-State Migration Inflows in Punjab (1981-2011)
(Number)

State/Year	Migrant population				Annual CGR* (Per cent)			
	1981	1991	2001	2011	1981-91	1991-01	2001-11	1981-2011
Uttar Pradesh	2,20,216 (25.24)	2,80,350 (24.89)	5,61,629 (32.04)	6,49,557 (26.10)	2.44	7.20	1.47	5.47
Haryana	2,48,043 (28.43)	2,98,101 (26.47)	3,61,766 (20.64)	5,45,584 (21.93)	1.86	1.95	4.19	3.96
Bihar	50,235 (5.76)	90,723 (8.06)	2,67,409 (15.26)	3,52,537 (14.17)	6.09	11.42	2.80	10.07
Himachal Pradesh	1,12,289 (12.87)	1,36,134 (12.09)	1,65,158 (9.42)	2,14,213 (8.61)	1.94	1.95	2.63	3.23
Rajasthan	91879 (14.37)	1,10,853 (9.84)	1,36,168 (7.77)	2,02,166 (8.12)	1.90	2.08	4.03	3.96
Chandigarh	23,771 (2.72)	39,000 (3.46)	60,581 (3.46)	1,49,591 (6.01)	5.08	4.50	9.46	9.48
Delhi	37,021 (4.24)	46,258 (4.11)	51,623 (2.95)	45,310 (1.82)	2.25	1.10	-1.30	1.00
Jammu & Kashmir	30,223 (3.46)	36,108 (3.21)	47,349 (2.70)	70,299 (2.83)	1.80	2.75	4.03	4.24
West Bengal	12,970 (1.49)	18,635 (1.65)	45,902 (2.62)	46,958 (1.89)	3.69	9.43	0.23	6.54
Madhya Pradesh	15,556 (1.78)	15,717 (1.40)	42,151 (2.40)	32,869 (1.32)	0.10	10.37	-2.46	3.75
Total of 10 states	8,42,203 (96.54)	10,71,879 (95.18)	1,739,736 (99.26)	2,309,084 (92.80)	2.44	4.96	2.87	5.09
Total for Other States	45,289 (3.46)	48,403 (4.82)	9,386 (0.74)	1,79,215 (7.20)	0.67	-15.13	34.30	7.01
Total of All States	8,87,492 (100.00)	11,20,282 (100.00)	17,49,122 (100.00)	24,88,299 (100.00)	2.36	4.56	3.59	5.21

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

Note: 1. CGR* is Compound Growth Rate
2. Figures in parentheses are percentages

Figure-1.1
State-Wise' Inter-State Migration Flows' (Duration 0-9 years) of Punjab,
2011



Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

Determinants/Reasons and Consequences of Internal Migration in Punjab

Regarding major determinants/reasons behind the internal migration, the census data need a few clarifications. First, listed reason/s were continuously same in the 1991 and 2001 population censuses, except for the 'business' as a reason of migration, which was added in the 1991 population census and onwards. Second, 'natural calamities' were the reason for the drop from the list in 2001. Third, an additional reason 'moved after birth' was added to the listed reasons in 2001 because a large number of married women when became mothers moved either to their natal residences or to a place having better medical facility for the child delivery. Further, whereas such women were not treated as the migrants at their

temporary place or residence, but the child/children born to them are treated as the migrants when they accompany their parents to their place of normal residence. Though technically, this is migration, the place of birth being different from the place of enumeration for the children born, separating this from other categories was useful.

Table-1.8
Distribution of Internal Migrants in Punjab as per Reasons of Migration
(1981-2011)

Reason/s	Number of Internal Migrants							
	1981		1991		2001		2011	
	Males	Females	Males	Females	Males	Females	Males	Females
Work/ Employment	5,41,189 (34.67)	68,346 (1.86)	5,48,706 (31.83)	90,294 (1.90)	7,35,732 (26.39)	1,04,597 (1.72)	1,060,487 (20.87)	183,569 (2.12)
Business	Na	Na	40,778 (2.37)	12,490 (0.26)	20,496 (0.74)	15,953 (0.26)	37,307 (0.73)	22,469 (0.26)
Education	41,057 (2.63)	34,233 (0.93)	32,430 (1.88)	28,540 (0.60)	21,073 (0.76)	15,377 (0.25)	33,338 (0.66)	27,597 (0.32)
Marriage	32,505 (2.08)	27,37,611 (74.65)	73,968 (4.29)	37,85,601 (79.72)	42,764 (1.53)	42,44,179 (69.77)	119,743 (2.36)	5,460,008 (63.09)
Moved with Household	4,91,020 (31.45)	5,04,522 (13.76)	5,38,612 (31.25)	4,99,516 (10.52)	2,46,946 (26.76)	1,58,373 (12.02)	1,848,519 (36.38)	1,569,055 (18.13)
/Moved after Birth	4,55,293 (29.17)	3,22,536 (8.80)	4,89,217 (28.38)	3,32,191 (7.00)	12,21,946 (43.87)	9,72,057 (15.98)	1,981,425 (39.00)	1,392,099 (16.08)
Others	15,61,064 (100.00)	36,67,248 (100.00)	17,23,711 (100.00)	47,48,632 (100.00)	27,87,954 (100.00)	60,83,089 (100.00)	5,080,819 (100.00)	8,654,797 (100.00)
Total migrants								

Note: Figures in parentheses are percentages.

Source: Census of India, Migration Tables (1981, 1991, 2001 and 2011).

An analysis of data regarding determinants/reasons behind their migration decisions revealed that the determinants/reasons cited by male and female migrants varied significantly (Table 1.8). The 'work or employment' was the most cited reason behind migration by males (34.67% males in 1981, 31.83% males in 1991, 26.39% males in 2001 and 20.87% males in 2011). Another important reason behind male migration was 'moved with household/moved after birth'. 31.45 per cent male migrants reported this reason in 1981, 31.25 per cent in 1991, 26.76 per cent in 2001 and 36.38 per cent males in 2011. Conversely, the 'work or employment' was the least important reason/s behind internal migration by females because just 1.86 per cent females in 1981, 1.90 per cent females in 1991, 1.72 per cent females in 2001 and 2.12 per cent females in 2011 cited this reason. 'Marriage' was the most important determinant/reason behind female migration in the state as 74.65 per cent females in 1981, 79.72 per cent females in 1991, 69.77 per cent females in 2001 and 63.09 per cent females in 2011 reported

this reason. And, 'moved with household/moved after birth' as a reason of migration amongst females was cited by just 13.76 per cent females in 1981, 10.52 per cent females in 1991, 12.02 per cent females in 2001 and 18.13 per cent females in 2011. Compared to this, a higher proportion of males cited this reason (31.45% in 1981, 31.25% in 1991, 26.76% in 2001 and 36.38% in 2011).

It is clearly highlighted from the analysis of determinants/reasons behind internal migration that the 'marriage' is the most important determinant/reason behind females' migration during the last three decades (1981-1991, 1991-2001 and 2001-2011). Amongst males, 'work/employment' and 'moved with household/moved after birth' continued to be two important reasons behind their migration decisions. In fact, the reason 'moved with household/moved after birth' is largely dependent upon and associated with a person's decision to migrate due to the reason disguised in the 'work/employment'; as in the due course of time, the entire folk of dependents in the household/family have to move to the new place. It means that both the pull and push factors in the form of economic, socio-cultural, political and miscellaneous factors are behind the migration related decisions of males and females in the state.

A perusal of determinants/reasons behind internal migration clearly highlighted that the 'marriage' emerged as the most important determinant/reason behind females' migration during population censuses of 1981, 1991, 2001 and 2011. It was followed by the reason named as 'moved with household/moved after birth'. Further, amongst males, 'work/employment' and 'moved with household/moved after birth' continued to be two important reasons behind their migration decisions. Education and business as reasons behind migration decision were cited by few migrants whether they belonged to males or females. In nutshell, it can be safely said that both the pull and push factors in the form of economic, socio-cultural, political and miscellaneous factors are behind the migration related decisions of males and females in the state.

As far as major consequences are concerned, several research studies (Singh, 1991; Todaro and Smith, 2012; Kannan and Breman, 2013) revealed that R-U migration in India has greatly exceeded the capacity of modern industrial and urban service sectors to absorb the rising influx of migratory labour. In fact, such large-scale migration led to the mushrooming growth of job-seekers in the formal and informal sectors of urban economy. As a negative consequence, one cannot only find rising unemployment and underemployment rates, but also leading to overcrowded housing, growth of slums and relative shortage of public amenities in the urban centres. Further, bulk of new entrants to the urban labour force found to be self-employed in number of low paid vocations or got work in the tiny and small-scale enterprises. These self-employed persons engaged themselves in a wide array of activities, ranging from the hawking/street vending, letter writing, knife-sharpening, and junk collecting to the selling of fireworks,

snake charming, drug peddling, prostituting, etc. Many others got jobs such as the mechanics, salesman, office jobs, construction workers, carpenters, barbers, small artisans and personal maid/male servants.

This situation clearly promoted informal sector employment in India which is not only unregulated and unorganised, but also bereft of any job protection, decent working conditions, old age pensions and other forms of social security. Nearly, nine out of ten workers were employed in India's informal sector in 2005 (NCEUS, 2006, 2007 and 2009). Most of them migrated from rural to urban areas and were employed in low-paying jobs. Apart from this, the household's other family members (women and children) began to work longer hours. It means that more women and children added to the number of job seekers in the urban settings. Most of them shackled again into the poverty and forced to live in the slums and squatter settlements, which generally lacked a minimum amount of public services such as drinking water, proper sanitation, electricity, health services, etc. Thus, the poverty ratio in the urban areas again remains high, although very low compared to the rural areas (De Haas, 2007).

Rising number of R-U migrants in India has led to unprecedented additions to urban informal sector that mostly engaged them in the low paid manual as well semi-skilled jobs/employment activities. Further, employment in India's informal sector is mostly unregulated as an overwhelming majority of informal sector workforce did not enjoy any job protection, decent working conditions, old age pensions and other forms of social security. In India, nearly nine out of ten workers were employed in the informal sector in 2009-10 (Kannan and Breman, 2013). Most of these workers were from the R-U migrants. Being employed in the low paid jobs, many family members of the migrant households including the women and children were found to be working and often worked for longer hours to raise families' earning levels. So, when more and more women and children were added to the number of job seekers; and this rising supply of workforce in the urban areas, fear of being unemployed, further depressed the urban wage rates and the bargaining power of the job/work seekers.

As a consequence of this, most of R-U migrants shackled again into the poverty and forced to live in the urban slums and squatter settlements, which were generally bereft of a minimum amount of public services such as the drinking water, proper sanitation, electricity provisions, school education, health services, etc. Thus, the poverty ratio in the urban areas remains again high, although it is low compared to the rural areas.

Conclusion and Policy Implications

The study clarifies that Punjab's economy witnessed dramatic improvements by raising agricultural production and productivity since the mid-1960s. It was largely due to the success of Green Revolution strategy in the state, which has

brought out a substantial rise in people's per capita income and living standards. Intensive agriculture along with small industries in the state raised a very high demand for the manual labour. The poor people living in the poor/backward states of India started migrating to Punjab initially in the form of seasonal migrants employed in the agriculture sector; subsequently attracted to the industrial and service sectors, many of them settled permanently in the state. It means that manual and semi-skilled labour in rural areas willingly or unwillingly preferred to employ in the industrial and service sectors in the urban centres. Many observed a growing tendency of internal migration as well as dominant pattern of R-U migration in the state; when compared to three other streams (rural-rural, urban-urban and urban-rural) over the time.

The study also revealed that short-distance migration (intra-district and inter-districts) in Punjab got an overwhelming proportion of internal migrants of Punjab. In fact, most of such migrants were females who customarily changed their parental households and joined their husband's households after the marriage. Interestingly, long-distance migration (inter-state) in the state witnessed a rising trend; showing annual CGR of 4.56 per cent during 1991-2001 compared to annual CGR of 2.36 per cent during 1981-91. The noteworthy point is that annual CGRs across the different types of internal migrants were much higher during 1991-2001 decade as compared to the decade of 1981-91. Interestingly, four states, UP, Bihar, Haryana and Rajasthan were the major contributors of inter-state migration in Punjab. However, there was a sharp rise in the migration inflows from the Bihar to the Punjab state as annual CGR of migration inflows from Bihar was the highest during past three decades. Bihar was followed by West Bengal and UP in terms of increase as recorded by annual CGRs.

Regarding the determinants/reasons behind migration decisions, responses stated by male/female migrants varied significantly. Amongst males, 'work/employment' and 'moved with household/moved after birth' were two important reasons behind their migration decisions, whereas 'marriage' was the most important determinant/reason behind females' decisions to migrate during all the decades (1981-91, 1991-2001 and 2001-2011). In fact, reason 'moved with household/moved after birth' was associated with a person's decision to migrate largely disguised in the 'work/employment'; as in the due course of time, the entire folk of dependents in the household/family moved to the new place. It means that both the pull and push factors in the form of economic, socio-cultural, political and miscellaneous factors were behind the migration related decisions of males and females in the state.

In fact, a rising tendency of internal migration in Punjab poses several challenges for the policy makers. For instance, rising R-U migration has caused a strain on available urban land, housing supply, and other civic amenities. Regular inflow of migrants from other states already depressed not only the urban wage

rates but also caused social and communal tensions in the minds of the natives' vs. migrants'. Emergence of slums and separate housing of the migrants came from other states on the fringe of urban towns/cities is cause of concern. In the light of these observations, the state must come forward to provide productive employment opportunities to the rural youth otherwise the rural and poor people will continuously drift to the urban centres in search for better life, income and employment. Further, the state should strive to raise civic amenities and facilities in the urban areas. More vocational training centres must be established in the rural areas for better skills and training of the youth for self employment. They must be given more micro-loans as a start-up capital to start their own business ventures.

The study strongly recommends that the state must come forward to promote selective R-U migration of educated and skilled workers through a planned strategy and/or curtail unwanted R-U migration of the poor people by creating productive and adequate employment opportunities to the rural youth in the rural areas itself; otherwise the rural and poor people will continuously drift into the urban centres in search of better life, income and employment. Such an influx of the poor people in the urban areas will not only increase slums or slum population, an ugly sister of uncontrolled urbanisation and development, but also lead to an illegal encroachment of public land/roads/pathways. Politicians-bureaucracy-encroachers nexus as a natural corollary of such migration will acquire dangerous proportion, as observed by the researcher in Ludhiana (Punjab) during the survey time. Further, the state should strive to improve civic amenities and facilities in the urban setting. More vocational training centres must be established in the rural areas to generate better skills and train the youth for self-employment. Such migrants must be given more micro-loans as a start-up capital to start their own business ventures.

Nevertheless, the results of this study suggest that R-U migration is beneficial to the individual migrants, their households and economy; and that it will continue unabated until the underlying basic factors causing wide R-U and inter-urban differentials in the income/wages and employment opportunities are not altered. This can only be accomplished within the framework of national migration policy which is an integral component of the nation's over-all development strategy, linked to and harmonised with its policies on the industrialisation, agricultural development and labour's social welfare.

While this study provides a comprehensive analysis of internal migration patterns in Punjab from 1981 to 2011, it has certain limitations. First, the study primarily relies on census data, which, while comprehensive, is collected at ten-year intervals, potentially overlooking short-term migration fluctuations and seasonal migration patterns. Second, the analysis does not account for qualitative aspects such as migrant experiences, social integration, or policy responses at the

micro-level. Third, the study is limited to migration trends within Punjab, and broader comparative analyses with other states could provide a more detailed understanding of regional disparities. Lastly, due to data constraints, the study does not fully capture the impact of recent economic policy changes post-2011, which may have further altered migration dynamics in Punjab.

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AND ACHALA SRIVASTAVA

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Market in Uttar Pradesh: Trends and Patterns*

DEEPIKA GUPTA AND
ANJU RANI

*Unemployment among Educated Women in Haryana
with Special Reference to Sonipat and Panipat District*

M SRINIVASA REDDY

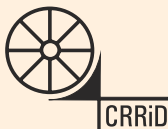
*Working and Living Conditions of Sewerage Workers A
Study of Vijayawada Municipal Corporation in Andhra
Pradesh*

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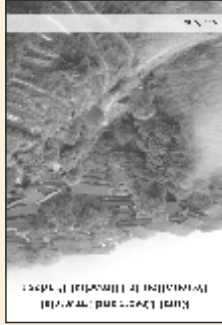
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Satish Verma



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Editorial Note

This December 2022 issue of *Man & Development* explores pressing dimensions of gender, labour, urban well-being, and geopolitics, themes that lie at the heart of India's contemporary development discourse. The five studies included here combine rigorous empirical analysis with policy-relevant insights, highlighting both persistent structural barriers and emerging opportunities for inclusive change.

Nomita P. Kumar, Kavita Baliyan, and Achala Srivastava lead the issue with a detailed investigation of occupational and industrial gender segregation in urban Uttar Pradesh. Using NSS and PLFS unit-level data (2011-12 to 2020-21) and the Duncan dissimilarity index, they document widening industrial segregation alongside stubborn horizontal and vertical divides. Women remain heavily concentrated in low-status service, care, and elementary roles, while being largely excluded from construction, transport, and technical manufacturing jobs.

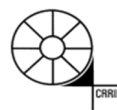
Deepika Gupta and Anju Rani examine unemployment among educated women in the urban areas of Sonapat and Panipat districts of Haryana. Drawing on primary data from 300 purposively selected respondents and binary logistic regression, the study identifies skill mismatches, safety and mobility constraints, unsuitable working hours, limited experience, and heavy care responsibilities as key barriers. Household economic status emerges as a significant positive factor, while having three or more dependents is negatively associated with employment.

M. Srinivasa Reddy shifts the focus to the often-invisible urban workforce, analysing the working and living conditions of sewerage workers in Vijayawada Municipal Corporation, Andhra Pradesh. The study highlights the harsh realities of sanitation labour and underscores the urgent need for better occupational safety, social protection, and dignity of work for this essential but marginalised group.

Vani Choudhary and Ravinder Kaur evaluate neighbourhood parks in Jammu City as indicators of child-friendly urban spaces. Their indicator-based assessment reveals how access to quality green spaces influences children's physical, social, and emotional development, offering valuable lessons for inclusive urban planning. Finally, Punit Gaur analyses India's engagement with Central Asia. The paper identifies structural impediments and strategic imperatives shaping regional cooperation, providing timely insights into India's foreign policy priorities in an evolving geopolitical landscape.

Together, these contributions remind us that meaningful development requires addressing not only economic growth but also the deeply gendered, spatial, and structural inequalities that continue to shape opportunities and outcomes. We hope the papers stimulate fresh thinking among researchers, policymakers, and practitioners.

Our sincere thanks to the authors for their scholarly contributions, the anonymous peer reviewers for their constructive feedback, and the CRRID editorial team for their dedicated support.



GENDER-BASED SEGREGATION IN URBAN LABOUR MARKET IN UTTAR PRADESH: TRENDS AND PATTERNS

Nomita P. Kumar¹, Kavita Baliyan² and Achala Srivastava³

Abstract: Much of the existing literature on occupational segregation in India have largely focused on gender-based occupational segregation based on secondary data. This study examines employment segregation, examining the relationships between industry, occupation, and sex, and more specifically, the variation in occupational segregation across industries. The study also examines occupational gender segregation by considering the distribution of workers across employment status in all occupations and industries. This study identifies the possible sources of gender differences in occupations and analyses trends and patterns of occupational segregation within industries while also discussing their policy implications. The findings highlight the need for policies and practices that can speed up the pace of change for women and improve their status in the urban labour market of Uttar Pradesh. The study also underscores the critical importance of considering employment segregation in policy design and filling the existing research gap. Targeted policies should be initiated/planned to encourage the equal occupational representation of both genders in the labour market.

Keywords: Occupational segregation, Industrial Segregation, Human Capital, India, Uttar Pradesh

JEL Codes: J16, J24, J71

Introduction

Labour markets in developing countries like India are a long-lasting structural challenge with deeply entrenched occupational segregation. While there has been a modest increase in female labour force participation in the workforce, the

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majority of women are still employed in a very limited number of low-level and feminised jobs when compared to men. Occupational and industrial distributions among workers demonstrates both horizontal segregation (where workers are clustered into certain industries) and vertical segregation (where women lack access to higher-profile positions). Occupational segregation is an important dimension of gender inequality and occurs when an occupation or a substantial part of it tends to be dominated by individuals of a particular gender (or other personal characteristic).

Occupational gender segregation is the result of “push” and “pull” factors such as discrimination against women, gender-specific socialisation, gender-linked traits, cultural beliefs about men’s and women’s competence and double standards of evaluation, the household division of labour, sexual harassment, government policies, and work-family arrangements rooted in social interaction and social structure (Weeden et al., 2018). Occupational segregation, a key element of gender inequality in the labour market, arises when an occupation tends to be dominated by workers of a particular gender (i.e., either female or male). Employers’ rigid ideas about the suitability of men and women for particular occupations persist in developing countries, and they restrict women’s employment opportunities to a much greater extent than men’s (Anker & Hein C, 1986). Occupational gender segregation refers to the tendency of men and women to work in different professions (Blackburn et al., 2002). The expansion of the economy and changes in the economic structure of the economy have not automatically led to a large-scale gender integration. Rather, structural norms, institutions, and segmentation by employment status continue to shape the differential outcomes of men and women in the labour market. Therefore, this study investigates the level and patterns of gender segregation by occupation and industry, and in particular, the variation in occupational segregation across industries in urban Uttar Pradesh, using dissimilarity indices and male-to-female ratios to understand how labour market stratification persists. It also underscores the critical importance of considering employment segregation in policy design while addressing the existing research gap. The study also examines trends in occupational and industrial segregation from 2011-12 to 2020-21. The study also examines occupational segregation across industries. This study further analyses trends and patterns of occupational segregation and discusses their policy implications. Overall, it examines the degree to which occupational gender segregation within industries is based on differences in the gender composition of occupations within those industries.

Conceptual Framework

Occupational gender segregation refers to the tendency of men and women to be concentrated in different occupations and industries (Blackburn et al., 2002; Anker, 1997). The persistence of segregation reflects the interaction of supply-

side, demand-side, and structural-institutional factors embedded within specific labour market and industry contexts (Weeden, Newhart, and Gelbgiser, 2018).

From the supply-side perspective, gender-differentiated labour market outcomes are shaped by gender-specific socialisation, cultural beliefs, and the unequal division of household and care work, which influence education, skill acquisition, and occupational aspirations of men and women (Hakim, 1992; Weeden et al., 2018). Human capital theory suggests that differences in education and work experience partly explain occupational sorting (Becker, 1964) and contribute to gendered employment outcomes; however, these differences are themselves structured by social norms and institutional constraints rather than by purely individual choice. Women's disproportionate responsibility for unpaid care work limits their labour supply, continuity of employment, and access to occupations requiring long or inflexible working hours, thereby reinforcing occupational segregation (Anker, 1997; Weeden et al., 2018).

On the demand side, employers' perceptions regarding the suitability of men and women for particular jobs play a crucial role in reproducing occupational and industrial segregation. In developing-country contexts, rigid gender norms, stereotypes about competence, and discriminatory hiring and promotion practices restrict women's employment opportunities more severely than men's (Anker and Hein, 1986; Anker, 1997). Employers may engage in statistical discrimination, gendered job queuing, and occupational closure, leading to the concentration of women in a limited set of occupations and industries (Hakim, 1992; Bridges, 1980, 1982). Sexual harassment and double standards of evaluation further discourage women from entering or remaining in male-dominated occupations (Weeden et al., 2018).

At the structural and institutional level, industry characteristics such as informality, capital intensity, working conditions, firm size, and employment status composition shape the degree of gender segregation across occupations (Perman and Stevenson, 1989; Stearns and Coleman, 1988). Labour market institutions, government policies, and work-family regulations rooted in broader social structures interact with industry-specific features to either constrain or facilitate women's participation in different sectors (Anker, 1997). Sectoral growth patterns also influence segregation, as expanding industries may disproportionately absorb male or female labour and reinforce industrial gender divisions over time (Bridges, 1980; Perman and Stevenson, 1989).

Within this framework, occupational and industrial segregation are mutually reinforcing processes. Occupational segregation restricts women's access to higher-paying industries, while industrial segregation limits the range of occupations available to women within particular sectors. Empirical studies suggest that industrial segregation may be more influential than occupational segregation alone in determining gender differences in labour market rewards

(Perman and Stevenson, 1989). Despite this, most existing research focuses primarily on occupational segregation, with relatively limited attention to variations in occupational segregation across industries, particularly in the Indian context (Bridges, 1980, 1982; Isaza Castro, 2014).

Guided by this conceptual framework, the present study examines gender-based employment segregation across industries in Uttar Pradesh. It analyses trends in occupational and industrial segregation from 2011-12 to 2020-21, using the Duncan formulation, identifies the most segregated occupations, and assesses the extent to which occupational segregation across industries reflects the underlying industrial gender composition. It also provides relevant policy recommendations aimed at reducing labour market segregation.

Review of Literature

Reskin (2001) argued that the majority of segregation studies have centered on men's and women's absorption in diverse occupations. Anker (1998) noted that 'in a 'typical' country in the early 1990s, about 55 per cent of workers held either 'male' or 'female' jobs. In some countries, occupational segregation is positively related to women's labour force participation, and the issues that facilitate women's employment and promote gender segregation include: part-time work and paid leave, which in turn leads to the shift of traditionally female domestic work into the market economy (Charles, 1992).

As per Weeden (1998), sex segregation in occupations refers to the degree to which males and females are distributed differently across occupations in the labour market, resulting in differential opportunities for social status and economic rewards. In India, only 30.9 per cent of employed female workers formed the female labour force during 2017-18, as per the Periodic Labour Force Survey. Furthermore, a major proportion of urban female workers, namely 45.6 per cent, were employed in the 'other services' sector. This high concentration suggest significant industrial and occupational segregation, with female workers being largely employed in teaching, nursing, and domestic services.

Existing literature on occupational segregation indicates that certain occupations remain highly differentiated by gender, as observed by Anker (1997) and Hakim C. (1992). As a result, female workers tend to be largely employed in female-dominated occupations, and vice versa, as observed by Preston (1999).

Considering these high levels of concentration by gender across occupations, the extent of occupational segregation is most commonly measured using the Index of Dissimilarity, as formulated by Duncan and Duncan (1955). This index calculates the proportion of workers who would need to change occupations in order to achieve an identical distribution of men and women across occupational categories.

Several empirical studies of gender segregation in the Indian labour market have applied this index or closely related variants. For instance, Duraisamy and Duraisamy (1999) examine gender disparities in employment and occupational distribution using the Duncan index. Similarly, international studies by Watts M. (1998) and Blackburn R. M. et al. (2002) highlight the Duncan index as a standard measure for analysing occupational and industrial segregation.

Stereotypes about ‘women’s and men’s’ industries may emerge out of the domestic division of labour and lead to inter-industry differences in gender composition (Caplow, 1954; Oppenheimer 1970; cited in Cohn 1985).

Most of the empirical literature on gender differences in the labour market has focused either exclusively on wage discrimination or occupational segregation (Isaza Castro, 2014). The majority of such studies examines occupational gender segregation. However, only a small number of studies (Perman & Stevenson, 1989; Bridges, 1980, 1982) that analyse occupational segregation together with industry segregation in the context of gender discrimination literature. There is still a pressing need for empirical research on the interaction between occupational and industry segregation. Although a few studies have examined differences in the strength of occupational segregation across industries (e.g., Bridges 1980, 1982; Stearns and Coleman 1988). However, in India industrial variation has not been sufficiently explored in Indian research studies.

Data and Methodology

This study uses the unit level data from the NSSO (68th round, 2011-12), the annual PLFS for 2017-2018, and PLFS 2020-21. The analysis is restricted to urban areas and focuses on, workers in principal plus subsidiary status (PS+SS) within the age group 15-59 years. To measure the extent of segregation, the study employs the standard measure, the dissimilarity index (also known as Duncan’s index or Duncan and Duncan’s index of Dissimilarity), which indicates the proportion of one group (in this case, either males or females) that would need to change categories to achieve an even distribution. As Hakim (1992) notes, ‘the Duncan index is based on comparing the distributions of men and women across all occupations/industries’. The Index of Dissimilarity, originally developed by Otis Dudley Duncan and Beverly Duncan (1955) is calculated as follows (often multiplied by 100 for percentage interpretation, though reported here as a proportion between 0 and 1).

$$D = \left(\frac{1}{2}\right) \sum_{(i=1)}^n \left| \left(\frac{m_i}{M}\right) - \left(\frac{f_i}{F}\right) \right|$$

where:

- m_i = male workers in category i
- M = total male workers

f_i = female workers in category i

F = total female workers

n = number of categories (occupational or industrial)

A value of 0 indicates perfect integration (identical distribution), while 1 (or 100%) indicates complete segregation. Substantively, the index represents the proportion of either male or female workers who would need to change their occupation (or industry) in order to achieve gender distribution for industry-specific occupational segregation, the Duncan index is computed within each industry separately, using the occupational distribution of male and female workers within that industry. In addition to the dissimilarity index, a chi-square test of independence is employed to determine whether the observed distribution of male and female workers across occupational categories and industries differs significantly.

Furthermore, in addition to the dissimilarity index, male-female ratios are computed for descriptive purposes. These ratios indicate the relative concentration of male and female workers within specific occupations or employment status categories but are not used in the construction of the segregation index.

Trends in Segregation

Sectoral employment trends in Uttar Pradesh from 2011-12 to 2020-21 show how gender segregation has evolved over the period. The dissimilarity index for industrial segregation increased from 0.35 in 2011-12 to 0.45 in 2020-21. Similarly, according to the Duncan dissimilarity index, there is a significant increase in the level of gender segregation in occupations between 2011-12 and 2017-18. Although there was a marginal decline thereafter, the value in 2020-21 remained higher than in 2011-12, implying that gender concentration in specific occupational groups remained higher in the urban labour market of Uttar Pradesh (Table 1). This trend additionally indicates a widening divergence in the industrial and occupational distribution of male and female workers. Sector-specific growth patterns reported in Table 2 help explain this structural divergence.

Table-1
Trends in Occupational/Industrial Segregation in UP

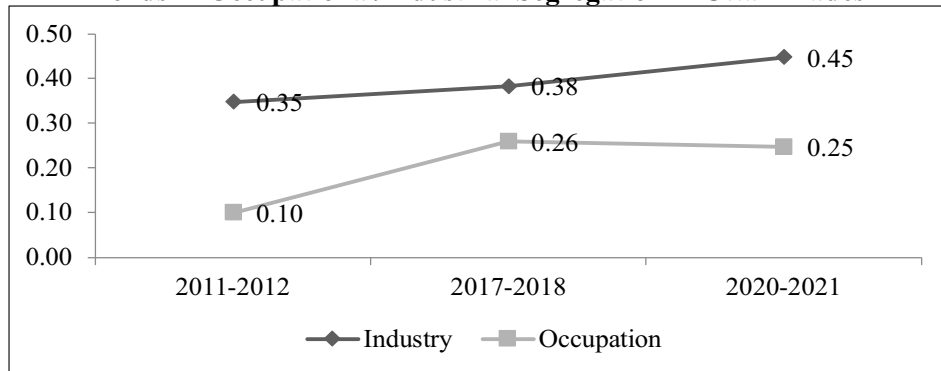
Components	Duncan Index (ID)		
	2011-2012	2017-2018	2020-2021
Industry	0.348	0.383	0.448
Occupation	0.103	0.260	0.247

Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

The changing structure of employment in Uttar Pradesh shows significant gendered variations over the last decade. Employment shifts from agriculture to

manufacturing, construction, and services are altering the relative participation of men and women in each of those sectors. These changes are indicative of the larger processes of both structural transformation and the persistence of occupational segregation in the labour market, as evident in the patterns observed in these sectoral growth trends (Table 2) and in the widening gender disparities observed in the labour market.

Figure-1
Trends in Occupational/Industrial Segregation in Uttar Pradesh



Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

The most dramatic change, however, occurred in the manufacturing sector. During the period from 2011-12 to 2017-18, the number of female workers in manufacturing declined substantially (-53.2%), while the number of male workers declined marginally (-2.0%). This large differential in the exit of female workers from the manufacturing sector has caused a large change in the gender composition of the sector, resulting in greater industrial segregation. Although the decline moderated during 2017-18 to 2020-21 (-3.3% for females and -5.1% for males), the earlier contraction had already substantially diminished women's relative presence in this traditionally male-dominated sector.

In contrast, the construction sector witnessed a phase of feminisation during 2011-12 to 2017-18. Female employment grew at an annual rate of 17.0 per cent, with women's share increasing from 2.78 per cent to 7.14 per cent, while the male share declined. This expansion can plausibly be linked to public works programmes such as MGNREGA, which boosted women's participation in manual and semi-skilled activities. However, in the subsequent period (2017-18 to 2020-21), a reversal occurred, the female share declined to 4.72 per cent, whereas the male share rose to 12.99 per cent. This re-masculinisation of construction employment further reinforced sectoral gender concentration.

The service sector registered robust expansion in female employment between 2011-12 and 2017-18, with an annual compound growth rate of 12.3 per

cent, followed by sustained growth of 9.6 per cent during 2017-18 to 2020-21 (Table 2). The sector's share in total employment increased markedly for women, from 27.41 per cent in 2011-12 to 51.1 per cent in 2017-18. The corresponding increase for men went from 19.8 per cent to 26.6 per cent. This indicates that female workers shifted their employment patterns towards tertiary activities.

Table-2
Annual Compound Growth Rate (2011-12 to 2017-18 and 2017-18 to 2020-21) of Workers

Industry Group	Female		Male	
	2011-12 to 2017-18	2017-18 to 2020-21	2011-12 to 2017-18	2017-18 to 2020-21
Agriculture	-4.8	14.5	-7.4	3.3
Mining and Quarrying	NA	-12.7	NA	NA
Manufacturing	-53.2	-3.3	-2	-5.1
Electricity water etc.	7.5	3.5	5.1	-6.7
Construction	17.0	0.9	-3.2	8
Trade hotel and restaurant	-33.3	-6.4	0.1	1.8
Transport storage and communication	11.8	10.1	2.3	-0.4
Other Services	12.3	9.6	5.1	-1.3
Occupational Group				
Legislators, Senior Officials, and Managers	-6.56	7.65	3.46	2.98
Professionals	11.22	2.24	NA	NA
Associate Professionals	NA	10.41	5.32	-1.71
Clerks	-6.78	2.10	-2.77	-0.53
Service Workers and Shop & Market Sales Workers	8.21	-0.77	1.45	-2.58
Skilled Agricultural and Fishery Workers	0.39	-16.50	-7.26	4.55
Craft and Related Trades Workers	-9.94	-4.21	-2.05	-6.02
Plant and Machine Operators and Assemblers	-17.46	14.07	3.93	-3.91
Elementary Occupations(labourers)	-3.42	-3.56	-1.12	6.13
Employment/Activity Status				
Self Employed	-8.3	-7.5	-1.1	-0.3
Regular Employed	14.2	11.2	3.9	0.4
Casual Wage Labour	-1.9	-4	-5.2	-0.2

Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

Women in the service sector mostly filled positions involving domestic work or teaching roles, demonstrating how occupational fields remain segregated according to gender. Both male and female workers experienced declining opportunities in clerical work from 2011 to 2018, although women faced steeper declines in employment (Table 2). The period between 2012 and 2017 saw a major change in urban employment patterns, driven by increased service sector

hiring in tourism and hospitality, education, and banking fields. These developments led to higher female employment as office clerks, typists, receptionists, hostesses and telephone operators (Patel K A, 1986).

The most notable change occurred in the service sector. From 2011-12 to 2018-19, female workers saw their employment grow by 12.3 per cent, a trend that continued at a rate of 9.6 per cent from 2017-18 to 2020-21. Women's share in the service sector increased from 27.41 per cent to 51.1 per cent, while men's share grew from 19.8 per cent to 26.6 per cent. This indicates a strong reallocation of female labour toward tertiary activities. The expansion of this service segment did not progress at the same rate throughout all sub-sectors.

Occupational segregation across industries

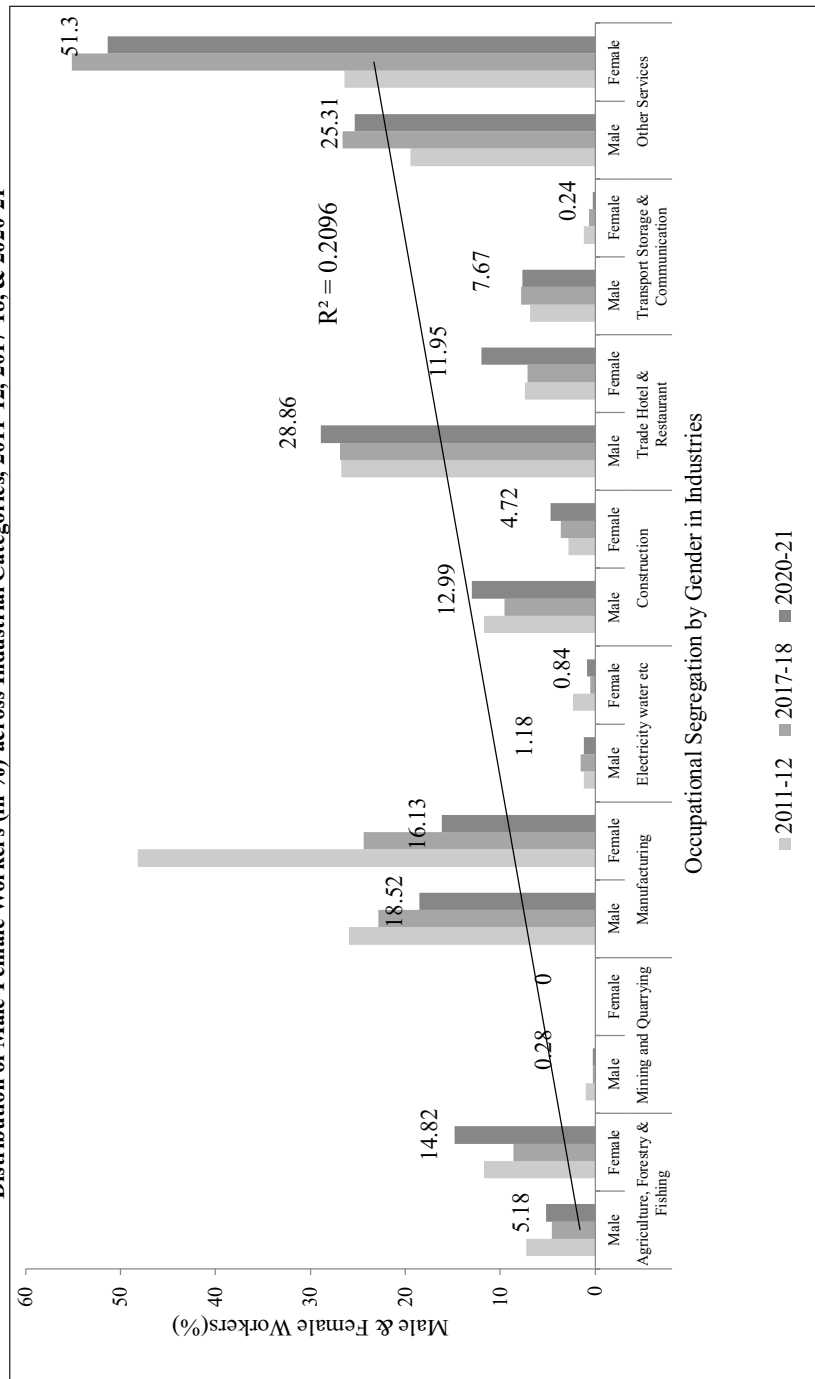
Figure 2 presents the percentage distribution of male and female workers across major industrial categories in urban areas for the years 2011-12, 2017-18, and 2020-21. It shows that women have largely been engaged in low-productivity sectors, such as labour-intensive, home-based, and informal work (Annexure 1, 2 & 3).

The slightly higher percentage of women in the manufacturing industry (Figure 2) does not imply that share of women in the overall employment in the manufacturing industry is high. Instead, the figure shows the share of all employed women who are engaged in the manufacturing industry. However, the overall proportion of women among workers in the manufacturing industry in the urban areas of Uttar Pradesh remains low.

As far as urban female workers are concerned, the service sector has become increasingly significant, with its share in the female employment rising from 26.37 per cent in 2011-12 to 51.30 per cent in 2020-21. Among urban female workers, the highest concentration is observed in the 'Other Services' category, as opposed to the overall service sector as a whole. This category includes activities such as personal services, education, health, and other community services. In 2020-21, more than half of urban female workers (around 51.3%) were engaged in 'Other Services', indicating a strong concentration of women in this segment of the tertiary sector.

In manufacturing and service-related industries, the percentage distribution of male workers has remained relatively stable, whereas the share of female workers has shown slight variation over the study period (2011-12 to 2020-21). A linear trend line in Figure 2 clearly shows that only about 21 per cent ($R^2=0.2096$) of the variation in gender representation across occupations and industries is explained by the linear trend. This suggests that gender distribution across occupations and industries does not follow a consistent linear pattern over time.

Figure-2
Distribution of Male-Female Workers (in %) across Industrial Categories, 2011-12, 2017-18, & 2020-21



Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

Industries that provide relatively higher wages and salaries, as well as job security, exhibit a high level of gender segregation. It has been observed that women continue to dominate a small number of industries and serve as a secondary workforce, as depicted in Figure 2. Although there has been a slight increase in the participation of women in the manufacturing and service sectors from 2011-12 to 2020-21, their participation in the construction and transport industries remains relatively low. Hence, despite marginal diversification of employment opportunities, the overall pattern continues to reflect a high degree of industrial segregation ($D=0.448$ in 2020-21). It has been observed that the relationship between various aspects of industrial composition and sex segregation in the labour market is of significant importance, but the mechanisms through which this influence operates remain poorly understood (Bridges, 1982).

Table 3 and Figure 3 presents the Dissimilarity Index (ID) values measuring occupational sex segregation across major industries between 2011-12 and 2020-21. The index reveals uneven and sector-specific trends rather than a uniform movement toward gender integration. Agriculture exhibits a marked decline in segregation (from 0.376 to 0.185), suggesting increasing convergence in the occupational distribution of men and women. This may reflect the feminisation of agricultural labour, male out-migration, and a redistribution of farm tasks across genders. Similarly, although the transport, storage, and communication remains the most segregated sector, its sharp fall in the ID value (0.806 to 0.524) indicates gradual, though incomplete, structural shifts enabling female entry into previously male-dominated activities.

In contrast, sectors such as Construction and Manufacturing show relative stability with moderate levels of segregation, indicating the persistence of gendered occupational clustering. Women remain concentrated in low-skilled roles or in specific sub-segments, while men dominate technical and supervisory roles. Notably, 'Other Services records a substantial increase in segregation (0.216 to 0.348), which suggests intensified gender concentration in care, personal, and domestic service occupations, a trend likely accentuated during the pandemic.

In general, the findings underscore that rising female participation does not automatically translate into occupational desegregation. While certain traditional sectors show declining segregation, entrenched structural norms and skill-based barriers continue to shape gendered employment patterns. The evidence suggests that labour market transformation in Uttar Pradesh remains characterised by partial integration alongside persistent vertical and horizontal segmentation across industries. Hence, the analysis demonstrates that occupational segregation by sex is widespread and significantly influences the industrial distribution of women workers (Bridges, 1980).

Table-3
Measuring Occupational Sex Segregation across Industries through Dissimilarity Index

Type of Industries	Dissimilarity Index (ID)		
	2011-12	2017-2018	2020-21
Agriculture	0.376	0.199	0.185
Mining and Quarrying	NA	NA	NA
Manufacturing	0.189	0.162	0.201
Electricity water etc.	0.349	0.333	NA
Construction	0.308	0.281	0.288
Trade hotel and restaurant	0.162	0.198	0.175
Transport storage and Communication	0.806	0.724	0.524
Other services	0.216	0.242	0.348

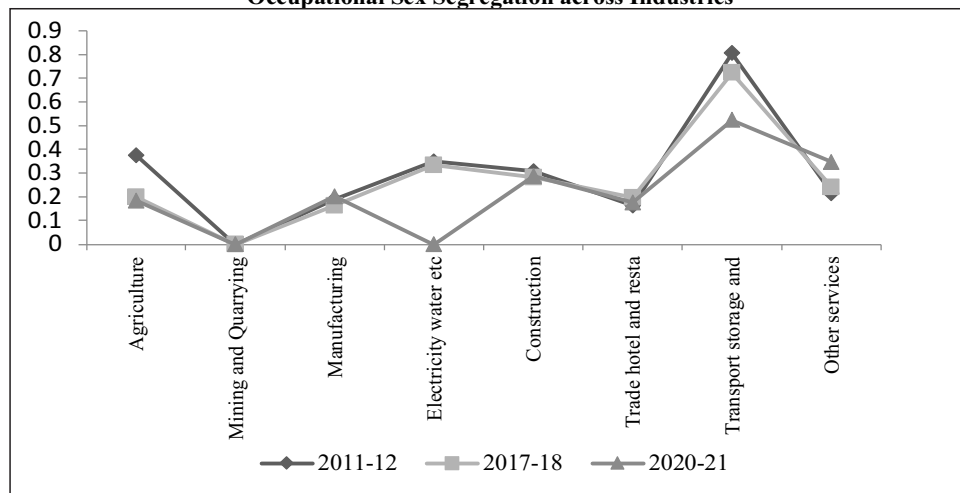
Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

Note: 'NA' refers to insufficient observation due to very small sample size

Hence, it is clear that the magnitude of segregation was more in the year 2011-12 than in the year 2020-21, male and female have distributed dissimilarly across occupation in industries. Cultural, economic, historical and social factors are the main reasons of sex segregation, which affect extent as well as pattern of occupational segregation (Anker et al., 2003) across industries.

The patterns observed in the Dissimilarity Index (Table 3) are strongly reinforced by the Male-Female Ratio estimates presented in Table 4, which reveal the micro-level occupational and industrial concentration underlying the aggregate segregation trends.

Figure-3
Occupational Sex Segregation across Industries



Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

At the occupational level, the male-female ratios indicate pronounced gender clustering within different employment status categories. For instance, in regular employment, the professionals exhibits consistently high male dominance (from 1.60 in 2011-12 to 2.29 in 2020-21), while Associate Professionals and Clerical categories also show persistent male overrepresentation. Conversely, in certain self-employed and service-related categories, ratios fluctuate below unity in some years, reflecting episodic female concentration.

Table-4
Gender Discrimination (Male-Female Ratio*) across Occupation

Occupations	Self Employed			Regular Employed			Casual Workers		
	2011-12	2017-18	2020-21	2011-12	2017-18	2020-21	2011-12	2017-18	2020-21
Legislators, Senior Officials, and Managers	0.80	0.59	0.65	0.41	0.43	0.41	0.00	0.00	0.00
Professionals	0.51	0.78	0.84	1.60	2.43	2.29	0.00	0.00	0.00
Associate Professionals	0.80	2.70	0.92	2.10	2.97	1.71	1.15	0.00	0.00
Clerks	2.01	0.00	0.00	1.24	0.68	0.60	2.26	0.00	0.00
Service Workers and Shop & Market Sales Workers	0.61	0.84	0.48	0.81	0.54	0.97	0.89	2.53	12.91
Skilled Agricultural and Fishery Workers	0.67	1.87	3.14	0.23	0.00	0.09	1.52	11.77	0.00
Craft and Related Trades Workers	1.54	1.82	1.86	0.21	0.24	0.20	1.12	0.10	0.56
Plant and Machine Operators and Assemblers	1.33	0.62	0.41	0.42	0.00	0.06	0.18	0.96	0.00
Elementary Occupations(labourers)	1.56	0.14	0.20	2.08	1.41	1.32	1.02	1.15	0.93

*Male to Female Ratio=Proportion of female workers/Proportion of male workers

Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

The extreme ratios in casual work, such as for service workers (12.91 in 2020-21) and Skilled Agricultural Workers (11.77 in 2017-18) indicate sharp gender imbalances, suggesting that women are either heavily concentrated in specific informal sub-occupations or largely excluded from them depending on the year. Such fluctuations in informal segments correspond with the instability observed in sectoral segregation trends. Hence, Table 4 demonstrates a substantial difference in the division of males and females in the overall occupational and industrial hierarchy, as reflected in female-to-male ratios. The male-female ratio data provide a structural explanation for the dissimilarity index trends. While some sectors show declining aggregate segregation, the ratio data reveal persistent horizontal (across occupations) and vertical (across employment status) gender stratification.

The highest male-female ratio is noted in the group of professionals, where the ratio is 2.43 (i.e., in favour of females), indicating that most female workers are engaged in nursing and teaching professions. Among occupations

with a more or less balanced female-to-male ratio (0.97) is the fifth occupational group, i.e., service workers and shop & market sales workers (18.75% female workers and 19.28% male workers were engaged in this group in 2020-21).

Table-5
Gender Discrimination (Male-Female Ratio*) across Industry

Type of Industry	Self Employed			Regular Employed			Casual Workers		
	2011-12	2017-18	2020-21	2011-12	2017-18	2020-21	2011-12	2017-18	2020-21
Agriculture, Forestry& Fishing	1.23	1.71	3.05	0.00	0.00	NA	3.44	17.23	10.97
Mining and Quarrying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manufacturing	2.93	2.18	2.20	0.11	0.44	0.22	1.14	1.06	0.26
Electricity Water etc.	1.34	1.49	0.58	2.69	0.10	0.63	4.60	0.00	0.00
Construction	0.29	0.00	0.64	0.07	0.57	0.00	0.41	0.65	0.73
Trade Hotel & Restaurant.	0.26	0.43	0.47	0.11	0.05	0.30	0.00	0.00	0.18
Transport Storage & Communication	0.00	0.00	0.00	0.38	0.15	0.04	1.51	0.00	0.64
Service & Others	0.58	1.33	0.88	2.47	2.16	2.23	2.83	0.66	3.03

Source: Authors' calculation based on unit-level data from the NSS-2011-12 & PLFS-2017-18 & 2020-21

When examined by industry, the structural basis of segregation becomes clearer. Agriculture shows a rising male-female ratio among the self-employed (1.23 to 3.05), alongside extremely high ratios among casual workers (17.23 in 2017-18 and 10.97 in 2020-21). This indicates that although the Dissimilarity Index for agriculture declined, gender concentration within employment types remains pronounced, suggesting a redistribution within occupations rather than full integration. In manufacturing, consistently high ratios among the self-employed (above 2.0) and low ratios in regular employment reflect segmentation between male-dominated entrepreneurial roles and more feminised wage roles, aligning with the moderate but persistent segregation indicated earlier.

The transport, storage and communication sector, identified as the most segregated sector in Table 3 (as measured by dissimilarity index), also displays nil female participation in self-employment across all years and persistently male-dominated casual work (Table 5). This structural exclusion substantiates the high Dissimilarity Index values despite their gradual decline. Similarly, construction shows low female representation in regular employment and fluctuating but male-skewed ratios in casual labour, reinforcing its stable segregation pattern.

The rise in segregation within the service and other industry category is mirrored by male-dominated regular employment ratios (above 2.0 throughout), alongside fluctuating but often high casual worker ratios (3.03 in 2020-21). This suggests vertical stratification within services, with men concentrated in formal and higher-status positions, while women remain clustered in specific service

niches, thereby intensifying occupational segmentation. In this regard, Hein (1986) found that the 'type of industry, combined with employers' a priori beliefs about the appropriateness of women for these industries, was an important factor in their original preference for women'. These findings demonstrate that the extent of segregation in occupational and industrial composition of the workforce in the urban labour market of Uttar Pradesh is profoundly gendered. Moreover, gender segregation in industries takes place to a greater extent than would be expected from their occupational distribution alone (Blau, 1977).

The results of the Chi-square test of independence in annexure 5 show statistically significant associations between gender and occupational distribution across all years and employment categories. In 2011-12, the χ^2 values were 34.72 for self-employed workers, 42.55 for regular employees, and 48.63 for casual workers, with similar patterns observed in 2017-18 and 2020-21. The highest χ^2 values were found among casual workers, indicating stronger gender-based occupational segregation in this category. In addition, there are significant differences between genders by industry, with χ^2 values of 43.96 for self-employed workers, 92.15 for regular employees, and 82.44 for casual workers in 2020-21 ($p < 0.001$). There is considerable evidence for the existence of gender-based segmentation within labour markets, demonstrating that women workers in manufacturing, agriculture, and service industries are clustered together, while men's employment in construction, transport, and trade also remains significantly clustered together.

Discussion

The results indicate gender segregation in the urban labour market of Uttar Pradesh follows a pattern of both horizontal and vertical segregation. Even as workers shift sectors within the job structure, segregation persists.

While the dissimilarity index has decreased slightly in the agricultural and transport sectors, the pronounced gender imbalances in different job positions remain obvious. The findings suggests that gender segregation in the urban Uttar Pradesh mirrors the broader Indian scenario, in which an increase in the female labour force does not necessarily lead to greater integration (Klasen and Pieters, 2015; Deshpande and Kabir, 2022).

Urban Uttar Pradesh exhibits a dual structure, characterised by a large informal economy dominated by women, coupled with a small formal sector. The high male-to-female ratios in regular jobs across industries highlight the restricted share of women in stable, high-paying jobs. This finding validates earlier claims of gender wage gaps being influenced by both supply and demand factors, as mentioned earlier (Blau and Jusenius, 1976; Bridges, 1980).

Additionally, the relative concentration of women in service-related professional and associate professional roles reflects the feminisation of the care

and education sectors in urban areas. While this increase may indicate better educational attainment among urban women, it also reinforces the clustering of work into socially sanctioned roles. Such clustering is consistent with the 'crowding hypothesis', which suggests that women are relegated to a limited number of jobs, thereby increasing competition and limiting wage growth (Bergmann, 1974). The increasing segregation observed in service-oriented industries in recent years may also reflect restructuring driven by the pandemic, which disproportionately removed women from formal employment and increased their burden of unpaid and underpaid care.

Importantly, the data show that professionals in urban UP exhibit a combination of horizontal segregation, characterised by over-concentration in certain tasks, and vertical segregation, characterised by minimal upward movement to positions of higher order in industries. In spite of the presence of women professionals in different sectors, their presence is minimal in legislature or leadership positions. This supports the proposition that gender inequality in the labour market is driven primarily by institutional hierarchy and progression dynamics, rather than by participation ratios (Deshpande, 2011).

The results indicate that the participation of females alone does not guarantee the integration of the occupation. Although there is evidence of declining trends in the segregation index for certain industries, the persistence of the dominance of males in regular employment and technical occupation reveals that structural factors are at play. Thus, the dynamics of the labour market in urban Uttar Pradesh illustrates a case of partial integration coupled with horizontal and vertical segregation.

In conclusion, the urban labour market in Uttar Pradesh presents a partially integrated, with deep structural issues. Sectoral growth alone is not sufficient to remove the differences between the two genders; therefore, addressing disparities must be addressed through employment policies. The employment policies must shift their focus beyond further encouraging female labour market participation and instead prioritise facilitating women's entry into technical occupations, managerial occupations, infrastructure-related occupations, and strengthening formal employment channels.

Conclusion and Policy Implication

The analysis demonstrates that gender disparities remain structurally embedded within the labour market, with persistent horizontal and vertical segregation shaping women's employment outcomes. In Uttar Pradesh's urban labour market, the majority of women workers continue to cluster in the lowest occupational groups, reflecting their disadvantaged economic position (Blau et al., 1998). Although some sectors show marginal declines in overall segregation, women continue to be concentrated in feminised professions such as teaching, nursing,

associate professional roles, service and sales work, and elementary occupations, while remaining under-represented in managerial, technical, and infrastructure-intensive industries, including transport, construction, utilities, and mining. These patterns reflect enduring structural barriers, ranging from gender norms and mobility constraints to institutional hiring and promotion practices, that continue to influence industrial distribution and earnings trajectories.

Overall, the presence of occupational sex segregation within industries is a grave concern for policymakers and researchers. The findings highlight that the gendered division of labour systematically reinforces inequalities among occupational groups across industries. Women's concentration in low-status occupations therefore underscores the urgent need for targeted interventions. To address these inequalities, government must consider to develop and formulate policies that accelerate women's employment opportunities, reduce occupational segregation, and improve women's overall position in the urban labour market of Uttar Pradesh.

Policy Implications

Evidence of sex-based discrimination at work in urban Uttar Pradesh suggests the need for structural and gender-specific policy interventions. First, policies should promote women's entry into non-traditional and fast-growing sectors such as transport, logistics, utilities, construction, and manufacturing. Skill development efforts under the Urban Employment Mission should be strengthened and explicitly targeted to reduce horizontal discrimination. This would enable women to acquire technical and vocational skills for diverse tasks beyond care and service roles.

Second, to address vertical stratification, policies must improve women's access to formal or regular employment. Policy tools like gender-targeted hiring incentives, diversity reporting requirements, and strengthened enforcement of existing anti-discrimination laws and equal pay legislation can significantly improve women's representation in secure and well-paying positions. Without effective institutional accountability mechanism, increasing female labour force participation is unlikely to produce equitable labour market outcomes.

Third, structural barriers related to safety and mobility in urban spaces require special attention. Investment in safe public transportation systems, effective enforcement of workplace sexual harassment laws, and gender-sensitive urban infrastructure planning are essential to enhancing women's participation in male-dominated industries. These measures address demand-side barriers that restrict women's work options.

Fourth, career advancement policies must go beyond participation metrics. Leadership development programs, mentorship networks, and transparent promotion pathways in both the public and private sectors can help

reduce the "glass ceiling" effect observed in managerial and administrative positions. Increasing women's representation in decision-making roles is essential to reducing vertical segregation.

Fifth, women's entrepreneurship policy to promote entry into more technologically advanced or higher value-added occupations rather than perpetuating concentration in low return jobs. Improved availability of credit, technology support, cluster development initiatives can serve as key facilitators in this regard.

Finally, a sixth priority should be developing a robust system for tracking gender-specific data on labour market outcomes using both state and city levels. Such a system would enable evidence-based decision-making to monitor progress towards equal employment participation for all genders; tracking labour market inequality and labour market participation patterns would provide effective means of addressing horizontal and vertical aspects of labour market inequality.

In summary, the policy recommendations highlight the need for comprehensive institutional change that addresses skills, work practices, workplace conditions, and the underlying policies that govern all aspects of gender employment in urban areas of Uttar Pradesh if gender discrimination at work is to be eliminated.

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Annexure-1
Occupational gender segregation by industries, 2011-2012

Industry	Legislators, Senior Officials, and Managers	Professionals	Associate Professionals	Clerks	Service Workers and Shop & Market Sales Workers	Skilled Agricultural and Fishery Workers	Craft and Related Trades Workers	Plant and Machine Operators and Assemblers	Elementary Occupations (labourers)	Total
Agriculture, Forestry & Fishing	Male 0.14	0.00	0.00	0.13	0.25	4.94	0.16	0.08	1.54	7.26
	Female 0.36	0.00	0.00	0.00	1.14	3.93	2.62	0.00	3.68	11.74
Mining and Quarrying	Male 0.51	0.20	0.02	0.10	0.00	0.00	0.13	0.00	0.03	1.01
	Female NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manufacturing	Male 2.56	1.05	0.81	0.19	0.79	0.01	14.21	3.86	2.41	25.89
	Female 6.58	1.41	0.50	0.03	4.07	0.81	20.40	5.99	8.40	48.18
Electricity water etc	Male 0.00	0.01	0.14	0.03	0.05	0.01	0.10	0.15	0.67	1.16
	Female 0.00	0.00	0.13	0.34	0.00	0.00	0.00	0.00	1.89	2.35
Construction	Male 0.82	0.35	0.06	0.08	0.17	0.14	4.02	0.11	5.93	11.69
	Female 0.91	0.00	0.05	0.00	0.17	0.00	0.59	0.00	1.11	2.82
Trade Hotel & Restaurant	Male 6.44	1.21	0.29	0.45	11.78	0.33	2.74	0.15	3.33	26.73
	Female 1.65	0.30	0.23	0.58	2.65	0.05	1.12	0.27	0.52	7.38
Transport Storage & Communication	Male 0.71	0.31	0.15	0.35	0.54	0.13	0.48	2.03	2.13	6.83
	Female 0.00	0.73	0.00	0.00	0.36	0.00	0.00	0.08	0.00	1.17
Service & Others	Male 1.96	4.10	2.38	1.90	3.11	0.39	2.39	0.49	2.71	19.44
	Female 1.53	3.86	4.68	2.50	3.81	0.07	1.44	0.57	7.90	26.37
Total	Male 13.13	7.23	3.86	3.25	16.70	5.97	24.25	6.88	18.74	100.00
	Female 11.03	6.30	5.58	3.45	12.20	4.85	26.17	6.90	23.51	100.00

Source: Authors' calculation from NSS (2011-12)

Annexure-2
Occupational gender segregation by industries, 2017-2018

Industry		Legislators, Senior Officials, and Managers	Professionals	Associate Professionals	Clerks	Service Workers and Shop & Market Sales Workers	Skilled Agricultural and Fishery Workers	Craft and Related Trades Workers	Plant and Machine Operators and Assemblers	Elementary Occupations(labourers)	Total
Agriculture, Forestry & Fishing	Male	0.47	0.00	0.00	0.00	0.00	3.96	0.00	0.02	0.10	4.55
	Female	0.03	0.00	0.00	0.00	0.00	7.37	0.00	0.00	1.22	8.62
Mining and Quarrying	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.14	0.00	0.22
	Female	na	na	na	na	na	na	na	Na	na	na
Manufacturing	Male	2.85	0.56	0.55	0.35	0.80	0.03	12.83	2.52	2.36	22.85
	Female	1.03	0.86	0.72	0.00	0.77	0.00	15.51	1.24	4.28	24.41
Electricity water etc.	Male	0.24	0.18	0.05	0.26	0.02	0.00	0.05	0.11	0.65	1.56
	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50
Construction	Male	0.48	0.18	0.04	0.05	0.00	0.00	2.21	0.20	6.38	9.55
	Female	0.37	0.00	0.00	0.00	0.09	0.00	0.00	0.00	3.13	3.59
Trade Hotel & Restaurant	Male	7.43	0.52	0.22	0.29	12.82	0.04	2.05	0.35	3.16	26.87
	Female	2.03	0.15	0.00	0.00	4.75	0.00	0.21	0.00	0.00	7.14
Transport Storage & Communication	Male	0.89	0.00	0.49	0.22	0.22	0.00	0.06	4.47	1.43	7.78
	Female	0.00	0.00	0.34	0.08	0.00	0.00	0.00	0.00	0.22	0.64
Service & Others	Male	3.95	5.17	4.94	2.16	4.66	0.08	2.67	0.80	2.18	26.62
	Female	4.76	12.90	20.69	2.85	7.80	0.00	0.39	0.86	4.85	55.10
Total	Male	16.31	6.62	6.29	3.32	18.53	4.11	19.96	8.62	16.26	100.00
	Female	8.22	13.91	21.75	2.94	13.42	7.37	16.11	2.10	14.19	100.00

Source: Authors' calculation from PLFS (2017-18)

Annexure-3
Occupational gender segregation by industries, 2020-2021

Industry	Legislators, Senior Officials, and Managers	Professionals	Associate Professionals	Clerks	Service Workers and Shop & Market Sales Workers	Skilled Agricultural and Fishery Workers	Craft and Related Trades Workers	Plant and Machine Operators and Assemblers	Elementary Occupations (labourers)	Total
Agriculture, Forestry & Fishing	Male	0.19	0.00	0.00	0.00	4.49	0.00	0.11	0.39	5.18
	Female	0.48	0.00	0.00	0.00	12.57	0.00	0.18	1.59	14.82
Mining and Quarrying	Male	0.02	0.04	0.00	0.00	0.00	0.22	0.00	0.00	0.28
	Female	na	na	na	na	na	na	Na	na	na
Manufacturing	Male	2.74	1.09	0.18	0.35	0.79	9.16	0.95	3.25	18.52
	Female	1.43	0.65	0.18	0.00	0.14	12.57	0.35	0.82	16.13
Electricity water etc.	Male	0.09	0.05	0.26	0.21	0.05	0.17	0.09	0.21	1.18
	Female	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.84
Construction	Male	0.50	0.13	0.22	0.08	0.00	2.56	0.08	9.41	12.99
	Female	0.00	0.00	0.00	0.00	0.51	1.88	0.00	2.33	4.72
Trade Hotel & Restaurant	Male	9.44	0.63	1.06	0.42	12.04	1.20	0.25	3.80	28.86
	Female	5.57	0.35	0.56	1.03	4.30	0.08	0.00	0.06	11.95
Transport Storage & Communication	Male	1.11	0.05	0.05	0.15	0.19	0.07	5.16	0.89	7.67
	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.10	0.24
Service & Others	Male	4.26	5.41	4.09	2.05	3.62	2.20	0.72	2.67	25.31
	Female	3.44	16.55	10.23	1.22	9.18	1.23	0.81	8.65	51.30
Total	Male	18.34	7.39	5.87	3.25	16.69	15.57	7.35	20.63	100.00
	Female	11.04	17.55	10.96	2.25	14.12	15.75	1.48	14.21	100.00

Source: Authors' calculation from PLFS (2020-2021)

Annexure-4

In the one-digit classification, NCO (2004) explains occupations in the following form:

- NCO1-legislatures and executives
- NCO2 - professionals
- NCO3 - technicians and associate professionals
- NCO4 - clerks
- NCO5 -service workers and shop and market sales workers
- NCO6 -skilled agricultural and fishery workers
- NCO7 -craft and related trades workers
- NCO8 -plant and machinery operators and assemblers
- NCO9 - and elementary occupations

Annexure-5

Chi-square(χ^2) test of independence for Gender Differences in Occupational and Industrial Distribution by Employment Status and Year

Year	Employment Status	Chi-Square(χ^2)		Significance Level (P-value)
		Occupation	Industry	
2011-12	Self Employed	34.72	52.48	p < 0.001
	Regular Employed	42.55	95.62	p < 0.001
	Casual Workers	48.63	61.77	p < 0.001
2017-18	Self Employed	28.41	47.31	p < 0.001
	Regular Employed	36.18	88.54	p < 0.001
	Casual Workers	51.27	74.83	p < 0.001
2020-21	Self Employed	26.91	43.96	p < 0.001
	Regular Employed	30.69	92.15	p < 0.001
	Casual Workers	54.34	82.44	p < 0.001



UNEMPLOYMENT AMONG EDUCATED WOMEN IN HARYANA WITH SPECIAL REFERENCE TO SONIPAT AND PANIPAT DISTRICT

Deepika Gupta¹ and Anju Rani²

Abstract: Educated women's unemployment remains a persistent challenge in Haryana despite improvements in female educational attainment and rapid urbanisation. This study examines the socio-economic and structural factors associated with unemployment among educated women in the urban areas of Sonipat and Panipat districts. Primary data were collected through a semi-structured questionnaire administered electronically, covering respondents' demographic profile, education, employment status, and perceived barriers to employment. Due to the absence of a comprehensive sampling frame, the study adopted a purposive quota-based sampling design comprising 300 educated women, equally divided into employed (150) and unemployed (150) groups. Descriptive analysis highlights multiple constraints faced by women, including skill mismatch, mobility issues, safety concerns, unsuitable working hours, limited work experience, and family responsibilities. To assess conditional associations between employment status and explanatory factors, the study employs binary logistic regression with employment status coded as a binary outcome (1=employed, 0=unemployed). The regression results indicate that household economic category is positively associated with employment, while having three or more dependents is negatively associated with employment, underscoring the importance of household resources and care responsibilities in shaping women's labour market outcomes. Higher education (graduate and above) is also positively associated with employment within the sample, though intermediate education categories show weaker and statistically insignificant effects. Given the quota-based sampling design, findings are interpreted as conditional and correlational rather than causal or population-representative. The study offers district-level evidence and policy-relevant insights for improving women's employment outcomes through targeted childcare support, safer mobility, and strengthened school-to-work transition mechanisms in urban Haryana.

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Keywords: Educated women; Unemployment; Haryana; Urban labour market; Employment barriers; Logistic regression; Sonipat and Panipat

Introduction

Unemployment is a critical indicator of both economic performance and social well-being, reflecting an economy's capacity to generate productive and inclusive employment opportunities. Beyond its macroeconomic implications, unemployment has profound social and psychological consequences, including income insecurity, skill depreciation, reduced self-esteem, and social exclusion (Brahmananda, 1983; Mamgain, 2017). In developing economies such as India, unemployment is closely linked to structural transformation, rapid educational expansion, and the uneven absorption of labour across sectors. Gender disparities in employment remain persistent across the world, with women consistently experiencing lower labour force participation rates and higher unemployment than men. These disparities are shaped not only by labour market conditions but also by deeply embedded social and cultural norms that govern women's mobility, occupational choices, and allocation of unpaid care work (Chakrabarti & Biswas, 2012; Deshpande & Kabeer, 2022). Women are often concentrated in a limited range of occupations, face barriers to entry into formal employment, and experience interruptions in their work trajectories due to marriage and family responsibilities. Consequently, improvements in female educational attainment have not translated proportionately into employment gains (Afridi et al., 2023).

In India, this paradox is particularly visible in urban areas. While cities provide better access to education, infrastructure, and employment opportunities, educated women in urban India often experience higher unemployment than their rural counterparts. Empirical evidence from national surveys such as the Periodic Labour Force Survey (PLFS) indicates that unemployment rates rise with education levels among women, especially graduates and postgraduates, reflecting job-search unemployment and queuing for preferred jobs (Deshpande & Kabeer, 2022; Goel & Kumar, 2024; Ministry of Statistics and Programme Implementation, MoSPI, 2023). Skill mismatches, limited availability of suitable formal employment, and reluctance or inability to accept low-quality or informal work further intensify this phenomenon. Haryana presents an especially striking case of this contradiction. Despite rapid economic growth, industrialisation, and urban expansion, the state records one of the lowest female labour force participation rates in India. Existing evidence suggests that educated women in Haryana face high unemployment due to demand-side constraints, restrictive gender norms, safety concerns, limited mobility, and inadequate access to gender-sensitive work environments (Afridi et al., 2023; Klasen & Pieters, 2015; Mehrotra & Parida, 2017; World Bank, 2023). National-level evidence further indicates that higher education among women does not necessarily translate into better employment outcomes, particularly in urban labour markets where suitable formal opportunities remain limited (MOSPI, 2023).

The districts of Sonipat and Panipat, both prominent urban and industrial centres of Haryana, exemplify these dynamics. Although female literacy and educational attainment in these districts have improved over time, employment outcomes for educated women remain weak. Available evidence suggests that a significant proportion of educated women remain unemployed or underemployed, pointing to a disconnect between educational expansion, labour market requirements, and prevailing social expectations regarding women's work (Mahata et al., 2017; Singh & Parida, 2022). Against this backdrop, the present study examines unemployment among educated women in the urban areas of Sonipat and Panipat districts of Haryana using primary survey data. Rather than estimating unemployment prevalence, the study focuses on identifying socio-economic characteristics and perceived barriers associated with women's employment status. By situating district-level evidence within the broader literature on female labour market exclusion, the paper seeks to contribute to policy-relevant discussions on why education alone has failed to secure employment for women and what structural and social constraints continue to limit their participation in the urban labour market.

Objectives of the Study

1. To examine the socio-economic characteristics associated with employment status among educated women in urban areas of Sonipat and Panipat districts.
2. To analyse the relationship between educational attainment and employment status among educated women in the study area.
3. To identify the major perceived barriers to employment faced by educated women and assess their association with employment outcomes.

Literature Review

Unemployment among educated women has emerged as a critical concern in developing economies, particularly in countries experiencing rapid educational expansion without commensurate growth in suitable employment opportunities. Early studies on unemployment in India highlighted its structural nature, linking it to sectoral imbalances, slow industrial absorption, and limited diversification of employment opportunities (Brahmananda, 1983). While these analyses primarily focused on aggregate unemployment, later research increasingly recognised gender-specific dimensions of labour market exclusion.

A growing body of literature documents persistent gender disparities in labour force participation and employment outcomes in India. Chakrabarti and Biswas (2012) emphasised that women's economic empowerment is constrained by ineffective policy implementation, regional disparities, and lack of institutional support. Subsequent studies reinforced the argument that education

alone is insufficient to ensure women's employment in the absence of supportive labour market conditions and social acceptance of women's work (Mamgain, 2017; Mehrotra & Parida, 2017).

Recent research has highlighted the paradoxical relationship between education and unemployment among women. Using national-level evidence, Deshpande and Kabeer (2022) demonstrate that unemployment rates among women increase with education, particularly at the graduate and postgraduate levels. This phenomenon is attributed to job queuing, preference for formal and socially acceptable employment, and limited availability of suitable jobs for educated women. Afridi et al., (2023) further argue that rising educational aspirations among women, combined with constrained labour demand, results in prolonged job search and lower employment outcomes for educated women.

Urban labour markets present unique challenges for educated women. While urban areas offer greater access to education and infrastructure, they also exhibit higher unemployment among educated women compared to rural areas. Goel and Kumar (2024), using PLFS and CMIE data, find that urban educated women face higher open unemployment due to skill mismatches, lack of flexible work arrangements, and concentration of employment growth in male-dominated sectors. These findings challenge the assumption that urbanisation automatically improves women's employment prospects.

Haryana is often cited as an extreme case of low female labour force participation, reflecting the combined influence of labour demand constraints and restrictive gender norms. Empirical studies show that women's work participation in northern states remains strongly shaped by household responsibilities, social expectations, and limited access to safe and suitable employment opportunities (Klasen & Pieters, 2015; Mehrotra & Parida, 2017; World Bank, 2023). Recent national evidence from the Periodic Labour Force Survey (PLFS) further indicates that female labour force participation remains low and unemployment among educated women remains a persistent concern, particularly in urban labour markets where formal job opportunities are limited (Ministry of Statistics and Programme Implementation [MOSPI], 2023). Mahata et al., (2017) also highlight that women's empowerment and workforce engagement in Haryana are shaped by structural and cultural constraints that often outweigh educational gains.

Several studies emphasise mobility, safety, and household responsibilities as key barriers to women's employment. Deb (2020) notes that states with better public infrastructure and supportive policies exhibit relatively higher female labour force participation. In contrast, concerns related to safety, commuting, and socially acceptable working hours significantly restrict women's participation in paid work in several northern states. These constraints are reinforced by the unequal distribution of unpaid care work, which reduces

women's ability to engage in regular and full-time employment (Deshpande & Kabeer, 2022; Neetha & Khera, 2022).

Despite extensive literature on female labour force participation and educated unemployment, district-level empirical evidence for urban Haryana remains limited. Existing studies largely rely on secondary data sources and state-level analysis, offering limited insight into localised constraints faced by educated women. Moreover, few studies explicitly examine perceived employment barriers alongside socio-economic characteristics using primary survey data. The present study seeks to address this gap by providing district-level evidence from Sonipat and Panipat, two rapidly urbanising districts of Haryana. By focusing on educated women and examining both observable characteristics and perceived employment barriers, the study contributes to the literature by contextualising educated women's unemployment within local labour market conditions. While the analysis does not aim to establish causal relationships, it adds to growing evidence that education alone is insufficient to overcome structural, social, and institutional barriers to women's employment in urban Haryana.

Contribution of the Study

This study contributes to the literature on educated female unemployment in India in three important ways. First, it provides district-level evidence from Sonipat and Panipat, two rapidly urbanising districts of Haryana, using primary survey data, thereby addressing the limited availability of micro-level insights on educated women's employment outcomes in urban Haryana. Second, by jointly examining socio-economic characteristics, educational attainment, and perceived employment barriers, the study offers a more integrated understanding of the constraints associated with women's employment status, beyond a purely education-based explanation. Third, the findings highlight that women's unemployment is linked to structural and household-level constraints such as mobility limitations, safety concerns, care responsibilities, and working conditions, rather than individual deficits alone.

While the results are interpreted as conditional associations due to the purposive quota-based sampling design, the study offers locally grounded evidence that can inform policy discussions aimed at improving women's access to suitable employment opportunities in urban Haryana.

Research Methodology

Research Design

The study adopts a quantitative, cross-sectional research design to examine factors associated with unemployment among educated women in urban areas of Haryana. The analysis is based on primary survey data collected from educated

women residing in Sonipat and Panipat districts. Given the exploratory nature of the study and data constraints, the research focuses on identifying conditional associations between employment status and selected socio-economic, educational, and structural factors rather than establishing causal relationships.

Data Collection and Instrument

Primary data were collected using a semi-structured questionnaire designed to capture respondents' socio-demographic characteristics, educational attainment, employment status, and perceived barriers to employment. The questionnaire included items measuring employment-related constraints such as skill mismatch, mobility issues, safety concerns, unsuitable working hours, family responsibilities, lack of work experience, and lack of awareness of employment opportunities.

Prior to the main survey, the questionnaire was pilot-tested on a small group of respondents to ensure clarity, relevance, and internal consistency of items. Based on feedback, minor modifications were made to improve wording and comprehension. The final questionnaire was administered electronically through email and online forms.

Sampling Design and Sample Size

The target population comprises educated women residing in urban areas of Sonipat and Panipat districts of Haryana. Due to the absence of a comprehensive sampling frame and logistical constraints, the study employed a purposive, quota-based sampling strategy. The sample consists of 300 respondents, divided equally between employed (150) and unemployed (150) women.

The quota-based design was adopted to enable a balanced comparison between employed and unemployed women. However, the sample is not representative of the underlying population and does not permit estimation of unemployment prevalence or population-level effects. Consequently, regression findings are interpreted as conditional and correlational, not causal or, general is able.

The combined urban population of Sonipat and Panipat districts (approximately 991,000 as per the Census of India 2011) is cited only for contextual reference and is not used for population inference.

Sampling Bias and Interpretation of Results

The absence of randomisation and a probability-based sampling frame implies a risk of selection bias. The employed and unemployed groups may differ systematically on unobserved characteristics such as household norms, access to networks, distance to workplaces, and family support. Therefore, regression results are interpreted strictly as conditional associations within the sample. To improve transparency and comparability, the study reports balance checks

between employed and unemployed groups on key observable socio-economic characteristics such as age, education, and household economic category.

Response Rate and Data Quality

The questionnaire was circulated electronically to a larger pool of potential respondents. Out of the total questionnaires distributed, 300 complete and usable responses were obtained. Electronic data collection offers efficiency but may introduce non-response bias, particularly if respondents with limited digital access are underrepresented.

Reliability of the Scale

The study assessed the internal consistency of the perceived employment constraints using a 12-item Perceived Barriers to Employment Scale. This scale covers constraints such as skill mismatch, mobility problems, safety concerns, unsuitable working hours, and family responsibilities, lack of confidence, low wages, and lack of work experience, gender bias, and limited job availability. Cronbach's alpha for these items yielded a value of 0.849, indicating high reliability. This suggests that the barrier items are broadly coherent in capturing a common underlying dimension of perceived employment constraints.

However, for the regression analysis, the study does not use a single composite barrier score. Instead, selected barrier items are included as separate binary indicators to capture the differential influence of specific constraints (e.g., mobility problems versus family responsibilities) on employment status. This approach enhances interpretability and helps identify which barriers are more strongly associated with employment outcomes.

Variables and Measurement

Dependent Variable

Employment status was coded as a binary outcome: employed (1) and unemployed (0).

Independent Variables

The explanatory variables included:

(i) Socio-economic characteristics

- Age group
- Household economic category
- Marital status
- Household size
- Number of dependents/children
- Social group/caste category

(ii) Educational attainment

- Educational level categorised from below primary to graduate and above

(iii) Perceived employment barriers

Skill mismatch, mobility constraints, safety concerns, unsuitable working hours, family responsibilities, lack of work experience, low wages, lack of awareness of schemes, and limited job availability.

It is important to note that although the barrier items demonstrate high internal consistency (Cronbach's $\alpha = 0.849$), the regression model includes selected barriers as separate binary indicators to identify the specific constraints most relevant to women's employment status. This approach allows clearer interpretation of which household-level and structural barriers are more strongly associated with employment outcomes.

Analytical Technique

Since the dependent variable has two categories, the study employs binary logistic regression. Results are reported as odds ratios with 95 per cent confidence intervals and standard errors. Multicollinearity diagnostics were examined, and no severe multicollinearity was observed. However, limited variation within some subgroups may lead to quasi-separation, implying that coefficient estimates and standard errors should be interpreted cautiously.

Ethical Considerations

Participation in the study was entirely voluntary and based on informed consent. Respondents were provided with a clear explanation of the study's purpose, procedures, and potential benefits of the study assuring anonymity and confidentiality. No personal identifiable information was collected or retained. The data were used solely for academic research purposes and not shared with any third-party or used for commercial ends.

Dependent Variable: Employment Status (1 = Employed, 0 = Unemployed)

Table 1 presents the descriptive profile of 300 educated women respondents from urban area of Sonipat and Panipat districts. The sample is equally divided into employed (50%) and unemployed (50%) groups to facilitate comparison. Most respondents fall within the prime working-age range, with 70 per cent belonging to the 18–35 age group. Nearly half belong to the middle economic category (46.7%), followed by low (31.7%) and high (21.6%) categories, reflecting socio-economic diversity in the sample.

A majority of the respondents are married (60%), and many report household responsibilities-61.6 per cent have at least one dependent, while 13.3 per cent have three or more dependents. OBC women constitute the largest social

group (46.7%). Educational attainment is relatively high, with 18 per cent holding graduate and post-graduation qualifications. Respondents were permitted to report more than one perceived barrier; therefore, the responses are treated as multiple-response items.

Table 1
Descriptive Profile of Educated Women Respondents in Urban Sonipat and Panipat (N=300)

Variable	Category (Code)	Frequency	Percentage (%)
Employment Status	Employed (1)	150	50.0
	Unemployed (0)	150	50.0
Age Group	18–25 years (1)	90	30.0
	26–35 years (2)	120	40.0
	36–45 years (3)	60	20.0
	46 years & above (4)	30	10.0
Household Economic Category	Low (1)	95	31.7
	Middle (2)	140	46.7
	High (3)	65	21.6
Marital Status	Unmarried (0)	120	40.0
	Married (1)	180	60.0
Household Size	≤4 members (1)	135	45.0
	5–6 members (2)	110	36.7
	7+ members (3)	55	18.3
Dependents/Children	0 (0)	115	38.3
	1–2 (1)	145	48.3
	3+ (2)	40	13.3
Social Group/Caste	SC/ST (1)	65	21.7
	OBC (2)	140	46.7
	General (3)	95	31.7
	Below Primary (1)	27	9.0
Educational Attainment	Primary (2)	42	14.0
	Middle (3)	36	12.0
	Secondary (4)	21	7.0
	Senior Secondary (5)	39	13.0
	Diploma/Certificate (6)	45	15.0
	Graduate & above (7)	54	18.0

Table-2
Major Perceived Barriers to Employment-by-Employment Status (N=300)

Barrier*	Employed (n=150)	Unemployed (n=150)	Total (N=300)
Skill mismatch	8 (5.3%)	19 (12.7%)	27 (9.0%)
Mobility problems	6 (4.0%)	19 (12.7%)	25 (8.3%)
Lack of confidence	5 (3.3%)	17 (11.3%)	22 (7.3%)
Unsuitable working hours	7 (4.7%)	14 (9.3%)	21 (7.0%)
Safety concerns	5 (3.3%)	15 (10.0%)	20 (6.7%)
Family responsibilities	6 (4.0%)	14 (9.3%)	20 (6.7%)
Lack of work experience	4 (2.7%)	19 (12.7%)	23 (7.7%)
Not enough jobs available	3 (2.0%)	19 (12.7%)	22 (7.3%)
Gender bias	4 (2.7%)	11 (7.3%)	15 (5.0%)
Low wages in available jobs	5 (3.3%)	9 (6.0%)	14 (4.7%)

Source: Primary survey data collected by the author

Note: Multiple responses were permitted; percentages represent the proportion of respondents within each employment group reporting a given barrier. Therefore, percentages do not sum to 100.

Perceived Barriers to Employment

Table 2 reveals that unemployed women report higher levels of barriers across all categories compared to their employed counterparts. Among unemployed respondents, the most frequent cited constraints include skill mismatch, mobility problems, lack of work experience, and limited job availability (each reported by 12.7%). Other notable barriers are safety concerns (10.0%), unsuitable working hours (9.3%), and family responsibilities (9.3%). These findings underscore the combined influence of labour market mismatch, mobility and safety issues, and care giving burdens on educated women's employment outcomes in urban Haryana.

Table 3 presents balance checks between employed and unemployed respondents across key socio-economic and educational characteristics, using

Pearson's chi-square test. The results indicate that most observed covariates, age group, marital status, dependents, caste category, and educational attainment, do not differ significantly between the two groups ($p > 0.05$). This suggests reasonable comparability across these characteristics within the sample. However, household economic category shows a statistically significant difference between the two groups ($p = 0.041$), with the employed group relatively more concentrated in the middle and high economic categories compared to the unemployed group. This imbalance highlights the potential for selection arising from the purposive quota-based design. It reinforces that regression results should be interpreted as conditional associations within the sample, rather than as causal relationships or population-level estimates.

Table-3
Covariate Balance between Employed and Unemployed Women (N=300)
(Pearson's Chi-square test)

Variables	Category	Employed (n=150)	Unemployed (n=150)	χ^2 p-value
Age Group	18–25 years	40	50	0.322
	26–35 years	65	55	
	36–45 years	30	30	
	46 years & above	15	15	
Household Economic Category	Low	40	55	0.041*
	Middle	75	65	
	High	35	30	
Marital Status	Unmarried	65	55	0.245
	Married	85	95	
Dependents/Children	0	65	50	0.071
	1–2	70	75	
	3+	15	25	
Social Group/Caste	SC/ST	30	35	0.786
	OBC	72	68	
	General	48	47	
	Below Primary	12	15	
Educational Attainment	Primary	20	22	0.614
	Middle	18	18	
	Secondary	10	11	
	Senior Secondary	18	21	
	Diploma/Certificate	25	20	
	Graduate & above	47	43	

Source: Author's calculations on field data collected for the study.

Note: $p < 0.05$ indicates statistically significant difference between groups.

Binary Logistic Regression Results

Binary logistic regression was employed to examine the conditional association between women's employment status and selected socio-economic characteristics, educational attainment, and perceived employment barriers. The dependent variable was coded as 1=employed and 0=unemployed. Results are reported as odds ratios ($\text{Exp}(B)$), along with 95 per cent confidence intervals and standard errors. Given the purposive quota-based sampling design and the equal split between employed and unemployed respondents, the estimated relationships should be interpreted as associational and sample-conditional, rather than causal or representative of the broader population. The regression results are presented in Table 4.

Table 4 presents the results of the binary logistic regression examining the conditional association between employment status and selected socio-economic characteristics, educational attainment, and perceived barriers among educated women in urban Sonipat and Panipat. The overall model is statistically significant (Model $\chi^2=26.85$, $p=0.041$), indicating that the included predictors jointly improve fit relative to the intercept-only model. However, explanatory power remains modest (Cox & Snell $R^2=0.086$; Nagelkerke $R^2=0.118$), suggesting that a substantial portion of variation in women's employment outcomes is attributed to broader structural and unobserved factors beyond those captured in the model.

Among the socio-economic variables, household economic category is a statistically significant predictor at the 5% level ($p=0.020$). The odds ratio ($\text{Exp}(B)=1.780$) implies that women from relatively higher economic categories have higher odds of employment within the sample, possibly reflecting improved access to job search resources, mobility, and supportive household conditions.

In contrast, women with three or more dependents/children show significantly lower odds of employment ($\text{Exp}(B)=0.540$, $p=0.048$), highlighting the constraining role of care giving responsibilities and household burden on women's labour market participation.

Regarding educational attainment, only the 'graduate & above' category is statistically significant at the 5 per cent level ($\text{Exp}(B)=1.950$, $p=0.040$) relative to the reference category (below primary). This suggests higher odds of employment among graduates within the conditional sample. Intermediate education categories, however, show non-significant effects despite some odds ratios exceeding one, implying that education alone does not consistently translate into employment gains across all levels. This mixed pattern aligns with broader literature on educated women's unemployment, where limited job availability and unsuitable work conditions often constraint the benefits of higher education. These effects are conditional on the quota-based sample and should not be interpreted as population-level estimates of employment likelihood.

Table-4
Binary Logistic Regression Results

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI for Odds Ratio
Socio-economic Characteristics							
Age group	0.010	0.078	0.017	1	0.910	1.010	0.86 – 1.19
Household economic category	0.577	0.248	5.400	1	0.020*	1.780*	1.09 – 2.89
Marital status (Married=1)	-0.328	0.246	1.780	1	0.180	0.720	0.45 – 1.15
Household size (5–6 vs≤4)	-0.174	0.217	0.650	1	0.420	0.840	0.50 – 1.41
Household size (7+ vs≤4)	-0.462	0.289	2.550	1	0.110	0.630	0.35 – 1.13
Dependents/children (1–2 vs 0)	-0.236	0.237	0.990	1	0.320	0.790	0.48 – 1.30
Dependents/children (3+ vs 0)	-0.616	0.311	3.910	1	0.048*	0.540*	0.29 – 0.99
Social group (OBC vs General)	-0.083	0.242	0.120	1	0.730	0.920	0.56 – 1.52
Social group (SC/ST vs General)	-0.211	0.321	0.430	1	0.510	0.810	0.41 – 1.58
Educational Attainment (Ref: Below Primary)							
Primary	0.293	0.246	1.430	1	0.230	1.340	
Middle	0.077	0.409	0.040	1	0.850	1.080	0.55 – 3.24
Secondary	0.652	0.421	2.420	1	0.120	1.920	0.46 – 2.56
Senior Secondary	0.344	0.306	1.270	1	0.260	1.410	0.85 – 4.33
Diploma/Certificate	0.438	0.319	1.880	1	0.170	1.550	0.62 – 3.20
Graduate & above	0.668	0.327	4.220	1	0.040*	1.950*	0.83 – 2.90
Perceived Barriers to Employment							
							1.03 – 3.69
Skill mismatch	-0.478	0.382	1.560	1	0.210	0.620	
Mobility problems	0.307	0.305	1.040	1	0.310	1.360	
Safety concerns	-0.211	0.389	0.290	1	0.590	0.810	0.29 – 1.32
Unsuitable working hours	-0.151	0.366	0.170	1	0.680	0.860	0.74 – 2.49
Family responsibilities	-0.301	0.437	0.480	1	0.490	0.740	0.38 – 1.71
Lack of confidence	0.113	0.315	0.130	1	0.720	1.120	0.41 – 1.81
Lack of work experience	-0.073	0.305	0.060	1	0.810	0.930	0.34 – 1.59
Not enough jobs available	-0.116	0.291	0.160	1	0.690	0.890	0.64 – 1.97
Gender bias	-0.051	0.407	0.020	1	0.900	0.950	0.51 – 1.70
Low wages in available jobs	-0.400	0.382	1.110	1	0.290	0.670	0.49 – 1.61
Constant	-0.210	0.620	0.110	1	0.740	0.810	0.42 – 2.13

Source: Author's calculations,

Note: * $p < 0.05$, ** $p < 0.01$

Most perceived barriers, such as skill mismatch, mobility constraints, safety concerns, unsuitable working hours, family responsibilities, and low wages, do not emerge as statistically significant predictors in the model. This may reflect overlap among barriers, limited variation within subgroups, or the possibility that these constraints operate simultaneously rather than independently.

Model Fit Statistics: - 2 Log Likelihood: 372.10, Model χ^2 (df=27): 26.85 (p=0.041), Cox & Snell R²:0.086, Nagelkerke R²: 0.118

Overall, the findings suggest that women's employment outcomes in urban Haryana are shaped more strongly by household economic conditions and care responsibilities. The modest model fit highlights the need for future research to incorporate additional structural factors, such as local job availability, workplace flexibility, and prevailing social norms.

Policy Implications

The findings of the study carry several policy implications for improving employment outcomes among educated women in urban Sonipat and Panipat districts of Haryana.

First, the regression results indicate that household economic category is positively associated with employment status, suggesting that women from relatively better-off households have higher odds of being employed. This underscores the need to reduce economic barriers for women from low-income households through targeted interventions such as job placement support, subsidised skill training programmes, and affordable transport facilities. Such measures can lower entry costs into the labour market and enable women to access opportunities beyond their immediate neighbourhoods.

Second, women with three or more dependents/children have significantly lower odds of employment, pointing to the constraining role of care giving responsibilities. Policies should therefore prioritise childcare and family-support mechanisms, including the expansion of affordable crèches, community day-care centres, and flexible work arrangements in urban areas. Employers and local administrations could also promote part-time work, work-from-home options, and flexible shifts for women, particularly for those in care giving roles.

Third, although 'graduate and above' education category is associated with higher odds of employment in the regression model, the descriptive evidence indicates that educated women continue to face multiple barriers, including skill mismatch, mobility constraints, unsuitable working hours, safety concerns, and lack of experience. This suggests that education alone is insufficient unless supported by stronger school-to-work transition systems. District-level initiatives such as career counselling cells, internship opportunities, industry-college

linkages, and job fairs in Sonipat and Panipat can help bridge the gap between qualifications and employability. Structured internships and apprenticeship programmes, in particular, could directly address the commonly reported barrier of “lack of work experience” among young educated women.

Finally, mobility and safety-related constraints, though not statistically significant in the regression, emerge as frequently reported barriers in the descriptive profile. Improving women’s employment therefore requires broader structural interventions. Though the nature of safety barriers was not a part of the analysis, impact of safe public transport, enhanced last-mile connectivity, better street lighting, and women-friendly workplace environments may be tested further. Collectively, these measures can address both household-level constraints and external structural barriers, thereby enhancing educated women’s participation in the urban labour market.

Conclusion

This study examined the factors associated with unemployment among educated women in urban areas of Sonipat and Panipat districts of Haryana using primary survey data and a binary logistic regression framework. The descriptive findings reveal that women face a combination of constraints, including skill mismatch, mobility issues, unsuitable working hours, safety concerns, family responsibilities, and limited work experience, indicating that educated women’s unemployment is shaped by both labour market limitations and household-level restrictions.

Balance checks suggests that the employed and unemployed groups are broadly comparable on several observed characteristics, although differences in household economic category point to potential selection bias under the quota-based sampling approach. The regression results show that household economic category is significantly associated with employment status, with women from relatively stronger economic backgrounds exhibiting higher odds of employment within the sample. In contrast, women with three or more dependents/children have significantly lower odds of employment, reinforcing the central role of care giving responsibilities in restricting labour market participation. Higher educational attainment (graduate and above) is also positively associated with employment, although intermediate education categories do not show consistent effects, reflecting the complex relationship between education and employment outcomes for women.

Overall, the study reinforces the argument that improving employment outcomes for educated women in urban Haryana requires policies that go beyond education expansion and address structural constraints such as childcare support, flexible employment options, safe mobility, and stronger school-to-work transition mechanisms. Given the purposive quota-based sampling design, the

results should be interpreted as conditional associations rather than causal or population-level estimates. Nevertheless, the study provides locally grounded insights that can inform district-level strategies aimed at reducing educated female unemployment in rapidly urbanising regions of Haryana.

Limitations and Future Scope

This study has certain limitations that should be considered while interpreting the findings. First, it relies on a purposive quota-based sample with an equal split of employed and unemployed respondents, which limits representativeness and does not allow estimation of true unemployment prevalence among educated women in urban Sonipat and Panipat. Consequently, regression results should be interpreted as conditional associations rather than causal or population-level effects. Second, electronic data collection via questionnaire may introduce non-response bias and under-represent women with limited digital access. Third, the analysis depends on self-reported information about perceived barriers to employment, which may be subject to recall bias or subjective interpretation. Fourth, limited variation in some subgroups raises the possibility of quasi-separation in the logistic regression estimates, warranting cautious interpretation of coefficients and standard errors.

Future research could strengthen the evidence base by adopting probability-based sampling designs, expanding coverage to additional districts of Haryana, and incorporating longitudinal or panel data to capture dynamic transitions between employment and unemployment. Further studies may also include richer measures of local labour demand, workplace conditions, social norms, and mobility infrastructure, and apply advanced methods such as propensity score matching or weighting to enhance comparability between employed and unemployed groups.

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WORKING AND LIVING CONDITIONS OF SEWERAGE WORKERS A STUDY OF VIJAYAWADA MUNICIPAL CORPORATION IN ANDHRA PRADESHⁱ

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Abstract: This study explores the working and living conditions of sewerage workers employed by the Vijayawada Municipal Corporation (VMC) in Andhra Pradesh. Based on a survey of 98 workers and follow-up interactions from 2018 to 2020, the research highlights the severe socio-economic vulnerabilities they face. Most belong to marginalised communities and are engaged on a contractual basis, lacking job security, social protection, and healthcare benefits. To measure deprivation, the study developed two composite indices, the Working Conditions Index (WCI) and the Living Standards Index (LSI). Findings reveal minimal use of safety equipment, widespread financial insecurity, and persistent social stigma. Although initiatives like the NAMASTE scheme have been introduced, major gaps remain in implementation. The study calls for urgent policy action focusing on mechanisation, stronger legal protections, and inclusive welfare programs to safeguard the rights and dignity of this workforce.

Keywords: Vulnerability Groups, Sewerage Workers, Living Conditions, Vijayawada Municipal Corporation (VMC)

1.1. Backdrop

Sanitation work in India, particularly sewerage work, is historically linked with caste-based occupational segregation, socio-economic vulnerability, and hazardous work environments. Sewerage workers perform physically demanding and life-threatening tasks, often without adequate safety, job security, or healthcare. Despite urban development and mechanisation initiatives, many of these workers, especially those from marginalised communities, continue to face

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institutional neglect and health risks. In the context of Vijayawada, a rapidly expanding city, the inadequacies in workforce strength, equipment, and welfare mechanisms are pronounced. This study contributes to understanding these challenges in a specific urban context, thereby informing targeted policy interventions.

1.2 Objectives

The specific objectives of the study are:

- i) To document the socio-economic profiles of the sewerage workers employed by the Vijayawada Municipal Corporation (VMC);
- ii) To assess the levels of living of these workers and their vulnerability levels affecting the quality and sustainability of living standards;
- iii) To examine the working conditions of these workers with special reference to safety measures and capacity building initiatives;
- iv) To record the perceptions of these workers regarding the changes in socio-psychological relations and stigma associated with their occupation;
- v) To study the awareness levels about social safety nets and the extent of utilisation for economic security; and
- vi) To suggest measures for improving the working and living conditions of sewerage workers.

1.3 Significance of the Study

The study is significant as it provides a localised, in-depth account of the sanitation workforce in Vijayawada, a major city in Andhra Pradesh. It examines how caste dynamics, employment type, and limited state support combine to create precarious working and living conditions.

2.1 Review of Literature

Sanitation work in India remains deeply rooted in socio-economic inequality and caste-based occupational hierarchies. A substantial body of literature highlights how institutional neglect, hazardous conditions, and legal gaps continue to marginalise sanitation workers, especially those in sewerage work.

Raghavendra and Kumar (2022) and Swaroop and Lee (2021) emphasise the persistence of caste-based sanitation work, with Dalits and other SCs forming the majority. Despite constitutional and legislative reforms, stigma remains entrenched through cultural, political, and legal channels.

Official data supports this. PIB (2024) and Vrinda Tulsian (2024) report that 92 per cent of sewer and septic tank workers belong to marginalised communities, 67.91 per cent SC, 15.73 per cent OBC, and 8.31 per cent ST.

Although sanitation work is officially defined as occupation-based, field studies and worker narratives reveal a continued caste linkage.

The living and working conditions are dire. Studies by Madhumithra et. al. (2021), the World Bank (2019), and Financial Express (2019) show widespread absence of protective gear, frequent chronic illnesses (skin, respiratory, gastrointestinal), and high mortality rates, with limited access to schemes like Ayushman Bharat or AarogyaSri.

Initiatives like the National Action for Mechanised Sanitation Ecosystem (NAMASTE) have made some progress, profiling over 57,000 workers, distributing PPE kits, and conducting skill workshops (Ministry of Social Justice and Empowerment, 2024). Still, implementation remains patchy, with limited coverage and few health cards or capital subsidies reaching workers.

Malhotra (2023) identifies five key reforms: enumeration, mechanisation, upskilling, Self Help Group (SHG)-based service models, and Emergency Response Sanitation Units (ERSUs). These offer scalable pathways to improve safety, dignity, and economic inclusion.

M. Srinivasa Reddy's study of sewerage workers in Vijayawada Municipal Corporation (VMC) echoes these findings at the local level. Many workers, including those from OBC and OC backgrounds, face abysmal working conditions. Contractual employment, long hours, stagnant wages, and lack of promotions are common.

Reddy's Working Conditions Index (WCI) shows poor use of safety equipment, high incidence of health issues, and low perceived safety. SC contract workers, especially Madigas and Rellis, are most vulnerable due to poor mechanisation, limited healthcare, and reliance on informal credit.

Housing conditions are poor, with most workers living in slums and few owning homes. While education levels have improved across generations, overall financial insecurity remains high, with significant indebtedness, largely driven by healthcare and education costs.

In sum, existing literature strongly affirms the precarious nature of sanitation work in India. Although programs like NAMASTE and state-level initiatives (e.g., Odisha's GARIMA, Tamil Nadu's sanitation mapping) show progress, much remains unchanged. Mechanisation, legal reform, comprehensive enumeration, and genuine social inclusion are urgent and essential to uphold the dignity and rights of sanitation workers.

2.2. Research Gap

While national-level studies on sanitation work exist, few micro-level assessments are available that combine statistical analysis with qualitative

inquiry. This study fills that gap by integrating quantitative indices with testimonies and field-level insights.

3. Methodology

3.1. Sampling Design

Based on information obtained from the Vijayawada Municipal Corporation (VMC) and associated contractors, a list of 223 sewerage workers across the three divisions of VMC was compiled. Among these, 83 workers belonged to the Scheduled Castes (SC), 98 to Other Backward Classes (OBC), 36 to Other Castes/Forward Castes (OC), and 6 to Scheduled Tribes (ST). For the study, a purposive sampling method was adopted. All 83 SC workers were included in the sample (complete enumeration), while an additional 15 workers from the OBC and OC categories were randomly selected to enable comparative analysis. In total, the sample comprised 98 sewerage workersⁱⁱ. These respondents were further classified based on their employment status — permanent, time-scale, and contract, for detailed analysis.

3.2. Data Sources and Collection Methods

Primary data were collected in 2018, with follow-up interactions in 2019 and 2020. Secondary data from VMC and contractors included worker numbers, caste details, pay structure, and worksite facilities. Semi-structured interviews were conducted with VMC officials and contractors. A structured schedule was administered to sample workers, and qualitative methods such as PRA, FGDs, and personal interviews were used to gather insights from workers, officials, contractors, and the public on their working and living conditions.

The data were collected on the socio-economic status, working conditions and living standards of the sewerage workersⁱⁱⁱ. Data on the awareness levels, perceptions, expectations and field level problems experienced by the sewerage workers were obtained from these sample households.

3.3. Methodological Approach: Index Construction and Analytical Framework

Two composite indices were developed to assess the working and living conditions of sewerage workers: the Working Conditions Index (WCI) and the Living Standards Index (LSI). The WCI used 21 indicators across four areas, wages, safety equipment, perceived safety, and health impacts, reflecting key aspects of the job environment.

The LSI comprised 33 indicators under six categories, housing, education, healthcare, income, social capital, and asset ownership, capturing long-term socio-economic well-being.

Indicators were scored as binary or scaled values, equally weighted, with index values ranging from 0 (worst) to 1 (best). Scores were grouped as Poor (<0.3), Moderate (0.31–0.7), and Good (>0.7), offering a detailed view of deprivation levels.

4. Analysis

4.1. Socio-Economic Profiles of Sewerage Workers

Of the 83 SCs that figured in the study, 56 belonged to *Relli* community, 26 were of *Madiga* community and one was *Mala*^{iv}. The average family size was 4.18 and it varied between 4.25 (*Relli*) and 3.58 (*Madiga*).

Table-1
Composition and Type of Engagement of Sample Sewerage Workers of VMC

Workers Status	SC	OBC & OC	Total
Permanent	21	4	25
Time-scale	5	3	8
Contract/outsourced	57	8	65
Total	83	15	98

Source: Field Survey

Migration

Over 40 per cent of worker families were rural migrants, primarily from Krishna district (72%), with some Relli migrants from North Coastal Andhra previously engaged in manual scavenging. About 38 per cent migrated to Vijayawada over 30 years ago, mainly due to push factors.

Among the fathers of sample workers, illiteracy rates were high, 67 per cent (OC & OBC), 45 per cent (Rellis), and 50 per cent (Madigas), with mean schooling years of 7.4, 5.4, and 3, respectively, among the literates. However, literacy improved significantly in the next generation, with no illiterates and average schooling years rising to 10.27 (OC & OBC), 10.79 (Rellis), and 7.85 (Madigas). Most workers had education up to the 10th standard.

Occupational mobility was evident, as workers' fathers held varied jobs, casual labor (48%), self-employed in agriculture (25%), and non-agriculture (9%). OBC and OC workers entered sewerage work due to limited job options and the hope of securing government employment.

Worker Profiles and Working Conditions

Status of Employment

Only 3 per cent of workers were illiterate, with the rest having 1–17 years of schooling (mean: 4.1 years). Most workers were aged 20–40. About 7 per cent held supervisory roles mainly permanent workers from OBC and OC groups.

Over one-fourth of OBC and OC workers were supervisors, compared to just 7 per cent among Rellis.

About 20 per cent of workers were permanent, less than 8 per cent were time-scale, and the rest were contract workers. Work experience ranged from 7 days to 39 years, averaging 13 years. Most were aged contract workers without social security.

Table-2
Workers Position across Worker Employment Status

Caste/Category	Position	Permanent	Time-scale	Contract	Total
OBC & OC	Worker	1 (9.1)	3 (27.3)	7 (63.6)	11 (100)
	Supervisor	3 (75)	0 (0.0)	1 (25)	4 (100)
	Total	4 (26.7)	3 (20)	8 (53.3)	15 (100)
SC: Relli	Worker	9 (17)	3 (5.7)	41 (77.4)	53 (100)
	Supervisor	2 (66.7)	0 (0.0)	1 (33.3)	3 (100)
	Total	11 (19.6)	3 (5.4)	42 (75)	56 (100)
SC: Madiga	Worker	5 (19.2)	2 (7.7)	19 (73.1)	26 (100)
	Total	5 (19.2)	2 (7.7)	19 (73.1)	26 (100)

Source: Field Survey;

Note: Figures in the parentheses indicate the percentages of the total

4.2. Wage Related Issues, Working hours and Allowances

Wages were mostly paid via online transfer, with 70 per cent reporting no delays. Only 1 per cent received special allowances. Workers typically did 8–12-hour day shifts and 6–12-hour night shifts, though some avoided night work.

Contract workers, regardless of experience, earned around ₹9,000 monthly. Time-scale workers received about ₹15,000 (₹11,000–₹12,000 take-home), but were excluded from welfare schemes as APL households. Their job terms lacked clarity, promotions, or increments. Permanent workers, however, received regular salaries, increments, and benefits as per VMC scales.

Manpower shortages led to overwork without extra pay or leave. Youth showed little interest in sewerage jobs. Workers reported strict subordination, fearing consequences like non-renewal or transfers if they questioned superiors like AEs or DEs.

4.3. Wage Earnings

Table 3 shows that time-scale and contract workers received low wages. Some contract workers took up private sewerage jobs, earning an additional ₹3,333 per month on average.

Multiple income sources were reported by about two-thirds of OC/OBC workers, 59 per cent of Rellis, and 70 per cent of Madigas, reflecting economic insecurity. Financial security was perceived by 53 per cent of OC/OBC, but only 29 per cent of Relli and 27 per cent of Madiga households.

4.4. Health Hazards

The main health hazards were skin diseases, eye and ear issues, respiratory problems, gastroenteritis and liver related problems due to addiction to alcohol. It is reported that when the workers got into the drainages for work, sometimes they accidentally swallow drainage water which may be one of the reasons for getting liver infections.

Table-3
No. of Workers and Sources of Wage Earnings across Workers Status and Caste
(₹/Month)

Caste/Category	Workers Status	Salary	Private Sewerage Works
OBC & OC	Permanent	4 (46545)	0
	Time-scale	3 (14494)	0
	Contract	8 (11556)	4 (3875)
	Total	15 (21474)	4 (3875)
Relli	Permanent	11 (44395)	0
	Time-scale	3 (15711)	0
	Contract	42 (12197)	4 (2625)
	Total	56 (18710)	4 (2625)
Madiga	Permanent	5 (50129)	0
	Time-scale	2 (15861)	0
	Contract	19 (11579)	1 (4000)
	Total	26 (19322)	1 (4000)
SC	Permanent	21 (60620)	0
	Time-scale	5 (15771)	0
	Contract	57 (11218)	5 (2900)
	Total	83 (19135)	5 (2900)
Total	Permanent	25 (57824)	0
	Time-scale	8 (15292)	0
	Contract	65 (11260)	33330
	Total	98 (19501)	9 (3333)

Source: Field Survey;

Note: Figures in the parentheses indicate workers average earnings per month (in ₹)

Sewerage workers faced difficulties accessing healthcare, including wage loss for hospital visits and indifferent treatment at ESI hospitals. They were excluded from government health schemes like Aarogyasri, and many couldn't afford private care, leading to neglected health issues. Time-scale workers weren't eligible for ESI or Aarogyasri, and even permanent workers received limited medical reimbursement, often too late.

Many were forced to borrow from informal sources at high interest for treatment. None had health insurance, and even insurance agents avoided enrolling them due to the nature of their work.

4.5. Use of Safety Equipment, Training and Perceived Safety

Machines were introduced to reduce work hazards and physical strain, but many were non-functional or insufficient for city-wide use. Safety gear like masks, goggles, and boots was largely unavailable or not replaced when worn out.

4.6. Working Conditions Index (WCI)

A Working Conditions Index (WCI) was developed using 21 indicators across four equally weighted areas: wages, safety equipment, perceived workplace safety, and health-related risks. Indicators were binary or scored up to 1, with higher scores indicating better conditions. Details are in Table 4.

Table-4
Working Conditions Index of Sewerage Workers: Caste/Category (%)

Caste/ Worker Status	Working Category Index	N	Wage Related Index	Safety Equipment use Index	Perceived Safety at Work Index	Health Safety Index	Index of Working Conditions
BC & OC	Moderate	15	0.6666	0.2	0.453	0.76	0.5199
	Poor	3	0.6	0	0.6	0.422	0.4055
Relli	Moderate	53	0.6416	0.057	0.475	0.7327	0.476575
	Total	56	0.6392	0.054	0.482	0.7161	0.472825
	Poor	1	0.6	0	0.2	0.3667	0.291675
Madigas	Moderate	25	0.696	0.12	0.488	0.668	0.493
	Total	26	0.6924	0.115	0.477	0.6564	0.4852
	Poor	4	0.6	0	0.5	0.4083	0.377075
SC	Moderate	79	0.659	0.077	0.479	0.712	0.48175
	Total	83	0.656	0.073	0.48	0.6972	0.47655
	Poor	4	0.6	0	0.5	0.4083	0.377075
Total	Moderate	94	0.6602	0.097	0.475	0.7197	0.487975
	Total	98	0.6578	0.093	0.476	0.7069	0.483425
	Permanent	25	0.73	0.15	0.66	0.6967	0.559168
	Time-scale	8	0.675	0.375	0.475	0.6667	0.547918
	Contract	65	0.6348	0.0435	0.4232	0.7145	0.453993

Source: Field Survey

Note: 1. based on the no. of indicators, the WCI score ≤ 0.3 was treated as poor; and between 0.31 and 0.7 as moderate and above 0.7 as good;

2. See Appendix 1 for the full list of indicators used in arriving at the indices

On wage related index, there was no significant variation across social groups and it was 60-70 per cent of the ideal situation. The use of safety equipment was awfully low (less than 12%). The perceived safety varied widely between 20 and 50 per cent. The work induced health disorders were reported to be substantial (70%) and fluctuated between 37 and 73 per cent. Combining all these indices, the WCI was developed. It can be inferred that the working conditions were either poor or moderate. It is the responsibility of the contractors and VMC to ensure better working conditions.

5. Levels of Living and Living Standard Index (LSI)

The levels of living were assessed through a set of indicators spread over several demographic-social-economic areas and the results were discussed below:

5.1. Housing, Quality and Amenities

About 35 per cent of workers owned houses; the rest lived in rented accommodations, mostly in slums. Ownership varied by caste, 20 per cent (OC/OBC), 36 per cent (Rellis), and 42 per cent (Madigas). Housing quality was poor, with 46 per cent in Kutcha and 42 per cent in Semi-Pucca houses; only 12 per cent lived in Pucca homes. Most houses had tap water, electricity, and toilets. Due to high urban rents, many workers rented homes in slum areas.

5.2. Assets

It was reported that hardly 3 and 10 per cent of worker households had some agriculture and non-agriculture land.

Table-5
Workers' Household Monthly Per Capita Income (HHMPCI) across Social Groups (₹)

Caste/ Category	HH MPCII Range	Wage Income/ Salary of Self	Income: Pvt. Sewerage Works (Self)	Income of Other Members	HH Monthly Gross Income	HHMPCI
OBC&OC	< 5,000	8 (11806)	3 (4500)	4 (6500)	8 (16744)	8 (3731)
	5,000-10,000	4 (28021)	1 (5000)	1 (6000)	4 (30771)	4 (7130)
	10,000-20,000	2 (32515)	0 (0.0)	1 (25000)	2 (45015)	2 (15005)
	> 20,000	1 (50547)	0 (0.0)	1 (30000)	1 (80547)	1 (26849)
	Total	15 (21474)	4 (4625)	7 (12428)	15 (28507)	15 (7682)
Relli	< 5,000	24 (12093)	2 (2750)	10 (4110)	24 (14035)	24 (3392)
	5,000-10,000	23 (15844)	2 (2500)	21 (13690)	23 (28561)	23 (6450)
	10,000-20,000	6 (45742)	0 (0.0)	5 (20600)	6 (62909)	6 (13595)
	> 20,000	3 (46775)	0 (0.0)	2 (9000)	3 (52775)	3 (22899)
	Total	56 (19097)	4 (2625)	38 (11831)	56 (27313)	56 (6786)
Madiga	< 5,000	13 (11571)	1 (4000)	5 (4500)	13 (13610)	13 (3246)
	5,000-10,000	8 (17374)	0 (0.0)	8 (9125)	8 (26499)	8 (6735)
	10,000-20,000	4 (40291)	0 (0.0)	3 (9666)	4 (47541)	4 (13793)
	> 20,000	1 (51784)	0 (0.0)	1 (10000)	1 (61784)	1 (20594)
	Total	26 (19322)	1 (4000)	17 (7911)	26 (24649)	26 (6609)
SC	< 5,000	37 (11910)	3 (3166)	15 (4240)	37 (13886)	37 (3341)
	5,000-10,000	32 (16763)	2 (2500)	29 (12431)	32 (28933)	32 (6734)
	10,000-20,000	10 (43562)	0 (0.0)	8 (16500)	10 (56762)	10 (13674)
	> 20,000	4 (48027)	0 (0.0)	3 (9333)	4 (55027)	4 (22323)
	Total	83 (19402)	5 (2900)	55 (10620)	83 (26791)	83 (6812)
Total	< 5,000	45 (11891)	6 (3833)	19 (4715)	45 (14394)	45 (3410)
	5,000-10,000	36 (18087)	3 (3333)	30 (12216)	36 (29152)	36 (6781)
	10,000-20,000	12 (41720)	0 (0.0)	9 (17444)	12 (54804)	12 (13896)
	> 20,000	5 (48531)	0 (0.0)	4 (14500)	5 (60131)	5 (23228)
	Total	98 (19726)	9 (3666)	62 (10824)	98 (27059)	98 (6948)

Source: Field Survey;

Note: Figures in the parentheses are average income of the earners in the concerned category (in ₹per month)

5.3. Household Income

The worker households earn income from different sources and data on household income; source wise and per capita income are presented in Tables 5 and 6. The income earnings of other members of the family were impressive and it increased with increase in income of the sewerage worker. Most workers' wives were casual non-agricultural laborers, especially among contract and time-scale households. Many workers also held multiple jobs, reflecting economic insecurity.

While none fell below the official poverty line (₹1,352 per capita/ month in 2016–17), using the state BPL norm (₹1.5 lakh annual income), 26.7 per cent of OC/OBC, 17.8 per cent of Relli, and 23 per cent of Madiga households were below the poverty line.

Table-6
Workers Sources of Income across Workers Status

(₹/Month)						
Caste/Category	Worker Status	Salary	Pvt. Sewerage Works	Other Members	HH Monthly Income	HHMPCI
OBC&OC	Permanent	4 (46545)	0 (0)	2 (18000)	4 (55545)	4 (14930)
	Time-scale	3 (14494)	0 (0)	3 (12333)	3 (26828)	3 (7223)
	Contract	8 (11556)	4 (3875)	2 (7000)	8 (15244)	8 (4136)
	Total	15 (21474)	4 (3875)	7 (12428)	15(28308)	15 (7682)
Relli	Permanent	11 (44395)	0 (0)	8 (15125)	11 (55395)	11 (14637)
	Time-scale	3 (15711)	0 (0)	1 (11000)	3 (19378)	3 (5761)
	Contract	42 (12197)	4 (2625)	29 (10952)	42 (20009)	42 (4718)
	Total	56 (18710)	4 (2625)	38 (11832)	56 (26926)	56 (6786)
Madiga	Permanent	5 (50129)	0 (0)	5 (8800)	5 (58929)	5 (14471)
	Time-scale	2 (15861)	0 (0)	2 (5500)	2 (21361)	2 (4513)
	Contract	19 (11579)	1 (4000)	10 (7950)	19 (15974)	19 (4762)
	Total	26 (19322)	1 (4000)	17 (7912)	26 (24649)	26 (6609)
SC	Permanent	21 (60620)	0 (0)	13 (12692)	21 (74156)	21 (19143)
	Time-scale	5 (15771)	0 (0)	3 (7333)	5 (20171)	5 (5261)
	Contract	57 (11218)	5 (2900)	39 (10182)	57(17523)	57 (4421)
	Total	83 (19135)	5 (2900)	55 (10620)	83 (26524)	83 (6812)
Total	Permanent	25 (57824)	0 (0)	15 (13400)	25 (70386)	25 (18318)
	Time-scale	8 (15292)	0 (0)	6 (9833)	8 (22667)	8 (5997)
	Contract	65 (11260)	3333	41 (10027)	65 (17282)	65 (4392)
	Total	98 (19726)	9 (3666)	62 (10824)	98 (27059)	98 (6948)

Source: Field Survey;

Note: Figures in the parentheses are average annual income of the earners in the concerned category (in ₹ per month)

5.4. Household Expenditure

The expenditure is a better indicator of welfare than income. Further, for 30 per cent of the households, the expenditure exceeded the income. The shares of important commodity groups in household expenditure were presented in Table 7.

A majority of expenditure (almost 50%) was on food items. Workers spent 13–16 per cent of their income on rent, over 5 per cent on health (SC workers), and 9–10 per cent on transport. Though FGDs suggested high addiction to intoxicants, survey data showed fewer reports. Field observations indicated significant spending on liquor, tobacco, and related products. Mobile expenses averaged ₹400 per month.

Table-7
Distribution of Household Expenditure across Caste/Category (₹/Month)

Commodity/Group	OC & BC	Relli	Madiga
Food	9400	8173	8192
Rent	2967	2575	2108
Health	817	942	916
Education	988	1679	459
Transport	1133	1523	1556
Intoxicants*	820	875	938
Total	19042(100)	17221(100)	16360(100)

Source: Field Survey

Note: *include Pan, Tobacco and liquor;

5.5. Indebtedness

Over 90 per cent of workers were in debt. SCBs provided loans to 26 per cent, mainly for housing and medical needs; only 7 per cent of all loans were for productive purposes. Cooperatives lent to 12 per cent, all for non-productive needs. SHGs covered 30 per cent, with 67 per cent of loans being unproductive. Moneylender access was limited, with most loans also for non-productive use. The main source was friends and relatives, 60 per cent of workers borrowed from them for non-productive reasons.

Only 35 per cent reported easy access to adequate credit, 56 per cent (OC/OBC), 36 per cent (Rellis), and 40 per cent (Madigas). Loans were often cumulative. Average outstanding loans were ₹3.23 lakh (OC/OBC), ₹2.48 lakh (Rellis), and ₹1.50 lakh (Madigas). Interest rates varied: 12–18 per cent (banks/co-ops), 12 per cent (SHGs), and up to 60 per cent from informal sources.

5.6. Savings and Insurance

Workers primarily saved through EPFO/GPF, SHGs, and LIC, mostly on a monthly basis. About 36 per cent enrolled in the Chandranna Bhima Scheme, and 8–10 per cent in PMSBY. Low awareness and eligibility issues limited wider coverage.

Workers faced multiple visits and lacked knowledge about welfare schemes, resulting in minimal insurance coverage. None reported benefits from SC Associations, the Social Welfare Department, or the SC Corporation due to lack of awareness and guidance.

5.7. State Support

Table-8
Workers' Sources of Credit, Purpose, Amount (in ₹'000) and Rate of Interest (%)
Across Social Groups

Source	Caste/Category	Purpose	Loan Amount	Interest Rate	
SCB	OBC & OC	Productive	1 (65.0)	1 (14)	
		Un-productive	6 (403.3)	6 (17)	
		Total	7 (355.0)	7 (16.6)	
	Relli	Productive	4 (402.5)	4 (14)	
		Un-productive	11 (292.7)	11 (15.3)	
		Total	15 (322.0)	15 (14.9)	
	Madiga	Productive	1 (300.0)	1 (12)	
		Un-productive	2 (125.0)	2 (19)	
		Total	3 (183.3)	3 (16.7)	
	SC	Productive	5 (382.0)	5 (13.6)	
		Un-productive	13 (266.9)	13 (15.8)	
		Total	18 (298.9)	18 (15.2)	
Co-operatives	OBC & OC	Un-productive	3 (166.6)	3 (20)	
	Relli	Un-productive	5 (324.0)	5 (13.20)	
	Madiga	Un-productive	3 (198.3)	2 (19)	
	SC	Un-productive	8 (276.9)	7 (14.86)	
	OBC & OC	Un-productive	3 (73.3)	3 (12)	
SHGs	Relli	Productive	7 (29.3)	7 (11.86)	
		Un-productive	14 (47.1)	14 (12.21)	
		Total	21 (41.2)	21 (12.10)	
	Madiga	Productive	2 (20.0)	2 (8)	
		Un-productive	3 (50.0)	3 (12)	
Money Lenders	SC	Total	5 (38.0)	5 (10.40)	
		Productive	9 (27.2)	9 (11)	
		Un-productive	17 (47.6)	17 (12.18)	
	OBC & OC	Total	26 (40.6)	26 (11.77)	
		Productive	1 (150.0)	1 (60)	
		Un-productive	2 (50.0)	2 (36)	
	Relli	Un-productive	1 (30.0)	1 (60)	
		SC	Un-productive	3 (43.3)	3 (44)
		OBC & OC	Un-productive	10 (401.0)	10 (31.80)
	Friends & Relatives	Relli	Productive	3 (133.3)	3 (25.33)
			Un-productive	32 (196.7)	32 (39.25)
			Total	35 (191.3)	35 (38.06)
Madiga		Productive	2 (375.0)	2 (30)	
		Un-productive	14 (131.4)	14 (42.43)	
Finance Companies	SC	Total	16 (161.9)	16 (40.87)	
		Productive	5 (230.0)	5 (27.20)	
		Un-productive	46 (176.8)	46 (40.22)	
	Relli	Total	51 (182.1)	51 (38.94)	
		Un-productive	2 (90.0)	2 (36)	
Private Co-operatives	Madiga	Un-productive	1 (40.0)	1 (14)	
		SC	Un-productive	3 (73.3)	3 (28.67)
	Relli	Un-productive	1 (100.0)	1 (24)	
SC	Un-productive	1 (100.0)	1 (24)		

Source: Field Survey

NB: Numbers in brackets refer to loan amount (₹'000) and interest rate (%).

Ration cards were held by 80 per cent of households, 98 per cent (OC/OBC), 76 per cent (Rellis), and 80 per cent (Madigas); 82 per cent had white cards and 17

per cent pink. Only 32 per cent felt financially secure, with the figure lower among SCs (28%).

5.8. Social Capital

Social capital was low (Table 8), with most workers not part of workers' associations (51%), CBOs/SHGs (42%), or political parties (95%). Few held formal roles. Reasons included lack of awareness, interest, time, and trust in these bodies. However, members occasionally attended association and political meetings, and regularly participated in CBOs, finding some value in their involvement.

5.9. Living Standard Index (LSI)

Living Standards of worker households were assessed using 33 indicators across six key areas: housing, amenities, education, health, credit access, and income. Each area was equally weighted, with most indicators binary and others scaled to a maximum score of 1. Based on the Living Standards Index (LSI), households were categorised into medium and high living standards. Notably, 12 per cent of Madiga households and time-scale workers achieved high LSI scores, reflecting improved socio-economic status (Table 9).

Table-9
Distribution of Sewerage Workers According to LSI across Caste and Employment Status

Caste/Employment status	Medium LSI (11-22)	High LSI (>22)	Total
OBC & OC	15 (100)	0 (0.0)	15
<i>Relli</i>	55 (98.2)	1 (1.8)	56
<i>Madiga</i>	23 (88.5)	3 (11.5)	26
SC	79 (95.2)	4 (4.8)	83
Permanent	25 (100)	0 (0.0)	25
Time-scale	7 (87.5)	1 (12.5)	8
Contract	62 (95.4)	3 (4.6)	65
Total	94 (95.9)	4 (4.1)	98

Source: Field Survey;

Note: 1. Figures in the parentheses indicate the percentages of the total;
2. See Appendix 2 for the full list of the indicators used in arriving at the LSI.

5.10. Determinants of Living Standards

A regression equation to explain variations in Living Standards Index (LSI) is fitted with caste dummies (*Relli* and *Madiga*), dummy for multiple sources of income (MSI), Social Capital Index (SCI), Non-agricultural Land (NAGL; as proxy for asset ownership), Schemes' Awareness Index (SAI) and Schemes Availing Index (SAVI). The details are given below:

$$\text{LSI} = 17.12 - 1.024^* \text{Relli} - 2.05^{***} \text{Madiga} + 1.408^{***} \text{MSI} + 0.41^* \text{SCI} + 0.424^{**} \text{NAGL} + 0.118^{**} \text{SAI} + 0.227^{**} \text{SAVI}$$

$$R^2 = 0.24, F = 5.417 ***$$

*, ** and *** indicate significance at 10, 5 and 1 per cent level respectively.

The explanatory power of the regression equation is not very high—it is only 24 per cent, and suggests that there are factors other than those considered here which impact on the living standards of the sewerage workers. One glaring omission is, of course, the income of the household. However, since the estimated value of the R^2 is statistically significant (as evident from the estimated value of F), the independent variables chosen here to explain the variations in the dependent variable, need to be taken seriously.

The regression coefficients for *Relli* and *Madiga* communities turned out negative suggesting that their living standards are lower than those of OBCs/OCs. Key factors improving living standards include multiple income sources, stronger social capital, land ownership and awareness and availing of government schemes. The state should launch awareness campaigns through NGOs and support the formation of SHGs to promote collective action and better access to welfare benefits.

6. Social Safety Nets (SSN)

The study assessed worker awareness, access, and satisfaction regarding 25 welfare schemes under the Scheduled Caste Component (SCC). While awareness was high (76.7%), access remained limited, resulting in a Safety Net Index (SNI) of 55 per cent. Among those who accessed schemes, satisfaction was high at 90 per cent (Table-10).

Table-10
Indices of Awareness and Access of Welfare Schemes and SNI across Social Groups

Caste/Category	Welfare Scheme Awareness Index	Scheme Access Index	SNI	User Satisfaction Index
OBC & OC	0.7267	0.763	0.5542	0.922
<i>Rellis</i>	0.7804	0.736	0.5746	0.8863
<i>Madiga</i>	0.7615	0.749	0.5702	0.91
SCs	0.7744	0.740	0.5732	0.8938
Total	0.767	0.744	0.5704	0.8981

Source: Field Survey

Note: SNI is a product of Awareness Index and Access Index

7. Socio-Psychological Perceptions

7.1. Changing Social Relationships

Nearly 98 per cent of workers felt sewerage work was still viewed as “mean” by the public. Relations with VMC coworkers were mostly friendly (36%) or neutral

(59%). About 84 per cent described their ties with VMC officials as cooperative or functional, though 16 per cent found them authoritarian.

Over one-third believed others were open to being their neighbors, while 57 per cent were unsure. Most (80%) felt the SC community was open to marital ties with sewerage workers. While 43 per cent reported no violence against SC women, others were uncertain. Social discrimination in schools had declined, with 40 per cent saying such incidents no longer occurred. The details of these responses were presented in Table 11 below:

Table-11
Modernisation of Sewerage System has Improved the Image in the Society and Health of the Workers

Caste/Category	Not at all		To some extent		To a large extent	
	Number	Per cent	Number	Per cent	Number	Per cent
OBC & OC	1	6.7	13	86.7	1	6.7
<i>Relli</i>	5	8.9	51	91.1	0	0
<i>Madiga</i>	4	15.4	22	84.6	0	0
SCs	9	10.8	74	89.2	0	0
Total	10	10.2	87	88.8	1	1

Source: Field Survey

7.2. Effect of modernisation of Sewerage System

The mechanisation facilitated in image building and health of sewerage workers to some extent and such a view was endorsed by 90 per cent of the workers.

8. Stakeholders' Views on Working and Living Conditions: PRA/FGDs and Personal Interviews

The views expressed by the workers through PRA/FGDs and personal interviews methods are summarised and presented below:

8.1. Working Conditions

Despite the fact that nearly 80 sanitation staff, on an average, retire every year in the VMC, the Corporation has failed to fill these vacancies with new faces. There has been no recruitment of sanitation staff since 2010. Thus, Work load has increased due to expansion of city (new capital new govt. offices and business establishments); the government should enhance man power or recruit more staff besides regularising the services of the underground drainage (UGD) workers who have been working for more than 10 years.

8.2. The Contract Worker Payment Details

₹354.83 per day and a gross salary of ₹10644.9 for 30 days/₹13159 per month and net salary after the deductions is ₹9513.56.

Timely salary payment is crucial, as contract workers face delays of 10–15 days. Wages for those with over 10 years of service should be doubled, and contract workers' pay raised to ₹18,000/month (₹600/day). Salaries should be disbursed directly by VMC/Government to ensure regular, timely payments.

8.3. Problems of Time-scale Workers

Workers receive only salary and DA, with no HRA, retirement benefits, health cards, or ESI coverage. They are excluded from BPL welfare schemes. Salary increments based on seniority, benefits similar to other sectors, and 100 per cent fee reimbursement for their children are needed.

Most commute from distant areas, highlighting the need for subsidised or free transport. On duty, they often face stigma, being given water in discarded containers and struggling to rent homes due to their occupation.

Retired or unfit workers could be assigned to manage Sulabh complexes. Workers felt Swachh Bharat should also address their welfare by improving working and living conditions.

While some seek other jobs, many stay due to lack of skills or alternatives. They hope for job regularisation and a better future for their children.

8.4. Discrimination at Work Place

Some of the OBC and OC workers have degree or technical qualifications and their services are being availed in office work. But, for this, there is no caste-based discrimination in the work.

8.5. Mechanisation

To address sewer overflows in narrow lanes, VMC introduced Air Tech Machines and is procuring silt grabbers. An insurance cover of ₹10 lakh is being considered for accident victims.

Workers emphasised the need for formal training on machine use, maintenance, and problem-solving. Regular technical training, exposure visits, incentives, promotions, and evening education classes were also suggested.

Senior workers noted that machines reduce drudgery but stressed that manual intervention is still essential for effective sewer management.

8.6. Health Disorders and Health Care

The introduction of machines has reduced health risks, as workers earlier had to manually enter manholes, exposing themselves to filthy water and toxic gases. However, workers expressed dissatisfaction with government claims about distributing safety equipment, stating few actually received it.

They stressed the need for a dedicated Community Health Centre, free regular checkups, and priority medical care due to the hazardous nature of their work. Key demands include comprehensive health care, maternity and child care, PF, family benefits, housing, sanitation, injury compensation, retirement benefits, and insurance. They also called for skill development and education support through government and welfare agencies.

8.7. Awareness

There are no dedicated welfare schemes for sewerage workers, and most lack awareness of existing government and insurance schemes. Few know about SCC or how to access scheme benefits due to the absence of guidance. Some parents are now exploring educational schemes; around 60 per cent access pre-metric scholarships, but many miss out due to documentation issues and time constraints. Post-metric scholarship access is slightly better, as children often apply themselves.

In 70-80 per cent of families, children pursue higher education, mostly in English-medium private schools. However, many discontinue after secondary school due to poverty.

It is recommended that local NGOs educate workers on job rights, health awareness, and welfare schemes. Housing remains a key issue, as workers often face discrimination when renting. VMC should support their housing needs, either by liaising with the Housing/Social Welfare Department or providing staff quarters.

8.8. Social Capital

Most workers avoid caste and political associations due to lack of trust in their commitment to sewerage workers' welfare, along with limited awareness, interest, and time. Until 2017, there was no dedicated association for sewerage workers. After two workers died on the job, AISKAL leaders mobilised them to form the Vijayawada Municipal Corporation Underground Drainage Workers Association (VMC UGDWA), though it still lacks formal structure and regular activities.

8.9. Public Perceptions

Sewerage workers feel their profession is still socially stigmatized, leading many to live far from work sites and conceal their occupation, often identifying as VMC or Water Works employees. In some cases, daughters-in-law severed ties upon learning about their in-laws' work.

To avoid stigma, male workers avoid attending school meetings, sending their wives instead, fearing discrimination against their children. While some workers sense gradual social change, the public image of their occupation remains largely negative.

8.10. The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013 or M.S. Act 2013^v

VMC classifies UGD workers under the engineering section, not as manual scavengers, so they are excluded from rehabilitation benefits under the MS Act, which are given only to sanitation section workers.

Workers have limited knowledge of the MS Act, 2013, mainly that entering manholes is prohibited and compensation is given in case of accidents. No efforts have been made to educate them further. Despite the Act, workers continue manual entry due to malfunctioning machines and the need to remove blockages like stones and garbage manually.

8.11. Official Views

Engineering officials claimed that workers prefer manual methods and avoid using machines or safety gear, leading to health issues. However, workers stated that VMC has not provided protective equipment.

They cited reasons for not using machinery, including long-standing manual work habits, lack of training, and the perception that machines are time-consuming and difficult to handle.

9. Conclusions and Action Points

9.1. Conclusions

Most sewerage worker households are distress migrants from rural areas, driven by lack of skills and assets. Only 20 per cent are permanent employees, leaving 80 per cent with low wages and no job security.

Working conditions are poor, with long hours, health hazards, and limited bargaining power. Safety equipment is rarely provided, and despite mechanisation, manual work continues due to machine shortages, repairs, and narrow drains. Exposure to hazardous gases and poor healthcare access has led to high morbidity and low life expectancy, especially among time-scale and contract workers. The average Working Conditions Index (WCI) score was below 50 per cent.

In 2016–17, average monthly per capita incomes were ₹7,682 (OC/OBC), ₹6,786 (Rellis), and ₹6,609 (Madigas). None fell below the official poverty line, but using the state's BPL cut-off, 27 per cent of OC/OBC, 18 per cent of Rellis, and 23 per cent of Madigas were poor. Around 62 per cent felt economically insecure, and family members' contributions were crucial, especially among contract workers.

Although average income exceeded expenditure, 30 per cent of households spent more than they earned. Nearly 90 per cent were indebted, with

average debts of ₹3.2 lakh (OC/OBC), ₹2.5 lakh (Rellis), and ₹1.5 lakh (Madigas), often at high interest rates from informal sources.

Only 35 per cent owned homes; most lived in slums. Living standards were moderate, with Madigas and Rellis worse off than OC/OBC workers. Improving social capital, awareness, and welfare access could enhance their quality of life.

A Vulnerability Index using 23 indicators showed that 77 per cent of workers faced moderate vulnerability, especially contract and Madiga workers. Reducing dependence on intoxicants, expanding livelihoods, and ensuring access to schemes and ration cards can lower their vulnerability.

Most workers were unaware of the MS Act, 2013, and were not classified as manual scavengers. Public perception of their occupation remains poor, though mechanisation has slightly improved their societal status.

Thus, the study highlights the stark contrast between the essential nature of sewerage work and the appalling conditions under which it is performed. While initiatives like the NAMASTE scheme signal progress, implementation remains sporadic and exclusionary. Through detailed indices and field insights, the research underscores the urgent need for mechanisation, legal enforcement, financial inclusion, and dignity-based rehabilitation. Sustainable urban sanitation requires not just infrastructure, but the upliftment of those who maintain it.

9.2. Action Points for Improving Sewerage Workers' Conditions:

1. Raise and inflation-link salaries of contract and time-scale workers; provide annual increments as incentives.
2. Supply machines, safety kits, and formal training; conduct regular health check-ups during duty hours.
3. Increase manpower to reduce workload and sanction 12 paid leaves for healthcare and administrative needs.
4. Strengthen social capital through NGOs or VMC UGDWA; promote SHGs, skill development, and mobility to better jobs.
5. Prioritise housing, staff quarters, and ration cards; facilitate access to soft loans to reduce debt dependence.
6. Introduce state-funded comprehensive health and life insurance for non-permanent workers.
7. Allocate "Pay and Use Toilets" to retired, ill, or deceased workers' families for livelihood support.

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Endnotes

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ⁱⁱ The study was limited to 98 respondents due to constraints in time and access. Though efforts were made to capture representation across caste and employment types, some bias may exist, particularly as SC workers were oversampled for depth.

ⁱⁱⁱ Data related to financial status and health conditions were based on self-reported information, which may be subject to recall errors or reporting bias.

^{iv} Of the total 83 SCs workers only one worker belongs to *Mala* community. Hence, the sub-caste comparison under SCs was carried out *Relli Vs Madiga*.

^v GoI.2014

Appendix-1

Indicators of Working Conditions and Construction of Index (WCCI)

Indicators: 21

Sl. No.	Indicator	Measurement
Group A: Duration of Work & Wage Payments		
1.	Hours of work– day time	<8hours=1; > 8 hours= 8/x,x is number of hours
2.	Hours of work– nighttime	<8hours=1; > 8 hours= 8/x,x is number of hours
3.	Delays in wage payment	No delay=1; Delayed=0
4.	Mode of payment	Online transfer=1; Others=0
5.	Special allowance for over time	Yes=1; No=0
Group B: Provision of Safety Equipment		
6.	Safety gear	Provided=1; Notprovided /not fit for use=0
7.	Face Mask	Provided=1; Notprovided /not fit for use =0
8.	Goggles	Provided=1; Notprovided /not fit for use =0
9.	Liquid repellent	Provided=1; Notprovided /not fit for use =0
10.	Rubber boots	Provided=1; Notprovided /not fit for use =0
Group C: Safety at Work Place		
11.	Perceived safety	Reported score/max.score(5)
Group D: Health Disorders due to Work		
12.	Occurrence of skin diseases	Reported score/max.score(3)
13.	Cardiovascular degeneration	Reported score/max.score(3)
14.	Respiratory disorders	Reported score/max.score(3)
15.	Spinal problems	Reported score/max.score(3)
16.	Jaundice	Reported score/max.score(3)
17.	Trachoma	Reported score/max.score(3)
18.	Gastroenteritis	Reported score/max.score(3)
19.	Ear infections	Reported score/max.score(3)
20.	Communicable diseases	Reporteds core/max.score(3)
21.	Other diseases	Reported score/max.score(3)

Appendix-2

Indicators of Living Standards and Construction Index (LSCI)

Living Standards Index (LSI):

Components: Housing (H); *Education (E); *Skill & Vocational Training (SVT); *Health Status (H); *Credit Worthiness (C); *Income (I); *Savings and Insurance (SI)

Sl.No.	Indicator	Measurement
Housing		
1.	Ownership of house	Owned=1; others=0
2.	House type	<i>Pucca</i> -1; Semi-Pucca-0.66; <i>Kutcha</i> -0.33
3.	Location	Non-Slum-1; Notified Slum- 0.66; Non-Notified Slum – 0.33
Amenities		
4.	Access to tapped water	Yes=1; no=0
5.	Toilet within habitation	Yes=1; no=0
6.	Electricity	Yes=1; no=0
Education		
7.	Literacy of adults	No. of Literates/ No. of Adults
8.	Education level of adults	Sum of The Scores of Adults/No. of Adults (Primary-1/4; Secondary-2/4; Higher Secondary-3/4; Above-1)
9.	Child literacy	Children Going to School/No. of Children In 6-14 Yrs
Health status and Mortality		
10.	No infant deaths in last 5 years	Yes=1; No=0
11.	No adult deaths in last 5 years (other than age related and accident)	Yes=1; No=0
12.	No malnourished child	Yes=1; No=0
13.	Women having no anemia	Yes=1; No=0
14.	Women having no sickness	Yes=1; No=0
15.	Women having no skin disease	Yes=1; No=0
16.	Women having no chronic ailments	Yes=1; No=0
Credit worthiness		
17.	Can Get Hassle Free Loan	Yes=1; No=0
18.	Got institutional loan	Yes=1; No=0
19.	Got loan for productive purposes	Yes=1; No=0
Income		
20.	Multiple sources of income to household	Yes=1; No=0
21.	Feeling financially secure	
Savings and Insurance		
22.	Had a savings account (other than SHG)	Yes=1; No=0
23.	SHG account	Yes=1; No=0
24.	Covered under health insurance	Yes=1; No=0
25.	Covered under life insurance	Yes=1; No=0



CHILD FRIENDLINESS OF NEIGHBOURHOOD PARKS IN JAMMU CITY: AN INDICATOR BASED ASSESSMENT

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Abstract: Neighbourhood parks play a critical role in shaping children's physical, social, and emotional development, however, their child friendliness is often overlooked in urban planning. This study evaluates the child friendliness of 100 neighbourhood parks in Jammu City using a composite, indicator-based framework comprising four key dimensions: site suitability, accessibility, facilities and amenities, and safety and security. Data were collected through field surveys, structured observations, and systematic scoring of park characteristics. The findings reveal that, although accessibility to parks is generally strong, significant gaps persist in infrastructure quality and spatial placement. Safety conditions are moderate, but specific hazards remain widespread. The overall modal composite score of 3.75 indicates a moderate level of child friendliness across the city, highlighting the need for more intentional planning, targeted interventions, and child-centred design strategies to enhance the role of neighbourhood parks in fostering healthy urban childhoods in Jammu City.

Keywords: Child friendliness, child-friendly cities, neighbourhood parks, urban planning, Jammy City, urban green spaces

Introduction

Children represent a vital demographic group within urban populations, not merely as future citizens, but as active participants in the social, cultural, and spatial life of cities. Despite their distinct needs, they have traditionally been marginalised in urban planning and policymaking processes (UN-Habitat, 2017). Their mobility, access to public spaces, and opportunities for independent exploration are often constrained by adult-centric urban environments that

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prioritise efficiency, safety, and control over creativity, freedom, and play (Gleeson & Sipe, 2006). Recognizing children as competent social actors with unique perspectives is essential for designing cities that are not only liveable but also inclusive across all age groups.

Within this context, neighbourhood parks emerge as critical public spaces where children engage in physical activity, social interaction, and imaginative play. These spaces support physical activity, cognitive development, emotional well-being, and social interaction (Veitch et al., 2006; Ward Thompson et al., 2008). Parks are not only recreational spaces but also play a key role in promoting children's independence, agency, and sense of place within their communities (Lester & Russell, 2010). These spaces serve as extensions of home and school environments, offering opportunities for recreation, autonomy, and interaction with nature. However, the extent to which parks support children's needs depends largely on how child friendly they are.

The concept of child friendliness refers to the degree to which an environment accommodates the developmental, physical, emotional, and social needs of children. According to Riggio (2002), a child friendly city is "a system of good governance committed to fulfilling children's rights," including the rights to play, participation, protection, and access to essential services. For Malone (2001), child friendliness includes physical accessibility, safety, and opportunities for meaningful engagement in civic life. A truly child friendly space encourages exploration, fosters a sense of belonging, and enables children to actively participate in shaping their surroundings (Christensen & O'Brien, 2003). Child friendly environments are also characterised by elements such as proximity to home, inclusive design, diversity of play options, natural features, and perceived safety (Spencer & Woolley, 2000; Derr & Tarantini, 2016).

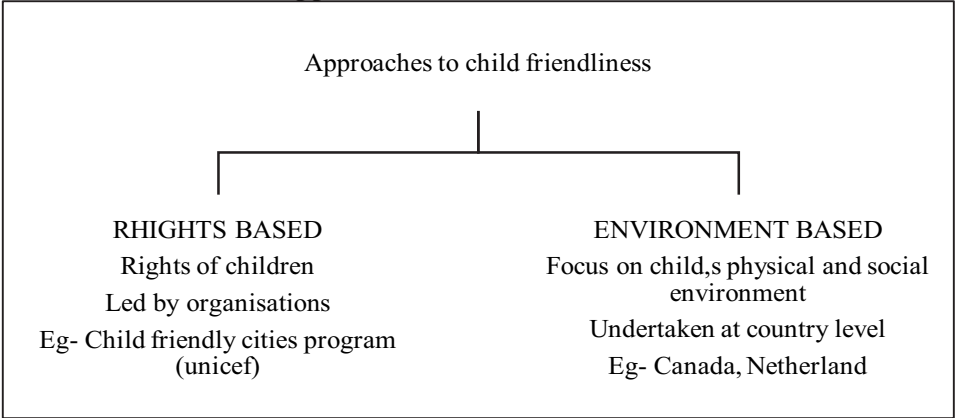
Two major frameworks guide the assessment and promotion of child friendliness in urban settings: the rights-based approach and the environment-based approach.

The rights-based approach is grounded in the United Nations Convention on the Rights of the Child (UNCRC), emphasising principles such as non-discrimination, the best interests of the child, survival and development, and respect for the views of the child. It advocates integrating children's rights into all aspects of urban governance, ensuring that policies and practices uphold and protect these rights. In alignment with this framework, the Child Friendly Cities Initiative (CFCI), launched by UNICEF in 1996, promotes the integration of children's rights into urban governance and planning.

The environment-based approach focuses on the physical and ecological aspects of urban environments that support children's development. Dr. Liisa Horelli's (2007) framework for evaluating Environmental Child Friendliness

(EFC) and the Bullerby Model by Kyttä (2003) emphasise access to safe, clean, and green environments, availability of age-appropriate play infrastructure, and neighbourhood designs that encourage independent mobility and interaction with nature. Recent guidelines by UN-Habitat (2017) and UNICEF (2023) further stress the importance of creating urban environments where children can safely play, learn, and grow.

Figure-1
Approaches to Child Friendliness



Source: Literature survey

These principles have been adapted into the Child Friendly Smart Cities framework and the National Institute of Urban Affairs (NIUA) guidelines, which include a comprehensive set of indicators to assess child friendliness in urban spaces. These indicators span multiple domains such as safety, education, mobility, environment, and governance, emphasising both physical infrastructure and institutional inclusion (NIUA, 2021). This framework encourages cities to reimagine urban planning through a child-centric lens, ensuring that the urban environment contributes positively to children’s growth and citizenship.

Urban green spaces, including neighbourhood parks, constitute a key component of the environment-based approach to child friendliness. Their role in supporting children’s physical, cognitive, and socio-emotional development has long been acknowledged. Urban green spaces like neighbourhood parks provide children with opportunities to play, create, relax, and reflect. Green spaces also contribute to a stronger neighbourhood social cohesion (Dimitrova et al., 2017).

A review of literature on child friendly neighbourhood parks reveals that common child-preferred features include play equipment, natural elements, and the presence of friends and family. Another recurring theme is concern related to safety, such as unfamiliar adults, inadequate lighting, and poorly maintained equipment (Valentine, 1997). Further, accessibility and location remain critical

issues. While proximity to parks is often used as a proxy for access, children's independent mobility is shaped by broader social and environmental factors — including traffic safety, walkability, and parental concerns (Kytä, 2004; Karsten, 2005).

In India, the concept of child friendly urban planning is still evolving. One of the early empirical studies on children's play environments in India was conducted in Nagpur (Bhonsle & Adane, 2016). The study examined neighbourhood play provisions and children's outdoor activity patterns and revealed that factors such as traffic and neighbourhood design influence children's play behaviour. Another important study examined child friendly characteristics of neighbourhood parks in Lucknow. Using participatory methods such as children's drawings and content analysis, the study explored how children perceived and experienced park environments (Agarwal, et al., 2021; Sehgal & Ogra, 2021). Dhar (2021), in a seminal study for the Observer Research Foundation (ORF), argued that Indian urban centres suffered from a "design deficit" that fundamentally excluded the youngest citizens. A recent case study from Rourkela by Panda & Das (2024), analysed the extent to which neighbourhood streets support children's mobility, safety, and play.

While planning initiatives such as the Nurturing Neighbourhoods programme emphasize integrating child-centric design principles into urban governance and planning processes across Indian cities (Van Leer Foundation, 2023), a significant gap remains: neighbourhood parks, despite their significance for children's development, remain under-examined through the lens of child friendliness. Addressing this gap, the present study evaluates neighbourhood parks in Jammu City using four core indicators of child friendliness: accessibility, site suitability, facilities and amenities, and safety and security. This assessment provides an evidence-based understanding of how well these parks serve the needs of children within the urban environment.

Research Objectives

The main aim of the study is to assess the child friendliness of neighbourhood parks in Jammu City using measurable indicators.

The specific objectives are:

1. To assess the site suitability of neighbourhood parks in terms of their location.
2. To examine the accessibility of the neighbourhood parks in terms of access from multiple directions.
3. To examine the availability of facilities and amenities conducive to children's play, recreation, and well-being.

4. To ascertain the level of safety and security for children in neighbourhood parks.
5. To derive policy insights and recommendations for enhancing the child friendliness of these parks.

Study Area

Jammu, often known as the “City of Temples” due to its dense network of shrines, serves as the winter capital of the Union Territory of Jammu and Kashmir. Local folklore traces the city’s beginnings to Raja Jamboo Lochan, who is believed to have lived around the 14th century BC.

Geographically, the city is situated between 74°24’–75°18’ E longitude and 32°50’–33°30’ N latitude, and had a recorded population of 5,02,197 as per 2011 Census. Located at an average elevation of 327 metres (1,073 feet), Jammu occupies an undulating ridge along the foothills of the Shivaliks. The Shivalik range forms the city’s northeastern and southeastern limits, while the northwestern side is marked by the Trikuta hills, renowned for the Shri Mata Vaishno Devi shrine. The city’s terrain consists of riverine valleys created by the Tawi, interspersed with plateaus, rolling slopes, and pockets of level land.

Jammu lies roughly 600 km north of New Delhi. The older part of the city is concentrated on the right bank of the Tawi River, whereas modern expansion has largely taken place on the left bank. Several bridges and flyovers now connect these two sections, with key links such as the Gandhi Nagar – Vikram Chowk corridor facilitating smooth movement across the river.

Some ongoing urban initiatives have indirectly contributed to improving children’s experiences in public spaces such as the “Adopt-a-Park” programme, the development of walkway parks with dedicated play zones under the Smart City Mission. However, these measures remain fragmented and not specifically designed with children as the primary focus. Therefore, there is a clear need for more focused, child-centred planning and targeted interventions to ensure that urban environments truly cater to children’s needs. The present study aims to examine the current state of child friendliness of parks in the Jammu City, providing a foundation for more focused child-centred planning in the city.

Methodology

Data Collection

The study adopts a quantitative research design to evaluate the child friendliness of neighbourhood parks in Jammu City. Out of a total population of 200 parks, 100 neighbourhood parks were selected across Jammu City through random sampling. The use of random sampling allowed for a balanced representation of parks across different wards and urban settings, capturing variations in planning

patterns, infrastructural provision, and spatial distribution. Further, selecting 50 per cent of the total population provided a sufficiently large and representative sample, enhancing the reliability and generalisability of the findings. Four primary parameters were selected to assess the child friendliness of the parks, namely site suitability, accessibility, facilities and amenities, and safety and security, representing the major dimensions of child friendly urban spaces. The selection of indicators was guided by an extensive review of the literature on child-friendly urban spaces and child-centred environmental design. The chosen parameters, site suitability, accessibility, facilities and amenities, and safety and security, represent key dimensions frequently identified in global and Indian urban planning guidelines as essential components of child friendly public spaces.

Each parameter was further subdivided into specific measurable indicators (Table 1), based upon which the indicators were assessed using a five-point ordinal scale (1 to 5).

For determining site suitability, park location was used as the primary indicator. Location of parks along primary, secondary and tertiary roads and their centrality in the neighbourhood were assessed. For accessibility, approach to the park from various sides was chosen as an indicator. Facilities and Amenities were evaluated on the basis of availability of play equipment, furniture and lamp post, dustbins, walking track, drinking water and toilets. Safety and Security concerns were ascertained by taking into account the presence of electric equipment/panel, uneven surfaces, stray animals, and open manholes in the parks (Table 1). Primary data were collected across the sampled parks on the chosen indicators through systematic field surveys and structured observation checklists.

Ethical considerations were observed throughout the data collection process. The study relied primarily on non-intrusive field observation of physical park environments and did not involve direct interaction with children or the collection of any personal or identifiable information. Observations were carried out in publicly accessible neighbourhood parks while taking care that the privacy and activities of park users were not disturbed.

Data Processing

For each park, indicator scores were aggregated to generate parameter-wise scores, which were then averaged to obtain a composite child friendliness score out of 5. Averaging was adopted to provide a simplified yet comprehensive representation of overall park performance, allowing comparison across parks. Further, all indicators were assigned equal weight because from the reviewed literature all of them emerged to be equally important dimensions of child friendliness. Additionally, no universally accepted framework exists that establishes hierarchical prioritisation among different dimensions of child

friendly environments. This comprehensive scoring mechanism allowed for a nuanced evaluation of each park's suitability for children, highlighting areas of strength and potential improvement across the urban landscape of Jammu. The standardised scoring criteria ensured consistency across sampled parks and reduced evaluator bias. However, though the ordinal scoring framework simplifies complex qualitative environmental conditions into numerical categories, it does not capture the exact extent to which one park performs better or worse than another. Parks were then classified into high, medium, and low level of child friendliness categories, with cut-off intervals determined from the highest and lowest observed scores to garner a picture of overall child friendliness. Spearman's rank correlation was used to analyse the relationship between each child friendliness parameter and the Composite Child Friendliness Score (CFS), thereby indicating the extent to which each parameter contributed to overall child friendliness of neighbourhood parks.

Data Analysis

Collected data were analysed using descriptive statistical techniques, including mean scores to generate composite child friendliness score and modal scores to get representative values for the whole data set, percentage distributions to understand the occurrence of each facility or condition across parks and range analysis to determine the variation in composite score.

Table-1
Scoring key for calculating composite score of child friendliness

Parameter	Score				
	5	4	3	2	1
Site suitability	Located on tertiary road and in the middle of a neighbourhood	Located on a tertiary road and not in the middle of a neighbourhood	Located on a tertiary road and not in the middle of a neighbourhood	Located on a secondary road and not in the middle of a neighbourhood	Located alongside a primary road
Accessibility	Approach from all sides	Approach from three sides	Approach from two sides	Single side entry defined	Single entry undefined
Facilities and amenities					
Play equipment, Furniture and Lamp Post, Dustbins, Walking track, Drinking and Toilets.	Combination of all 5	Combination of any 4	Combination of any 3	Combination of any 2	Only 1
Safety and Security					
Electric equipment/panel	None present	Any 1	Combination of any 2	Combination of any 3	Combination of all 4
Uneven surfaces, Stray animals, Open manholes					

Source: Author generated by reviewing literature

Results and Discussion

Site Suitability

Site suitability plays a crucial role in determining the child friendliness of neighbourhood parks. Park location within residential neighbourhoods influences independent mobility, frequency of park use, and parental perceptions of safety. Parks located centrally and on tertiary roads generally experience lower traffic risk and improve children's walkability and access to the parks. Such locations serve as ideal sites for neighbourhood parks. Parks located along primary and secondary roads are less suitable as these roads are marked by high traffic flows and thereby increase safety risks for children mobility. Similarly, parks situated at peripheral locations within neighbourhoods tend to discourage regular use, as they are often perceived as less desirable and unsafe for children's independent visits.

The observed site suitability scores of the neighbourhood parks ranged between 1 and 5. To facilitate structured interpretation, the scores were classified into three performance categories, low, medium, and high using equal interval classification based on the observed range. The resulting distribution revealed that 47 parks fell under the low category, 21 under medium, and 32 under high, suggesting that location remains one of the weaker dimensions of child friendliness (Table 2). Out of the 100 neighbourhood parks surveyed, only 15 parks were located on tertiary roads at the centre of their neighbourhoods, representing the most desirable and child-friendly siting. These were mostly concentrated in wards 50, 69, and 70. An additional 18 parks were situated on tertiary roads but lacked centrality. These parks were located in wards 9, 10, 12, 29, 39, and in wards 54, and 55. Meanwhile, 21 parks were located on secondary roads within the neighbourhood centre. These were located predominantly in wards 20, and 21.

The largest share, comprising 40 parks, was located on secondary roads but not in central locations. Such parks were primarily located in wards 21, 22, 23, with a few in wards 69, and 70. A small number, six parks, were positioned along primary roads, exposing children to heavy traffic and reducing the suitability of these parks for unsupervised or frequent child use. These were spread across different wards.

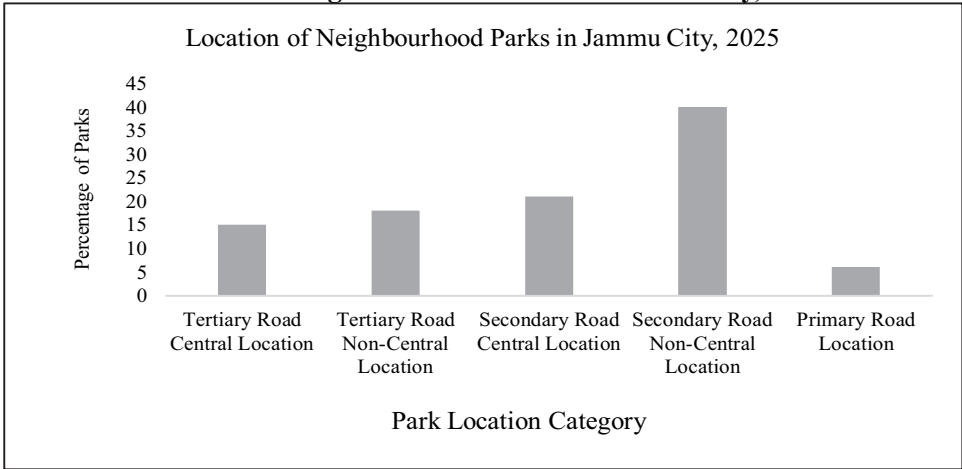
These findings indicate that only one-third of the parks were situated at the functional centre of residential clusters, where accessibility, walkability, and safety were naturally enhanced. In contrast, nearly two-thirds of the parks were located at the periphery, making them less visible, less reachable, and less likely to attract regular child visits.

Furthermore, two-thirds of the parks located along secondary and primary roads exposed children to traffic conflicts, noise pollution, and increased

safety risks, factors known to constrain and deter independent mobility and discourage parents from allowing children to visit parks alone (Figure 2).

The limited number of centrally placed and tertiary road parks reflected a weak spatial integration between park planning and neighbourhood design in Jammu City. Rather than being embedded as core community assets, many parks appeared to be placed in leftover spaces or along road edges, undermining their intended role as safe, accessible, and child-friendly recreational environments.

Figure-2
Location of Neighbourhood Parks in Jammu City, 2025



Source: Field survey, 2025

Accessibility

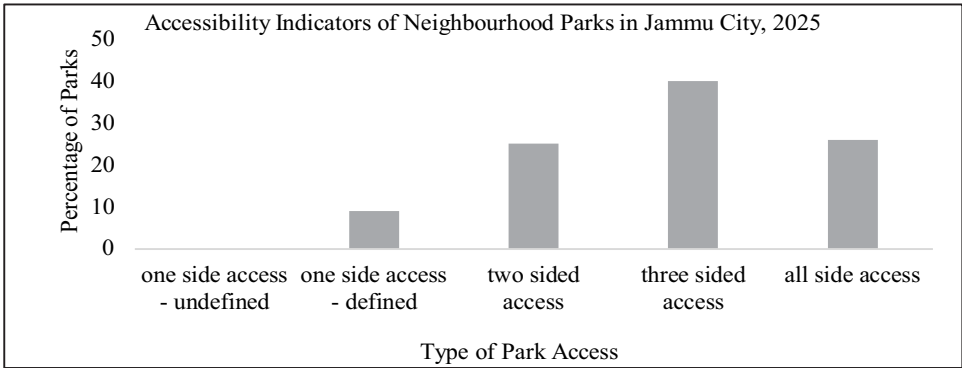
Accessibility is an essential component in examining child friendliness of neighbourhood parks as it determines the ease with which children can physically approach and use them. The degree of accessibility influences the frequency of park visits and independent mobility and walkability of children to parks. It also serves as a measure of inclusiveness with regard to park use. Parks that offer multiple entry and exit points are well integrated into the neighbourhood, as they can be accessed from multiple directions. These are also safer as they facilitate natural surveillance by parents, thereby improving both actual and perceived safety. Conversely, parks with restricted or poorly defined access often discourage regular use, especially among children who depend on proximity and ease of movement.

The observed accessibility scores of the neighbourhood parks ranged between 2 and 5. To facilitate structured interpretation, the scores were classified into three performance categories-low, medium, and high using equal interval classification based on the observed range. The resulting distribution revealed

that 10 parks fell under the low category, 22 under medium, and 68 under high, suggesting that accessibility represents one of the stronger dimensions of child friendliness across the surveyed parks (Table 2), reflecting relatively robust physical connectivity and ease of approach to most neighbourhood parks in Jammu City.

This indicates that parks, in general, were well linked to surrounding residential areas and were approachable through clearly defined entry points. Of the 100 parks assessed, 26 featured access from all four sides, 40 from three sides, 25 from two sides, and only nine had a single-side entry. Notably, no park lacked a defined entry point altogether. Parks located in wards 50, 69, and 70 were highly accessible while those in 20, 21, 22 exhibited a mixed bag of high, medium and low accessibility. The remaining parks exhibited moderate accessibility.

Figure-3
Accessibility Indicators of Neighbourhood Parks in Jammu City, 2025



Source: Field survey, 2025

The dominance of multi-side access with two-thirds of parks offering three or more approach sides indicates an open and permeable spatial layout. Such layouts not only enhance physical convenience but also contribute to greater visibility, surveillance which are crucial for encouraging children’s independent use.

However, the remaining one-third of parks with two or fewer access points highlights a lack of uniformity in spatial planning and integration with the built environment. Parks enclosed within built-up areas or surrounded by private plots often exhibit restricted entries, reducing their accessibility for nearby residents and consequently lowering usage frequency by children (Figure 3).

Overall, while accessibility remains a notable strength of Jammu’s neighbourhood parks, the one-third of parks with restricted entry points indicates

scope for improvement toward creating a more uniformly accessible and child-friendly park system.

Facilities and Amenities

Facilities and Amenities form the functional backbone of neighbourhood parks. The availability, variety, and quality of these determine the diversity of play options, engagement levels and duration of park visitation by children. Child-oriented facilities and amenities such as play equipment, drinking water, and sanitation infrastructure are particularly important as they support physical activity, social interaction, cognitive stimulation, and overall well-being. Parks devoid of adequate amenities demonstrate reduced recreational value and limit children's active play and exploration.

The observed amenities and facilities scores ranged between 0.5 and 4.5. To facilitate structured interpretation, the scores were classified into three performance categories, low, medium, and high, using equal interval classification based on the observed range. The resulting distribution reveals that 29 parks fell under the low category, 38 under medium, and 33 under high, reflecting a moderate but uneven provision of child-focused infrastructure across neighbourhood parks in Jammu City (Table 2).

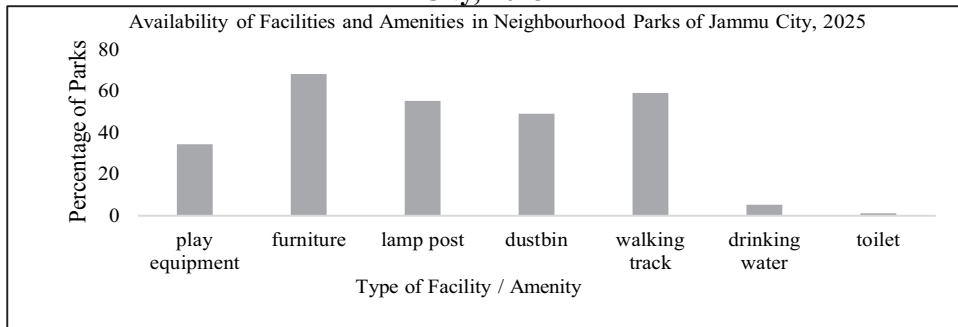
On average, all wards exhibited had a mixed share of high, medium and low performing parks with respect to amenities and facilities. There was no distinct ward-wise pattern except that parks of ward 50 were mostly better performing with regard to amenities and facilities.

The distribution of amenities showed a clear imbalance: while several general-use features were present, critical child-centric facilities remained severely lacking.

Core amenities essential for children's play and comfort were found in very limited numbers. Only 34 per cent of parks had any form of play equipment, which were mostly concentrated in wards 21, 50, and 53. Only five per cent of the parks provided drinking water, located in wards 20, 21, and 45. An extremely low, 1 per cent, offered toilet facilities and this single facility was in ward 20. These figures underscore a significant neglect of basic child-friendly infrastructure.

In contrast, features catering primarily to general recreational use, particularly for adults and the elderly were relatively more common. Seating furniture for seating were available in 68 per cent of parks, lamp posts in 55 per cent, dustbins in 49 per cent, and walking tracks in 59 per cent. Such facilities were distributed across various wards. The prevalence of these amenities suggests that park development in the city had historically prioritised passive recreation and adult use over active, child-centred engagement (Figure 4).

Figure-4
Availability of Facilities and Amenities in Neighbourhood Parks of Jammu City, 2025



Source: Field survey, 2025

This skewed distribution highlights a broader planning issue: neighbourhood parks in Jammu had largely evolved as multi-purpose open spaces rather than intentionally designed child friendly environments. The absence of essential facilities such as drinking water and toilets not only discouraged extended visits but also raised concerns about sanitation and comfort. Moreover, the limited availability of play structures restricted opportunities for physical activity, imaginative play, and social interaction, all of which are central to the developmental role of urban parks for children.

Safety and Security

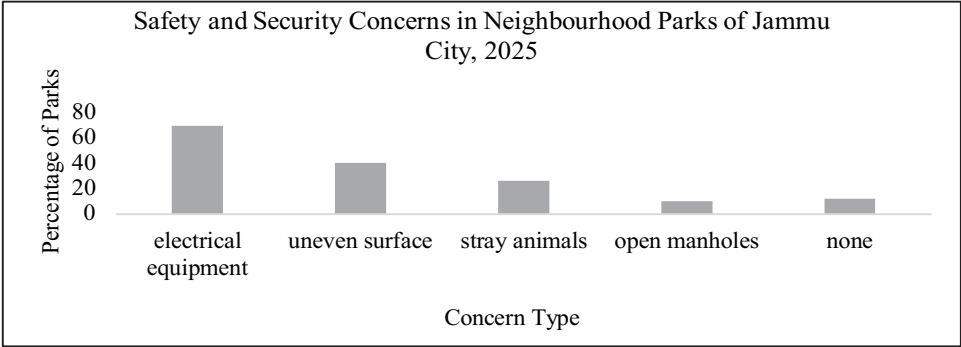
Safety and security are a critical dimension in measuring child friendliness of neighbourhood parks, as it directly influences children's freedom to play, explore, and interact independently. Safer parks free from structural hazards promote longer play duration, independent mobility, and unsupervised play activity. In contrast, the presence of hazards, poor maintenance, or environmental risks can transform parks into spaces of fear, discouraging visitation and restricting children's autonomy.

The observed safety and security scores ranged between 1 and 5. To facilitate structured interpretation, the scores were classified into three performance categories-low, medium, and high using equal interval classification based on the observed range. The resulting distribution revealed that 16 parks fell under the low category, 37 under medium, and 47 into high, suggesting relatively satisfactory internal safety conditions in a majority of parks, although a notable proportion still requires targeted improvements. (Table 2)

A closer examination, however, highlighted several safety concerns that could significantly influence children's comfort and actual usability of these spaces. Parks in wards 50, 69, and 70 accounted for the majority of high-scoring

parks with regard to safety and security, while all remaining wards had a mix of high, medium, and low performing parks.

Figure-5
Safety and Security Concerns in Neighbourhood Parks of Jammu City, 2025



Source: Field survey, 2025

The assessment revealed multiple forms of physical and environmental hazards. Electrical panels or transformers were present within or adjacent to 69 per cent of parks, indicating potential exposure to electrical risks and the need for regular safety audits and protective enclosures. This issue was particularly prevalent in wards 22, 50, 53, 69, and 70. Surface-related hazards were also notable, with 40 per cent of parks having uneven ground. These occurred predominantly in wards 20, 21, 53, and 55. Additionally, 10 per cent of the parks contained open manholes, located in wards 9, 10, 29 and some in ward 55. These hazards, uneven surfaces and open manholes, posed serious risks of tripping, falling, and physical injury, especially for younger children. Additionally, the presence of stray animals in 26 per cent of parks introduced another dimension of vulnerability, affecting children's sense of safety and discouraging independent or unsupervised play. This hazard was observed in parks located across various wards. Notably, only 12 per cent of parks were completely free from such hazards, pointing toward a broader systemic gap in risk mitigation and routine maintenance. These hazards-free parks were mostly located in ward 21 (Figure 5).

Table-2
Comparative Indicator Performance

Indicator	% Low	%Medium	% High	Overall Performance
Site Suitability	47%	21%	32%	weak
Accessibility	10%	22%	68%	Strong
Facilities & Amenities	29%	38%	33%	Moderate-weak
Safety & Security	16%	37%	47%	Moderate-strong

Source: Author generated

While the overall mean score appeared relatively positive, it masked localised vulnerabilities that could significantly impact children's day-to-day experiences. These findings underscored the need for continuous monitoring, structural safeguards, regular safety audits, and inspections.

Child Friendliness: A Composite View

The assessment of 100 neighbourhood parks in Jammu City revealed considerable variation in their child friendliness levels. Based on four core indicators, accessibility, site suitability, facilities, amenities, and safety and security, a composite score was calculated for each park. The composite scores ranged from 2.125 to 4.5 and the modal score of child friendliness was 3.75, indicating a moderate level of suitability for children's use. Spearman's rank correlation analysis was used to examine the relationship between different park attributes and overall child friendliness scores. The results indicated that all four parameters exhibited a positive association with child friendliness, though with varying strength (Table 3). Amenities demonstrated the strongest relationship with child friendliness ($\rho = 0.760$), suggesting that the availability and quality of play facilities and activity infrastructure played the most influential role in shaping overall child friendliness in neighbourhood parks.

Accessibility also showed a strong positive correlation ($\rho = 0.622$), indicating that the ease of reaching parks significantly enhanced their usability and attractiveness for children.

Site suitability exhibited a moderate positive relationship ($\rho = 0.526$), implying that site conditions contributed to child friendliness, but to a lesser extent.

Safety and security displayed a moderate correlation ($\rho = 0.512$), suggesting that while safety remained important, it did not emerge as the primary determinant of child friendliness within the study area (Table 3). Overall, the findings suggest that functional usability and physical engagement opportunities were stronger determinants of child friendly parks than environmental or contextual factors.

Table-3

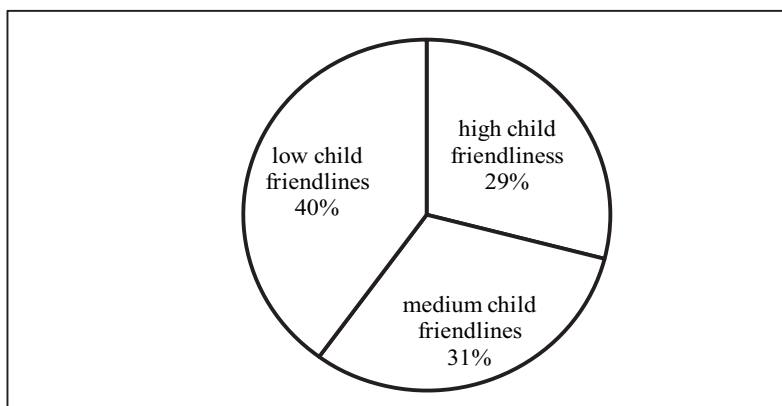
Correlation between Composite Child Friendliness Score and Parameters

Parameter	Correlation with Composite Score (Spearman ρ)
Site Suitability	0.526
Accessibility	0.622
Facilities and Amenities	0.760
Safety and Security	0.512

Source: Author generated

Based on these scores, the parks were categorised into three levels of child friendliness: high, medium, and low. About 29 per cent of parks fell into the high child friendliness category (Figure 6), reflecting environments that were largely conducive to children's needs and play activities. Parks scoring high on the Child Friendliness Index were largely concentrated in the southern and south-eastern parts of Jammu City. A prominent cluster was observed across wards 20, 22, 23, 42, and 44, with additional presence in wards 53 and 50, particularly within older planned residential neighbourhoods such as Gandhi Nagar and Channi Himmat. These areas are characterised by relatively organised layouts, better road hierarchy, and clearer integration between residential areas and public open spaces. The modal composite child friendliness scores further reinforced this spatial pattern. Planned neighbourhoods recorded a modal score of 3.25 compared to 2.5 in unplanned neighbourhoods, suggesting that parks located within planned residential layouts generally exhibited better child-friendly characteristics (Table 4). Apart from these clusters, isolated high-performing parks were also observed in wards 35 and 12, located closer to the older urban zones (Figure 7).

Figure-6
Child Friendliness of Neighbourhood Parks in Jammu City, 2025



Source: Field survey, 2025

About 31 per cent of parks exhibited moderate performance, suggesting the presence of some child friendly features but with noticeable scope for improvement (Figure 6). Medium-scoring parks exhibited a spatial pattern that frequently overlapped with high-scoring parks, especially within the same planned residential areas. Several medium-performing parks were spread across wards 20, 21, 22, 23, 29, 42, 45, 50, 53, 54, and 69. These parks, instead of forming a distinct geographical zone, were often located in close proximity to high-performing parks. This spatial overlap indicated that differences in child friendliness within these neighbourhoods were not primarily driven by location or

broader urban form, but by variations in park characteristics. Factors such as the uneven provision of play equipment, limited availability of drinking water and toilets, localised safety hazards, and inconsistent maintenance contributed to moderate performance despite favourable locational contexts. The presence of medium-performing parks in the vicinity of high-performing ones highlighted intra-neighbourhood disparities in park quality and underscored the role of design, management, and amenity provision in shaping children's experiences. In addition to these, medium-category parks were also observed in peripheral wards such as 52 and 69, indicating some targeted interventions in peripheral zones that may have improved overall park quality (Figure 7).

Two-fifths of parks fell into the low child friendliness category, indicating serious deficiencies in location, maintenance, and safety (Figure 6). These low child friendliness parks were predominantly located in peripheral areas of Jammu City, with a prominent concentration observed in Sainik Colony covering wards 69 and 70. Although Sainik Colony represents a planned residential neighbourhood, the low performance of its parks suggested that peripheral planned colonies which came up in later phases of urban expansion experienced gaps in park quality. Parks in these instances appeared to have been developed as formal land use provisions, with limited emphasis on child-oriented design, safety, and amenity provision. Peripheral wards including 55, 71 also reported low performing parks. This observation was further supported by modal score comparison, where parks located in core city areas recorded a higher modal score of 3.75, while parks in peripheral neighbourhoods recorded a lower modal score of 2.5, indicating spatial inequalities in park quality across the urban landscape (Table 4).

Additional low-performing parks were observed in central city wards including 9, 10, and 59, representing dense and mixed land use zones where spatial constraints, traffic pressures, and limited available open space affected park functionality and safety conditions for children. Further, low-performing parks were also identified in wards 20, 21, 22, 23, and 54 (Figure 7).

The analysis further suggested that parks located within economically stronger neighbourhoods generally performed better than the not so affluent ones. Parks across wards 20, 22, 23, 50, and 53 have a high child friendliness score and all correspond to the affluent Gandhi Nagar and Channi Himmat region. This analysis was supported by modal score comparison, whereby economically stronger neighbourhoods recorded a modal score of 3.75, whereas parks located in less affluent neighbourhoods recorded a comparatively lower modal score of 2.75 (Table 4).

Another notable observation across all wards was that high-performing parks were generally larger in size, allowing for the inclusion of diverse play infrastructure, landscaped open spaces, and safer spatial zoning of activities,

compared to smaller parks. This size-based variation was particularly evident in wards where both high and medium performing parks were located within the same residential catchment, namely wards 20, 21, 22, 50, and 53.

The overall spatial pattern of neighbourhood parks across different child friendliness categories revealed a clear disparity between the old and new city areas. Most of the parks in the old inner city area came under low and medium child friendliness category with just two parks that featured in high child friendliness category. Conversely, neighbourhood parks located in the newer city extensions lying on river Tawi’s left bank performed better across child friendliness indicators with majority of the parks in high child friendliness category lying on this side. The modal score comparison further substantiated this trend, wherein the old city recorded a modal score of 2.75, while the newer city extensions recorded a substantially higher modal score of 3.75 (Table 4). This suggests the influence of improved urban planning, better infrastructure, and enhanced service provision in neighbourhoods developed during later phases of city expansion.

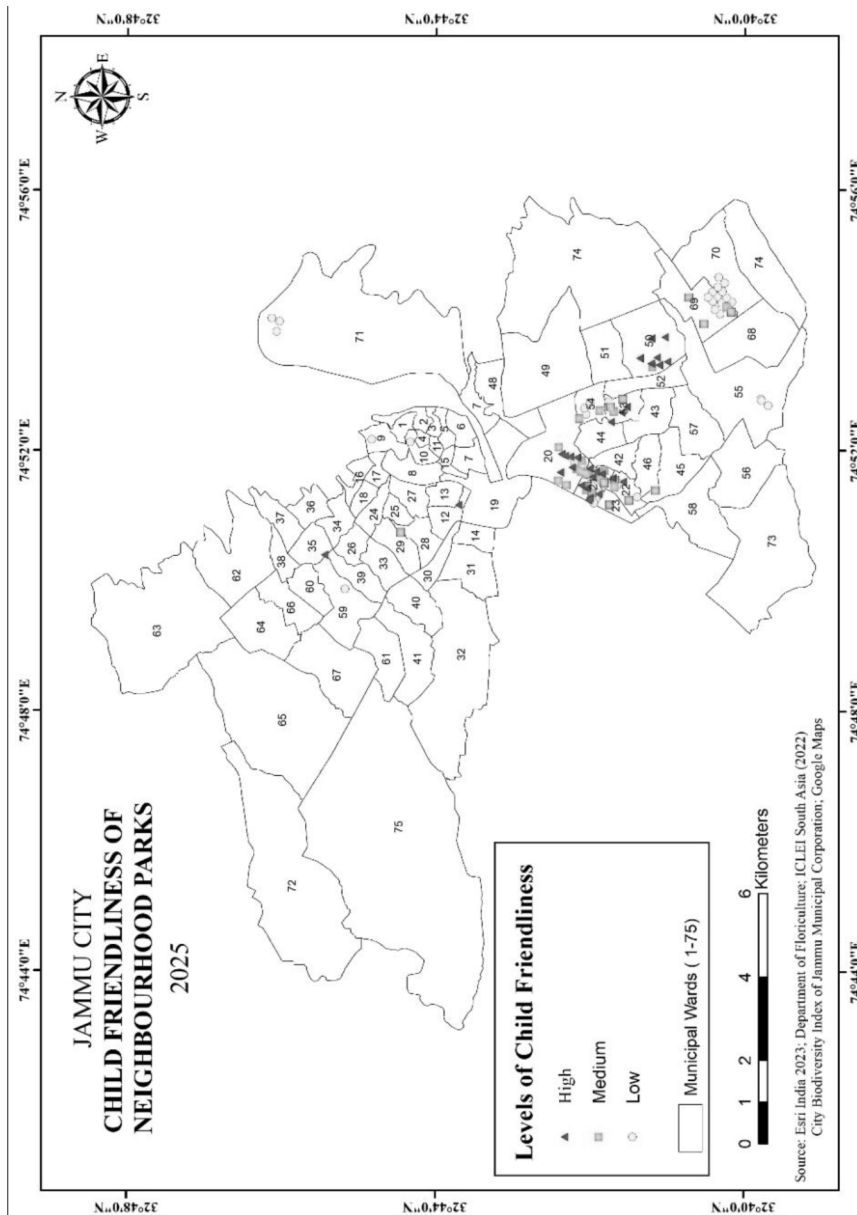
The moderate overall score suggested that although the city provided a reasonable play environment for children, it was not consistent in adhering to the necessary child friendly criteria in a consistent and holistic manner. The large share of parks in the low child friendliness category (40%) highlighted systemic issues such as inadequate facilities, poor spatial placement within neighbourhoods, and the presence of safety hazards. Even among the parks that scored in the medium category (31%), the performance was uneven, many parks offered only a few functional elements while lacking critical features such as drinking water and toilets. Overall, the findings pointed to gaps in design, maintenance, and policy integration, indicating that while Jammu City has made provisions for neighbourhood parks, these spaces do not yet fully align with the criteria necessary to support safe, accessible, and developmentally enriching environments for children

Table-4
Modal Composite Child Friendliness Scores of Neighbourhood Parks: A Spatial Comparison

Category	Modal score
Planned Neighbourhoods	3.25
Unplanned Neighbourhoods	2.5
Core City	3.75
City Periphery	2.5
Old City	2.75
New City	3.75
Higher Socio-economic Neighbourhoods	3.75
Lower Socio-economic Neighbourhoods	2.75

Source: Author generated

Figure-7
Spatial Distribution of Neighbourhood Parks in Jammu City by Child Friendliness Levels, 2025



Policy Prescriptions

The study, through a systematic assessment of 100 parks, provides one of the first empirical insights into the spatial and functional adequacy of recreational spaces for children within Jammu's urban fabric.

The overall modal child friendliness score of 3.75 indicates that the city's neighbourhood parks exhibit a moderate level of child friendliness. However, the distribution of parks across child friendliness categories, 40 per cent in low, 31 per cent in medium, and 29 per cent in high child friendliness categories, reflected significant variation in quality and planning attention.

To enhance the child friendliness of neighbourhood parks and align them with national and international best practices, the following recommendations are proposed:

1. **Reorient Park Siting and Design:** The analysis revealed that parks located along primary and secondary road corridors often scored lower on site suitability and safety parameters, as high traffic volumes restrict independent child mobility and increase accident risks. This was especially the case with the parks located in the new city extension areas even though they were overall better scoring. To address the issue, safe pedestrian connectivity, including zebra crossings, traffic -calming measures, sidewalks, and signage, should be prioritised to reduce mobility barriers.
2. **Infrastructure Upgradation and Maintenance:** Park assessment revealed that parks located in the peripheries of the city consistently lacked adequate amenities and facilities. Introducing minimum infrastructure standards for these parks, including at least one drinking water point, child-safe toilets, shaded play zones, and inclusive play equipment, should be mandated. Such improvement initiatives can be taken up under improvement initiatives under urban renewal and Smart City development frameworks.
3. **Safety Audits:** Safety and security indicators emerged as a critical concern in several low-performing parks. The concern was dominant in the parks located in the old city region. Institutionalising periodic child-specific safety audits can help identify and mitigate hazards such as exposed electrical equipment, uneven surfaces, stray animals, and open manholes.
4. **Develop Child Centric Park Design Guidelines:** The study findings indicated inconsistencies in park planning and design approaches across different parts of the city. This highlights the absence of standardised design frameworks specifically tailored to children's recreational and

safety needs. To address this gap, standardised child-centric park design guidelines should be developed that emphasises optimal accessibility, appropriate location within neighbourhoods, provision of essential child-focused facilities, and built-in safety measures, ensuring that all parks meet a consistent baseline of child friendliness.

Conclusion

The study highlighted that neighbourhood parks in Jammu city exhibited significant variation in their child friendliness. This variation stems from differences in facilities and amenities, safety and security conditions, accessibility, and site suitability.

While several parks functioned as important spaces of play, recreation, and social interaction for children, others are perceived as unsafe or inadequate due to poor maintenance, limited safety measures, or lack of play opportunities. The findings underscored the need for inclusive and child-centric urban planning, wherein neighbourhood parks, as important child oriented spaces, are prioritised and developed as safe, accessible, well-equipped environments that support children's overall well-being.

Note: This study did not require institutional ethical approval as it involved only observational data in public spaces.

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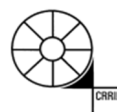
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REGIONAL COOPERATION IN CENTRAL ASIA AND INDIA'S ENGAGEMENT: STRUCTURAL IMPEDIMENTS AND STRATEGIC IMPERATIVES

Punit Gaur¹

Abstract: This article examines the structural determinants and geopolitical impediments to regional cooperation among Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan since the Soviet era. It focuses particularly on India's engagement with the region. The article references the Fourth Consultative Meeting of Central Asian leaders (2022) and the proposed Treaty on Friendship, Good-Neighbourliness, and Cooperation. It identifies five main obstacles to effective multilateral cooperation: sharp economic differences, fragmented institutions, unresolved border conflicts, different political paths, and a worsening water crisis. For example, Kazakhstan's GDP per capita is nearly eleven times that of Tajikistan. This inequality leads wealthier states to favour bilateral over multilateral arrangements. The Kyrgyz-Tajik border conflict, which became the deadliest military clash since independence in September 2022, delayed the ratification of the Treaty on Friendship. This outcome shows that bilateral disputes remain a primary barrier to broader regional agreements. The article also finds that elite-driven political consolidation, along with the return of the Taliban in Afghanistan and Russia's invasion of Ukraine, has increased pressure on Central Asian states and made coordinated responses more urgent. Regional organisations like CAREC, the SCO, the EAEU, and China's Belt and Road Initiative influence cooperation but do not fully address regional deficits. The article highlights India's increased strategic interest in Central Asia, seen in the first India-Central Asia Summit (2022) and the Delhi Declaration, which boosted cooperation in connectivity, trade, security, and culture. It concludes that long-term multilateral cooperation depends on the creation of new supranational institutions, the resolution of disputes, and fair resource-sharing, especially in water management.

Keywords: Central Asia, regional cooperation, multilateralism, geopolitics, water crisis, India-Central Asia relations, post-Soviet integration

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Introduction

During Soviet rule, the Central Asian republics were isolated from the rest of the world. Their economies were closely tied to the USSR. Many analysts believe living standards improved due to significant investments in infrastructure and human capital. However, these investments also brought environmental and cultural changes. After the Soviet Union collapsed in 1991, Central Asia became home to new independent states of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The region now has about 60 million people. Tensions among the countries have disrupted trade and weakened regional water and energy systems. Regional cooperation can be observed through multilateral efforts between Central Asian countries. The main question is: What are the obstacles to closer cooperation, and how can they be removed?

The newly independent Central Asian republics faced severe challenges. These included inexperience in state-building, border disputes, economic hardship, and ethnic tensions after the Soviet collapse. Following independence, Central Asian states could pursue integration when geopolitics favoured rapprochement. Between 1994 and 2005, they launched several projects: the Common Economic Space (Kazakhstan, Uzbekistan, Kyrgyzstan), the Central Asian Economic Community, and the Organisation of Central Asian Cooperation (Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan). Except for Turkmenistan, all four countries took part in regional cooperation. However, these initiatives failed to achieve goals such as free trade zones, customs unions, or currency and payment unions. Russia, China, and the US were not active in these processes.

Despite numerous integration initiatives, true rapprochement has not occurred. Most countries choose bilateral relations. The article explores why Central Asian states struggle with multilateral cooperation. It examines the reasons for Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan's reluctance to cooperate in a multilateral format. Factors include clashing interests among external actors, leadership competition between Kazakhstan and Uzbekistan, water policy disputes, and challenges to cross-border cooperation. The article analyses the steps Central Asian countries must take to establish effective multilateral cooperation.

Consultative Meeting: Determinant of Regional Cooperation

Regional cooperation in Central Asia has long been a goal, especially after the five republics gained independence in 1991. Despite early efforts through organisations such as the Central Asian Union, the Central Asian Economic Community, and the Central Asian Cooperation Organisation, these initiatives fragmented, leaving the region with mistrust and little practical progress in cooperation. In 2017, Uzbek President Shavkat Mirziyoyev's proposal for Consultative Meetings marked a significant shift, directly addressing this history

of fragmentation. With the support of all regional countries, the first Astana meeting in 2018 included Turkmenistan for the first time, signalling a unified approach. Since then, annual Consultative Meetings have become the main platform for resolving key issues in transportation infrastructure, energy, trade, water management, and digital connectivity, proving themselves as a catalyst for genuine regional cooperation.

Central topics at the recently held Fourth Consultative Meetings in July 2022, in Cholpon-Ata, Kyrgyzstan, included regional security, connectivity, cultural integration, trade, and economic partnerships. The five leaders expressed their concerns about the situation in Afghanistan. They considered developing a roadmap that envisages the ‘entire spectrum’ of the security agenda in Central Asia. The leaders agreed to continue close regional cooperation to promote long-term peace and the social and economic reconstruction of Afghanistan. They also focused on enhancing intra-regional cooperation, which would benefit all (The Diplomat, 2022).

At the meeting, the leaders emphasised the efficient use of transport corridors to unlock the region’s transit potential and improve connectivity along the North-South and East-West routes. They jointly explored several new transport initiatives. Turkmenistan proposed routes linking Central Asia to the Caspian Sea – Black Sea region and the Persian Gulf. Kyrgyzstan highlighted plans for the China – Kyrgyzstan – Uzbekistan railway to attract investment and strengthen transit capacity. Kazakhstan advocated further development of the Trans-Caspian International Transport Route, also known as the “Middle Corridor,” which gained renewed importance following the Russia-Ukraine crisis in February 2022. Kazakhstan also expressed interest in participating in the Mazar-i-Sharif – Kabul – Peshawar railway project to enhance South Asia-Central Asia connectivity.

To improve intra-regional economic integration, Central Asian leaders proposed forming a network of border trade and economic hubs. This system, called the “Unified Commodity Distribution System of the Central Asian countries,” would unite agricultural producers, exporters, importers, buyers, and logistics companies from the region and help exports to other countries. Leaders also called for digitalisation of the economic sector to cut costs and improve product competitiveness.

They discussed the implementation of joint hydropower projects for the mutually beneficial use of water resources of transboundary rivers, including the construction of Kambarata HPP-1 in Kyrgyzstan. This hydroelectric power plant will strengthen the energy security of Central Asian countries (News Central Asia, 2022).

Central Asian leaders also emphasised cooperation in culture and education. The Declaration on creating a single 'Central Asian higher education space' was adopted in the last meeting in 2021. At this meeting, leaders agreed to expand inter-university exchanges and further increase quotas for youth training in Central Asia (Euractiv, 2022). Cooperation in the field of higher education through the opening of branches of leading universities and a multilateral agreement on implementing youth policy were also discussed (Euractiv, 2022).

The leaders emphasised creating a 'single cultural space' in the region, characterised by composite, multifaceted interactions among Central Asia's cultural communities. They also discussed the further popularisation of Central Asia's famous spiritual and historical heritage, contemporary achievements in literature, art, and cinema, and the encouragement of cooperation between the creative intelligentsia. Kazakhstan suggested that, to establish a single cultural space, it is worth introducing an annual selection of a "cultural capital of Central Asia" (Kazinform, 2022).

The Fourth Consultative meeting endorsed several documents aimed at increasing regional cooperation. In the meeting, all five Central Asian countries approved the "Roadmap for Developing Regional Cooperation for 2022-2024", the "Regional Green Agenda Program for Central Asia" and the "Concept of Interaction between the States of Central Asia within the Framework of Multilateral Formats" (Kazinform, 2022).

Kazakhstan proposed a "Treaty on Friendship, Good-Neighbourliness and Cooperation for the Development of Central Asia in the 21st century". The Presidents of Kyrgyzstan, Kazakhstan and Uzbekistan signed the Treaty. However, Tajikistan and Turkmenistan decided to accede to this Treaty after completing their internal procedures. Kazakhstan also proposed that a meeting of the Foreign Ministers of Central Asian countries be held every six months to develop coordinated approaches to regional and international issues (President of the Republic of Kazakhstan, 2022).

Impediments to Regional Cooperation in Central Asia

Since the 2022–2024 Roadmap for Regional Cooperation was adopted and the Treaty on Friendship for Central Asia's development was proposed at the Cholpon-Ata summit in July 2022, both have faced implementation challenges. The Treaty, in particular, remains unratified by key member states. There are key structural challenges, including economic disparities, weak regional integration, border conflicts, political changes, and the water crisis, that have impeded regional cooperation in Central Asia.

1. Economic Asymmetry

A major barrier to lasting cooperation is the large economic gap between Central Asian countries. In 2023, Kazakhstan's GDP per capita was about \$13137, while Tajikistan's was only \$1,189 which is a ten-fold difference shaped by resource distribution and development paths (World Bank, 2024). Kazakhstan, Turkmenistan, and Uzbekistan have significant oil and gas reserves. Wealthier countries like Kazakhstan and Uzbekistan favour bilateral arrangements, while less affluent ones, such as Kyrgyzstan and Tajikistan, rely on remittances from Russia, which accounted for over 30 per cent of their GDP in 2022 (World Bank, Migration and Remittances Data, 2024). Natural resources dominate exports across the region, accounting for over 90 per cent in Kazakhstan and Turkmenistan (UN Comtrade, 2023). Unlike ASEAN, Central Asia lacks unified economic institutions, which limits progress on the roadmap's goals.

2. Integration Deficits

The 2022-2024 Roadmap was undermined from the outset by the lack of supranational institutions to enforce its commitments. While platforms like C5+1 have deepened dialogue, progress remains uneven. Institutional fragmentation persists: Kazakhstan and Kyrgyzstan are members of the Eurasian Economic Union (EAEU) and the World Trade Organisation (WTO); Uzbekistan is negotiating WTO accession; Turkmenistan remains outside most initiatives; and Tajikistan is a member of the WTO only. This lack of alignment hinders operationalising joint commitments, unlike the EU and ASEAN, which have made progress through strong institutions (Laruelle & Peyrouse, 2012). As a workaround, Kazakhstan and Uzbekistan signed the Treaty on Allied Relations in December 2022, which was ratified by 2024, establishing the Interstate Council and fostering bilateral unity in the absence of a broader consensus (Eurasianet, 2022a). While constructive, this approach risks deepening two-speed integration that could marginalise Tajikistan, Kyrgyzstan, and Turkmenistan.

Border Conflicts

The ongoing Kyrgyz-Tajik border conflict has been a primary reason for the Treaty on Friendship's stagnation. Despite Kazakhstan's expectations, the Astana summit yielded no progress due to Tajikistan's refusal to sign, citing unresolved border disputes with Kyrgyzstan. In September 2022, the deadliest military confrontation since independence erupted involving drones, helicopters, rocket launchers, tanks, and armoured vehicles, resulting in both military and civilian casualties. Tajikistan reported 41 fatalities and 20 injuries (Radio Free Europe/Radio Liberty, 2022). The hostilities concluded with border closures that left little prospect for negotiations. Tensions among national leaders shaped the atmosphere at Central Asian summits, while nationalist rhetoric on both sides intensified the dispute. Although a significant border agreement was concluded in

March 2025, unresolved issues from 2022 to 2024 obstructed the comprehensive adoption of the Treaty (The Diplomat, 2025). This situation underscores that successful multilateral agreements depend on resolving bilateral security concerns. Tajikistan's refusal to sign was a direct and logical response to its ongoing dispute with a fellow signatory.

4. Political Transformation

Since 2022, Central Asia has experienced a range of often divergent political developments that have complicated prospects for regional cooperation. In Kazakhstan, unrest in January 2022 prompted President Tokayev to initiate constitutional reforms described as a shift from a “super-presidential” system. Uzbekistan’s President Mirziyoyev introduced parallel reforms in 2023. Both administrations contended that these changes would strengthen parliamentary authority and improve rights, though, in effect, they consolidated executive power. Both presidents secured term extensions through referenda: Kazakhstan’s president may remain in office until at least 2029, and Uzbekistan’s until 2040. In Turkmenistan, a dynastic transition occurred in March 2022, when President Berdimuhamedow transferred power to his son, Serdar, who now faces significant economic challenges, including food shortages and inflation. In April 2024, Kyrgyzstan enacted legislation restricting foreign-funded NGOs, thereby limiting the scope for civil society and cooperation with the EU. These varying political trajectories—marked by power consolidation, dynastic succession, and democratic setbacks—have engendered an environment in which leaders prioritise regime preservation and sovereignty over transparency, a prerequisite for substantive treaty cooperation. Scholarly interpretations indicate that such reforms primarily aim to maintain incumbent leaders’ positions rather than advance democratic norms (Cummings, 2022; Heathershaw & Schatz, 2017). Additional analyses suggest that formal changes mask the persistence of informal power networks, with ruling elites leveraging both domestic institutions and transnational financial networks to consolidate authority (Cooley & Heathershaw, 2017; Lewis, 2021). Overall, political transformations in Central Asia remain elite-driven and continue to reinforce existing power structures.

5. Water Crisis

The water crisis is Central Asia’s most urgent shared problem and a major source of tension that has slowed the Treaty’s progress. Cross-border water cooperation is becoming a key challenge for the region’s future. In 2021, a long-standing border dispute between Kyrgyzstan and Tajikistan flared up again over irrigation, causing violent clashes that continued into 2022. The region faces a structural divide: upstream countries Kyrgyzstan and Tajikistan control the headwaters of the Amu Darya and Syr Darya rivers, while downstream countries Kazakhstan, Turkmenistan, and Uzbekistan rely on these rivers for farming. This creates a

zero-sum situation that simple diplomatic agreements cannot fix. Adding to the problem, Afghanistan's Qosh Tepa Canal project, started in March 2022, could divert up to 20 per cent of the Amu Darya's water (World Bank, 2023). Experts say water levels in eastern Turkmenistan were 70 per cent below average in June 2023, and that Uzbekistan and Turkmenistan are likely to suffer most (Eurasianet, 2023). Glaciers are melting, too, and by 2050, the Syr Darya's flow may drop 15 to 30 per cent, and the Amu Darya's by 21 to 40 per cent while water demand grows by 1 per cent each year (Siegfried et al., 2012). The 2022–2024 Roadmap named water cooperation a priority, but without strong enforcement, progress has been slow. The crisis mainly results from poor cooperation and a lack of formal agreements.

Determinants of Intra and Inter-Regional Cooperation

In Central Asia, many factors at the regional and interregional levels shape how cooperation operates. Economic integration remains a major goal for Central Asian countries, which want to harmonise trade policies and eliminate the economic fragmentation left by the Soviet Union. But ongoing border disputes between neighbouring countries make people less trusting and make it harder for products, people, and resources to travel freely. Changes in politics also change how the willingness and capacity of countries to cooperate. Changes in leadership and governance arrangements can either make it easier or harder for people to work together. The water issue, caused by rivalry over shared river systems such as the Amu Darya and Syr Darya, is a serious problem. It makes things harder among states, but it also forces them to talk to each other.

At the inter-regional level, international institutions and initiatives are the main ways that countries work together. The Central Asia Regional Economic Cooperation (CAREC) program provides an organised framework for trade and infrastructure development. The Eurasian Economic Union (EEU) strengthens economic relations between some Central Asian countries and Russia. The Shanghai Cooperation Organisation (SCO) strengthens the region's diplomatic and security ties with major powers such as China and Russia (Cooley, 2012). Through large infrastructure investments, the Belt and Road Initiative (BRI) has changed the way Central Asia connects to other parts of Eurasia (Laruelle & Peyrouse, 2013). These variables, both within and between regions, work together to create the complex framework in which Central Asian cooperation is negotiated and sustained.

Impact of Recent Geopolitical Developments on Regional Cooperation in Central Asia

The twin geopolitical shocks of 2022, the Taliban's consolidation of power in Afghanistan and Russia's full-scale invasion of Ukraine, profoundly reshaped the dynamics of regional cooperation in Central Asia.

The Taliban Dispensation in Afghanistan and Its Implications

A surprising development for the regional countries was the takeover of Kabul by the Taliban forces in August 2021, which happened about a week after their last Consultative meeting in Turkmenistan. The Taliban dispensation in Afghanistan creates many challenges, including terrorism threats to the region, extremism, drug and arms trafficking, cybercrime, and other cross-border organised crimes. Afghanistan is one of the extra-regional developments with security implications for the entire Central Asia, making regional cooperation quite significant.

The Russian-Ukrainian Crisis and Its Implications

Due to the ongoing Russia-Ukraine crisis, sanctions were imposed on Russia by Western countries, directly affecting Central Asian countries. The sanctions on Russia and Russia's counter-sanctions, which prevent access to European goods from reaching Central Asia via Russia, have affected the economic prospects throughout the region. The Central Asian countries, especially Kazakhstan, Kyrgyzstan, and Tajikistan, whose economies are closely linked to Russia's, are already facing various economic challenges. Russia is reaching out to its Central Asian partners in the Eurasian Economic Union (EAEU) to strengthen solidarity and discuss emergency measures to address the economic fallout from sanctions (Eurasianet, 2022b).

Out of five Central Asian republics, three countries, Tajikistan, Kyrgyzstan, and Uzbekistan, heavily depend on migrant remittances from Russia. The latest data from the World Bank shows that remittances account for 30 per cent of Tajikistan's gross domestic product, 28 per cent for Kyrgyzstan, and nearly 12 per cent for Uzbekistan (Kasturi, 2022). Almost one-third of Tajikistan's economy depends on remittances sent to their homeland by migrants earning rubles (Eurasianet, 2022c). Millions of migrant workers and their families from Central Asian countries in Russia could be affected by any further escalation in the Russia-Ukraine crisis (Eurasianet, 2022c).

Central Asian countries are observing the current Russia-Ukraine crisis with concern. They are cautious in their responses, urging both sides to take all the necessary steps to de-escalate the tension. Central Asian countries have already faced challenges due to the pandemic fallout, the situation in Afghanistan, and turmoil in Kazakhstan. Russia-Ukraine uncertainty will also have consequences for the region, and to mitigate them, regional cooperation among Central Asian countries is the need of the hour.

Indian Perspective

In continuation of India's engagement with Central Asia, India hosted the first-ever India-Central Asia Summit virtually on 27 January 2022. The Summit was an outcome of developing political understanding between the leaders of Central

Asian countries and India. The visit of Prime Minister (PM) Narendra Modi in 2015 to all five Central Asian countries was a milestone in amplifying engagement between India and the region. In recent years, high-level exchanges between the two sides have intensified. There has been a mechanism for the India-Central Asia Dialogue at the foreign minister level since 2019. New Delhi also hosted the Regional Security Dialogue on Afghanistan at the level of National Security Advisors in November 2021, attended by all Central Asian countries. The First India-Central Asia Summit was held against the backdrop of changing geopolitical conditions in the region. People-to-people contacts, energy, and regional security and connectivity are among India's foremost reasons for engaging the Central Asian region, reflecting the broader strategic logic of India's new regionalism in Eurasia (Das Kundu, 2017). The current situation in Afghanistan and the region's broader geopolitical and geostrategic landscape require both sides to overcome common challenges.

At the first Summit, India and Central Asian countries proposed a roadmap to strengthen cooperation for the next thirty years. PM Modi highlighted "Central Asia is Central" to India's vision of an integrated and stable extended neighbourhood (The New India Express, 2022). A comprehensive "Delhi Declaration" was adopted by both sides to reckon mutual interest. It has been decided to hold the Summit-level meeting every two years and to establish the "India-Central Asia Centre" as the Secretariat in New Delhi to continue inclusive partnership through the India-Central Asia Summit. Following, are some of the major initiatives with particular reference to political engagement, regional connectivity, security, energy, cooperation, trade and investment and cultural and tourism, that India and Central Asian countries took:

Political Engagement: With the ongoing India–Central Asia Dialogue mechanism at the Foreign Ministers' level, both sides decided to extend the dialogue to the Trade and Cultural Ministers' level at regular intervals. India and Central Asian countries also proposed a "India-Central Asia Parliamentary Forum" to enhance political engagements (Ministry of External Affairs, 2022a).

Cultural Engagement: India proposed commissioning a 'Dictionary of Common words' used in India and Central Asian countries, and the Buddhist exhibition in all five Central Asian republics would also enhance cultural ties between the two sides. Under the capacity-building programme, India will host a 100-member youth delegation from the region annually, offer professional training programmes for diplomats, and provide additional training slots and scholarships to Central Asian countries, thereby strengthening cooperation and engagement with the region, especially through people-to-people contact (Ministry of External Affairs, 2022b).

Trade and Investment: Many sectors have been identified, such as medicine, healthcare, pharmaceuticals, education, information technology, infrastructure,

agriculture, energy, space industry, textiles, gems and jewellery, where significant potential can be realised through intensive efforts. Both sides also proposed to create an India-Central Asia Investment Club under ICABC (India-Central Asia Business Council) to endorse investment opportunities. India and Central Asian countries would like to start cooperation between specialised national institutes, especially in information technology, renewable energy, finance, digital and advanced technologies. Increased demands for digitalisation and e-Governance also encouraged India and Central Asian countries to propose establishing an "IT/ITEC Task Force" between organisations, parks, and companies on both sides to work in this direction. Both sides also discussed the healthcare sector. Central Asian countries invite leading hospital chains to consider opening branches of their multi-specialty hospitals and diagnostic clinics, given the increased medical tourism from this region to India (Ministry of External Affairs, 2022b).

Connectivity: The lack of direct land connectivity impedes trade and investment between India and Central Asian countries. Connectivity was one of the important topics of the first India-Central Asia Summit. India has proposed establishing a Joint Working Group on Chabahar Port to discuss the free movement of goods and services and achieve its potential. All five Central Asian countries agreed to India's proposal to include Chabahar Port in the International North-South Transport Corridor (INSTC). Turkmenistan proposed including the Turkmenbashi Port within the INSTC framework and stressed the importance of the TAPI gas pipeline project, while India also hailed the interest of Central Asian countries in utilising the services of the Shahid Beheshti Terminal at Chabahar Port to facilitate trade between the two sides. Both sides also agreed to undertake initiatives to further develop transit and transport potential, improve the logistics network, and encourage joint efforts to establish regional and international corridors (Ministry of External Affairs, 2022a).

Regional Security: PM Modi reiterated that mutual concerns and objectives are vital to regional security, particularly in the current situation in Afghanistan. Both sides took steps regarding Afghanistan's situation and its impact on regional security and stability, including establishing the Joint Working Group on Afghanistan, holding regular meetings of Secretaries of the National Security Councils, and conducting joint counter-terrorism exercises between India and Central Asian countries. India and Central Asian countries also discussed the "Delhi-Regional Security Dialogue on Afghanistan", which was a crucial step toward addressing common challenges of terrorism, extremism, and radicalisation and toward establishing a "regional consensus" for a "World free of Terror" (Ministry of External Affairs, 2022c).

Since the early 1990s, Central Asian countries have been looking to India for a fruitful partnership to support their economic diversification and social

development. The 30th anniversary of diplomatic relations between India and the region's five republics provides an impetus to strengthen cooperation based on mutual interests, understanding, and friendship. India is making constructive and earnest efforts to engage with Central Asian countries. Engagement through the first India-Central Asia Summit would allow both sides to meet immediate challenges. The measures announced at the Summit indicate the practical steps taken by the two sides to achieve tangible outcomes. The Central Asian countries positively addressed India's concerns about terrorism, extremism, and radicalisation within the framework of regional security. The connectivity issue is of mutual interest to both sides. Central Asian countries would like to connect Central Asia to the entire South Asia region and acknowledge India's role in this direction. The first India-Central Asian Summit can be described as a multilateral framework to transform the "Connect Central Asia Policy" into the "Act Central Asia Policy".

Conclusion

Since the dissolution of the Soviet Union, limited inter-state cooperation among Central Asian republics has constrained the region's developmental potential. Nonetheless, regional engagement has shown an upward trend in recent years. Central Asian heads of state have advanced comprehensive intra-regional cooperation by deepening bilateral diplomatic relations and institutionalising Consultative Meetings. This cooperation spans political, trade, economic, cultural, humanitarian, and international dimensions. The Consultative meeting framework remains the only dedicated regional platform for Central Asian states to deliberate on and collectively address shared challenges.

Contemporary Central Asia is undergoing a profound structural transformation. At the same time, it confronts an array of shared geopolitical, security, and economic challenges. The interconnected nature of these issues makes a collective, region-wide approach imperative for effective mitigation. The viability and depth of cooperation in Central Asia depend on strong intra-regional collaboration among all five states. The Fourth Consultative Meeting illustrates the Central Asian states' commitment to building a 'five-sided' multilateral framework as the foundation for regional cooperation.

Structural and historical factors highlight the need for regional cooperation to sustain economic development in Central Asia. The communication, transport, and energy infrastructure from the Soviet era was conceived as an integrated, supranational system. Its effective operation requires coordinated, region-wide governance, not fragmented national management. Transboundary environmental challenges, such as water scarcity, land degradation, and the Aral Sea crisis, also demand cooperative solutions. The region's collective market offers a comparative advantage over smaller, isolated economies. It can remove trade and transit barriers, making the region more

attractive to both domestic and foreign investors. Harnessing regional cooperation to access external markets offers Central Asian states a strategic opportunity for global economic integration.

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