

Mobility in the Margins: Economic Opportunity and Intergenerational Change in Semi-Urban India

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Abstract:

Introduction: Mobility constitutes a key metric in assessments of equity. Most existing studies focus on either metropolitan or rural areas of India. Research on semi-urban districts in India remains limited. Few studies address the factors that determine economic mobility in semi-urban regions.

Methods: This study uses a mixed-method approach to examine the interaction among structural factors, spatial conditions, and individual aspirations that determine economic mobility in semi-urban India based on analyses of national datasets from semi-structured interviews and perception-based questionnaires.

Results: The results from 90 interviews and perception surveys in selected districts of Uttar Pradesh, Bihar, and Madhya Pradesh, showed digital and educational access, as well as bureaucratic documentation, are significant predictors of upward mobility.

Discussion: In contrast, climate vulnerability and caste are significant predictors of limited mobility. Individuals' aspirations mediate the effects of these factors. A comparison of two cases Bhagalpur and Indore indicates differing impacts of these factors on economic mobility.

Conclusion: Policy frameworks ought to integrate digital equity, climate resilience, bureaucratic transparency, and mechanisms to support aspirations. This study presents a replicable model for inclusive development planning and underscores the need for region-sensitive interventions rather than one-size-fits-all national strategies.

Keywords: Economic mobility, intergenerational opportunity, semi-urban India, digital public infrastructure, gig economy, climate vulnerability, social capital.

1. INTRODUCTION

Economic mobility is not a factor that indicates individual success as much as a national equity measure. The results of the Opportunity Insights data that was conducted by (Chetty *et al.*, 2014) across the United States suggest that the economic status of an area at one point is strongly linked to the regions and this outcome can be determined to a great extent. The analysis conducted by (Chetty *et al.*, 2014) shows that the economic success of a person is predominantly determined by the neighbourhood (Chetty *et al.*, 2014). Mobility studies, therefore, have no longer concentrated on income but have made the emphasis on access to schools, social networks, and trust on institutions. The book *Frontiers in Sociology* maintains that spatial contexts, like it is for schools, transportation and communal identity, within nations tend to influence policies

and as a consequence, measuring mobility requires more localised, finer-grained indicators of development.

Even with the increase in GDP and technological potential, India still records endemic wealth inequalities and social immobility especially on caste and religious basis. According to (Asher *et al.*, 2022), there has been an increase in aggregate mobility, but Scheduled Castes (SC) still experience structural disadvantages. Educational access remains stratified by caste hierarchies (Deshpande, 2011). Indicatively, the education, which is the main mobility distributor, has yet to be translated into intergenerational mobility. When considering both inter- and intragenerational caste and gender effects at the household, community, and institutional levels, (Asher *et al.*, 2024) discover that daughters of the bottom half of the Indian educational distribution achieve much less upward mobility than their counterparts in the United States.

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Urban centres are typically recognised as planned loci of social mobility; however, semi-urban centres continue to be little studied and poorly characterised. Semi-urban centres exist within a governance structure that is framed as a rural-urban binary. Millions of people undertake unpaid, informal labour yet are omitted from national migration studies and migration policy (Mohanty & Wadhawan, 2021; Arora, 2023). Accordingly, this situation prompts two fundamental questions: what enables economic opportunities to thrive in semi-urban India, and what constrains them? In what ways does this them get transposed across generations?

This study examines the digital divide, climate vulnerability, and governance patterns in semi-urban districts, addressing three questions: whether residents can or will acquire the digital capacity required to participate in an app-based economy; how climate change modifies livelihoods; and the degree to which public administration remains effective across varying levels of vulnerability (World Bank, 2022; Aayog, 2022; DST, 2020).

2. RESEARCH GAPS

This study both identifies and addresses three principal gaps in the literature. First, mobility research predominantly examines metropolitan areas or rural poverty; studies of semi-urban spaces are scarce (Datta & Rajan, 2024). Second, intergenerational research on income or education among low-income families commonly overlooks digital access as well as broader dimensions of climate vulnerability and aspirational transgenerational dynamics (Kishan & Rajverma, 2024). Third, there are a few models that integrate quantitative and qualitative data specifically designed for public policy use (UNESCO, 2024). We address these gaps through a mixed-methods approach that combines household statistics, employment patterns, and measures of digital access with questionnaires and interviews to produce a model capable of informing policy recommendations for domestic and international development goals.

2.1. Analytical Framework Overview

The study utilises an integrated analytical framework and does not attempt to advance new theoretical propositions. We synthesise existing literature on mobility into two structural layers, with aspirations serving as the mediating mechanism:

- Layer 1: Structural-Spatial Constraints (Integrated) integrates structural elements (caste, gender, bureaucratic, and climatic vulnerabilities) with spatial elements such as location, infrastructure, and digital access.
- These processes operate concurrently rather than in isolation. We measure these through the following indicators: district-level caste distribution and gender ratios; climate-vulnerability indices (DST, 2020; Mohanty & Wadhawan, 2021); penetration rates (NDAP); and transportation infrastructure.
- Layer 2: Aspirations as the Mediating Mechanism Guided by (Appadurai, 2004; and Ray, 2006), we regard aspirations not as direct predictors but as mediating variables that shape the ways individuals interpret and

respond to structural-spatial constraints. We evaluate this proposition using the following methods: Perception surveys designed to measure discrepancies between expected and actual mobility. In-depth qualitative narratives that reveal aspiration-constraint interactions

- Our Contribution: This framework synthesises existing theories (Bourdieu, 1986) social capital, (Sen, 1999) capabilities approach, and spatial inequality models into a region-specific analytical tool for semi-urban India, rather than creating new theoretical constructs.

2.2. Semi-Urban India Mobility at the Frontier

Despite the rapid transformation of semi-urban areas, research on their mobility remains limited. They are characterised by several defining features. These areas host hybrid labour markets where informal employment overlaps with agriculture and small- to medium-sized industry. In these contexts, employment frequently operates outside formal systems, exhibiting low capitalisation and weak demand for transportation. Another problem is fractured governance. Governance, though exercised by panchayats and municipalities, lacks accountability which is witnessed when things go wrong. Digital inequalities have become persistent. These areas have not been equally covered by digital public infrastructure projects like Aadhaar and UPI. The availability of the internet in these regions is patchy, with huge disparities between women and low-income families. Most of these semi-urban regions are located along the Ganges and the Brahmaputra. Flooding takes place annually in this region and seasonal droughts also destroy livelihoods and lead to migration. According to (Arora, 2023; and Mohanty & Wadhawan, 2021), over 80% of India's population resides in districts impacted by climate change.

2.3. Conceptual Framework

The study's conceptual framework is illustrated in Fig. (1). The structural, mobility-enabling, and aspirational influences form a conceptual hierarchy; nevertheless, my regression model seeks to identify predictors of mobility outcomes. Aspirational influences, identified through storytelling and perception surveys, function as mediators within the overall framework.

2.4. Target Regions

We chose the study locations in accordance with four criteria that include availability of mobility data, digital equity indicators, rankings of climate susceptibility, and demographic heterogeneity.

The classification should be clarified. This paper uses the term semi-urban district to denote those districts that exhibit a rural-urban mix operationally defined as those districts (a) in which (b) a substantial part of the labour force is still engaged in agriculture or informal non-farm activity, and (c), which have a system of governance which is a mix of panchayat and municipal governmental structures. Such an operationalisation goes in line with the characterisation by (Aayog, 2022) of an emerging town and peri-urban area, and with the administrative units of the SECC in the districts.

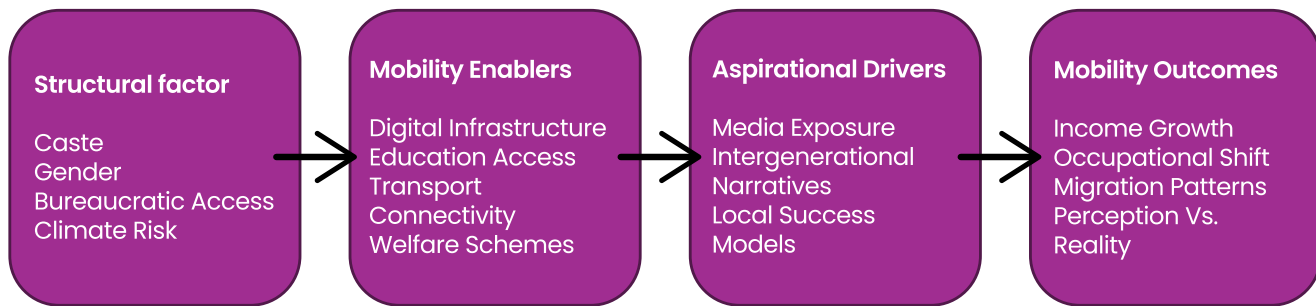


Fig. (1). A conceptual framework illustrating the mechanisms of economic mobility in semi-urban India.

It is based on this that Lucknow (UP) and Indore (MP) are districts comprising many blocks situated outside the city boundaries. Mohanlalganj and Bakshi Ka Talab, which are the peripheral blocks in the Lucknow district, are classified as semi-urban or rural. The focus on the non-municipal and rural blocks is given in the Indore district. Gonda (UP), Bhagalpur (Bihar), and Satna (MP) do not have major urban centers, hence they are considered to be semi-urban in all the four criteria.

The mapping of these places in Uttar Pradesh, Bihar, and Madhya Pradesh is also a way of giving a geographical background to the framework of analysis and are highlighted in Appendix Fig. (A1).

3. METHODOLOGY

This paper employs a mixed methods design to analyze the economic mobility in semi-urban India based on quantitative data of households and qualitative research of semi-structured interviews and perception questionnaires. The analysis explores the results of intergeneration and specifically explains the factors specific to the region, access to digital, climate vulnerability, and effective governance.

3.1. Study Design

This paper presents a mixed-methods approach for investigating economic mobility in semi-urban India. The quantitative analysis relies on nationally representative datasets (PLFS, SECC, NDAP), perception surveys, and ninety interviews conducted in selected districts. This study seeks to address the theoretical and empirical gaps in the literature on mobility in India. Using a mixed-methods approach (Creswell & Plano Clark, 2018), we examined economic mobility. The study aims to furnish policymakers with insights and recommendations that facilitate systematic and planned access to knowledge and economic development in semi-urban India. Based on the selected districts in relation to the available literature, we chose three states to focus on: Uttar Pradesh, Bihar, and Madhya Pradesh. In each state, we selected 3-5 districts each according to the following three criteria.

This purposive selection enabled observation of how spatial and structural factors influenced semi-urban mobility outcomes across diverse contexts.

3.2. Sampling Strategy

A stratified purposive sampling methodology was employed in conducting the fieldwork to ensure that the

sampling was diverse in terms of generational difference and job. We stratified the respondents in three categories within each district and imposed the stratification of the districts to provide the correct representation of the key demographic and economic stakeholders.

The groups of seniors (born ≤ 1968), middle (born 1969, 1986), and young (born 1987 or later) formed the generational cohorts. We also evaluated intergenerational mobility trends as part of the study and hence defined cohorts to understand how the opportunities that some groups had experienced over the years differed with that of other groups.

Agriculture, the gig economy, and informal employment were the identified occupational categories. Such types fit well since the semi-urban labour market is hybridised and the agricultural sector is strong. Moreover, the rise of the digital economy and informal work opportunities frequently creates supplementary employment dimensions (Sharma & Sharma, 2025).

Gender was either a male, female or non-binary where suitable. Gender distribution can be understood in order to examine gendered trends in mobility and access to opportunity.

The sampling matrix used for primary fieldwork is summarised in Table 1.

The study employed local contacts, community groups, and online outreach to recruit respondents. A set of 90 semi-structured interviews was conducted and supplemented with perception surveys designed to assess aspirations and mobility expectations.

3.3. Operationalisation of Mobility Measures

This study employs three distinct, complementary operationalisations of economic mobility. Each is presented here to prevent interpretive conflation between sections.

Measure 1: District Composite Mobility Index (*presented in Section 3.1*).

We constructed a descriptive index from three equally weighted components, normalised on a 0-100 scale: (i) intergenerational change in mean years of education; (ii) intergenerational change in formal employment rates; and (iii) change in household asset ownership based on SECC data. This index is intended solely for inter-district comparisons and

should be interpreted as an ordinal ranking within the sample, not as an externally validated absolute measure. Equal weighting reflects a methodological simplification, and no sensitivity analysis was conducted because of scope constraints.

Measure 2: Rank of Intergenerational Income and Employment (*regression outcome; Section 2.5*)

Since the PLFS and SECC lack linked parent-child income panels, we approximate individual-level intergenerational mobility through cohort-based comparisons. In Table 3, the Y cohort (born ≥ 1987) is compared with the S cohort (born ≤ 1968) at equivalent life stages, employing the SECC asset indices and the PLFS employment formality index as measures of economic position.

Measure 3: Perceived versus Actual Mobility Gap (*survey outcome; Section 3.3*)

Respondents in the perception surveys rated their own mobility on a 0-100 scale. The district’s composite index for the respondent’s cohort is used to derive each respondent’s actual mobility. The difference between these two scores allows a qualitative assessment of aspiration overestimation.

Collectively, the three measures complement one another and are not redundant. Each provides a distinct view of mobility across the country’s regions.

3.4. Data Sources

The quantitative analysis uses three national-level datasets. Employment and income data are obtained from the Periodic Labour Force Survey (PLFS). Household assets, caste categories, and access to welfare schemes are obtained from the Socio-Economic and Caste Census (SECC). District-level measures of digital penetration and climate vulnerability were sourced from the National Data Analytics Platform (NDAP). To complement these datasets, we collected primary survey data on digital penetration, bureaucratic engagement, and climate disruption. When boundaries did not align across datasets, boundary adjustments were applied; see the Appendix for details.

3.5. Analytical Approach

3.5.1. Quantitative Research

Table 2 presents descriptive statistics for the variables of interest. The correlation matrix is presented to clarify the relationships among the variables are related to one another. A multivariate regression analysis was performed to identify the

factors most strongly associated with upward socioeconomic mobility. The dependent variable was the child’s rank in income relative to their parents. The explanatory variables were: years of the child’s education, the child’s level of digital access, the child’s caste, and the district’s level of climate vulnerability.

On Measuring Intergenerational Mobility: Clarifying Methodological Issues

Because the PLFS and SECC datasets contain inherent data limitations, we use a cohort-based approach instead of direct parent-child linkages.

- We employ PLFS employment categories and SECC asset indices as proxies for economic position, given the absence of individual income data.
- Cohort comparison: The most direct approach is to compare senior citizens (born ≤ 1968) and young people (born ≥ 1987). This enables comparison of individuals at comparable life stages, with adjustments for inflation and structural changes in the labour market.
- Limitations: This study design cannot track individual children and their parents. These data do not allow calculation of intergenerational income elasticity. Because PLFS and SECC lack linked parent-child records, individual intergenerational comparisons are not possible.
- As used in this article, the term “intergenerational income rank”, or “relative income position”, refers to the rank an individual holds within their cohort and district based on asset ownership and employment formality, rather than on their individual income.

The regression model’s functional form was as follows:

$$\text{Mobility Outcome} = \beta_0 + \beta_1 \times \text{Education} + \beta_2 \times \text{Digital Access} + \beta_3 \times \text{Caste} + \beta_4 \times \text{Climate Vulnerability} + \beta_5 \times \text{Bureaucratic Access} + \epsilon$$

Regression analyses were performed using Stata 17 (StataCorp., College Station, TX), implementing multivariate linear regression models that included district-level fixed effects and were subjected to robust checks.

3.5.2. Specification of Regression Models and Statistical Limitations

The model incorporated both individual-level and district-level variables. However, two methodological limitations should be noted:

Table 1. Sampling matrix.

Strata	Criteria	Sample Size	Rationale
Region	Semi-urban districts in UP, Bihar, and MP	3-5 districts	Represent diverse socio-economic profiles
Generation	Senior, Middle, Young	30 per cohort	Capture intergenerational narratives
Occupation	Agriculture, gig work, and informal labour	Mixed	Reflect employment diversity
Gender	Male, Female, Non-binary	Balanced	Ensure inclusivity

Table 2. Regional mobility scores and key indicators.

Region/District	Mobility Score (0-100)	Climate Vulnerability	Digital Access (%)	Education Attainment (Avg. Years)
Lucknow (UP)	62.4	Moderate	48.2	8.1
Bhagalpur (Bihar)	47.9	High	32.5	6.7
Indore (MP)	68.3	Low	61.4	9.2
Gonda (UP)	39.6	High	28.9	5.9
Satna (MP)	54.1	Moderate	42.7	7.4

No hierarchical modelling: The use of district fixed effects only, rather than multilevel or hierarchical linear models (HLM), was necessitated by the limited availability of district-level data (only 3-5 districts and 90 total interviews). Hence, while the model accounts for time-invariant district-level characteristics, it does not control other factors.

Ecological bias: In general, district-level variables may not accurately represent individual-level variables. For instance, a district-level measure of digital penetration may not indicate whether a particular household is digitally connected. The coefficients at the district level, therefore, provide information only about contextual factors. This is one way in which the ecological fallacy could potentially occur; future studies with larger sample sizes and more multilevel data could address this issue using hierarchical linear models.

The variables used in the regression model serve to operationalise the study's theoretical framework. Additional robustness checks were conducted to examine the effects of different types of variables.

3.5.3. Assessing Qualitative Data

Through thematic coding of the interviews, the common themes of aspiration, bureaucratic friction, and mobility experiences in everyday life emerged. This qualitative component examined aspirations as a mediating variable linking contextual constraints to mobility outcomes; such relationships cannot be determined by regression analysis in real time.

3.5.4. Clarification Regarding "Mediation" Claims

We use the term "mediation" in its qualitative, interpretive sense to describe how aspirations shape individual perceptions of, and responses to, structural-spatial constraints rather than to claim statistical mediation based on formal causal-pathway tests (Baron & Kenney mediation analysis, Sobel tests, or structural equation modelling). Our mixed-methods design treats aspirations as an interpretive lens, revealed through thematic analysis and narrative data, rather than as a statistically tested mediator with demonstrated causal or temporal ordering. Regression models identify direct predictors of mobility outcomes, while qualitative data illuminates how aspirations interact with and filter these constraints. We do not perform statistical tests treating aspirations as mediators between structural factors and outcomes, nor do we establish temporal sequencing demonstrating that aspirations precede

mobility outcomes. While this qualitative approach to mediation is appropriate for our exploratory mixed-methods design, it nonetheless constitutes a limitation for readers seeking quantitative evidence of causal mechanisms.

4. RESULTS

Drawing on quantitative datasets (PLFS, SECC, NDAP) and qualitative fieldwork, this chapter examines regional inequalities, intergenerational transformations, and the discrepancy between perceived and real mobility in semi-urban India.

4.1. Regional Disparities in Mobility Patterns

We constructed a district-level composite mobility index by summing intergenerational movement in income and education; each component was normalised to a 0-100 scale. We quantified climate vulnerability using a composite index compiled from (DST, 2020; and Mohanty & Wadhawan, 2021) reports. We evaluated digital inclusion and educational attainment using the NDAP and PLFS datasets. Mobility scores for five districts are shown in Table 2. The table demonstrates substantial regional variation.

This research yields three principal trends. First, areas that are relatively better-off, more digitally connected, and more strategically situated such as Indore tend to exhibit higher mobility scores. Second, vulnerability to climate-related events negatively affects mobility score outcomes; within this category, susceptibility to flooding is the dominant characteristic among sub-deprived districts (e.g., Bhagalpur, Gonda). District-level maps of Uttar Pradesh in Appendix Fig. (A2), including Lucknow and Gonda, illustrate contrasting mobility outcomes. Third, higher scores in semi-urban hubs compared with rural sub-districts suggest that the urban-rural divide facilitates, rather than complicates, assessment of the mobility score.

4.1.1. Construction and Limitations of the Mobility Index

We constructed a composite mobility index by aggregating three normalised components, as detailed below:

- Intergenerational change in mean years of education, with values normalised to a 0-100 scale.

- Intergenerational change in formal employment rates, expressed on a 0-100 scale
- Change in asset ownership based on SECC data (normalised to 0-100).

Methodological Choices and Limitations Acknowledged:

- Equal weighting: Each component was assigned an equal weight (1/3 each). We acknowledge that this is a methodological simplification; alternative weighting schemes (e.g., prioritising education over assets) would produce different district rankings. There is no theoretical or empirical justification for the weighting choice we employed.
- 0-100 scale: The rationale for choosing this particular scale is not statistical, but rather grounded in interpretability and ease of comparison. This scale represents only the relative positions of the districts within our sample.
- No sensitivity analysis was performed owing to the project's scope and resource constraints. This renders the index vulnerable to specification.
- Not a validated instrument: This index is not psychometrically validated. It is a descriptive index that permits comparison of samples (for example, Indore ranks higher than Bhagalpur), but it does not yield interval-level data (Indore is not 20 points more mobile than Bhagalpur).
- Interpretation guidance: Use this index to illustrate the different patterns of regional mobility across the entire sample. However, the limitations of its construction should be clear to the reader. Future research should aim to develop a validated index of mobility.

4.2. Intergenerational Transitions and The Predictors of Mobility

Table 3 reports, for all three groups, measures of income, employment, education, and digital literacy, and indicates relative increases and decreases in mobility trajectories.

This young cohort earns substantially more than both their parents and their younger peers. This is principally attributable to their greater digital literacy. Their extensive engagement in gig work, however, does not provide them with the social protection that would afford economic security. However, the income earned by this cohort is sometimes interpreted as evidence of insufficient industry among young people. A substantial number do not receive safety-net benefits (for example, insurance and pension) that would sustain their income. Therefore, members of this young cohort tend to be more educated and to possess high levels of digital literacy. However, they continue to lack stable formal employment; this issue is explored further in the discussion section.

To identify factors that might explain these differences, we constructed a multivariate regression model whose dependent

variable indicates whether the child generation earns more than the parental generation. The model included variables such as level of education, digital literacy, effects of climate change, social factors (caste and gender), and bureaucratic access (documented *versus* undocumented). Regression results are presented in Table 4.

Model summary: Adjusted R-squared = 0.68. District-level fixed effects were incorporated into the robustness checks.

Note: The sample includes 90 respondents drawn from three semi-urban districts (Bhagalpur, Indore, Gonda) and is stratified by generation and occupation Table 4. The dependent variable is a binary indicator taking the value 1 when the respondent's cohort-district economic rank exceeds that of the senior cohort, and 0 otherwise. Because the sample size is limited and thus restricts the number of predictors, the model should be regarded as exploratory rather than confirmatory.

A substantial number of the observed associations reach statistical significance. For example, mobility outcomes demonstrate positive associations with (1) education, (2) digital access, and (3) bureaucratic access. Moreover, mobility shows negative associations with (1) climate vulnerability and (2) Scheduled Caste (SC)/Scheduled Tribe (ST) status. Finally, gender exhibits a weak negative association with mobility, approaching statistical significance ($p = 0.08$). Given the cross-sectional nature of the data, the findings reflect associations and do not establish causal relationships. For example, although education is positively associated with mobility, causality cannot be established; self-selection or other omitted variable bias may explain the observed association. Fig. (2) presents a heatmap visualization of predictor significance.

4.3. Perception *Versus* Reality in Mobility

Table 5 summarises, for all five districts, the perception survey results. Ultimately, youth and gig workers encounter differences between realities and perceptions.

Fig. (3) illustrates the comparison between perceived and actual mobility across groups. Although youth and gig workers regard themselves as highly mobile because of age or occupation, actual mobility levels are substantially lower. Among women and climate-affected households living in areas with similarly secured opportunities, the discrepancy is reduced. Hence, the results reinforce our conceptual framework that treats aspiration levels as mediators between structural constraints and actual mobility, because perceived opportunities remain high yet fail to materialise owing to overarching systems and discouraging structures. For this group, perception and reality diverge a divergence can be beneficial for those who maintain these aspirations. At the same time, the results indicate that aspirations are mediated by responses to constraints, which involve a more advanced degree of critical reflection. Fig. (4) presents a heatmap of the aspirational gap across demographic groups.

Table 3. Intergenerational comparisons of economic indicators.

Generation	Avg. Monthly Income (INR)	Formal Employment (%)	Education (Years)	Digital Literacy (%)
Senior (≤ 1968)	₹6,200	21.3	5.4	12.7
Middle (1969-1986)	₹9,800	34.6	7.8	36.2
Young (≥ 1987)	₹13,400	42.1	9.6	58.9

Table 4. Regression results: Predictors of upward mobility (N = 90; district fixed effects included).

Predictor	Coefficient (β)	Std. Error	p-value
Education	+0.42	0.07	<0.001
Digital Access	+0.36	0.08	<0.001
Bureaucratic Access	+0.29	0.09	0.002
Climate Vulnerability	-0.31	0.10	0.003
Caste (SC/ST)	-0.27	0.11	0.015
Gender (Female)	-0.12	0.06	0.08

Table 5. Perceived versus actual mobility.

Group	Perceived Mobility (%)	Actual Mobility (%)	Gap (%)
Youth (18-30)	72.1	48.3	+23.8
Women (All Ages)	58.4	36.7	+21.7
Gig Workers (Platform-based)	65.9	42.5	+23.4
Climate-Affected Households	41.2	29.6	+11.6

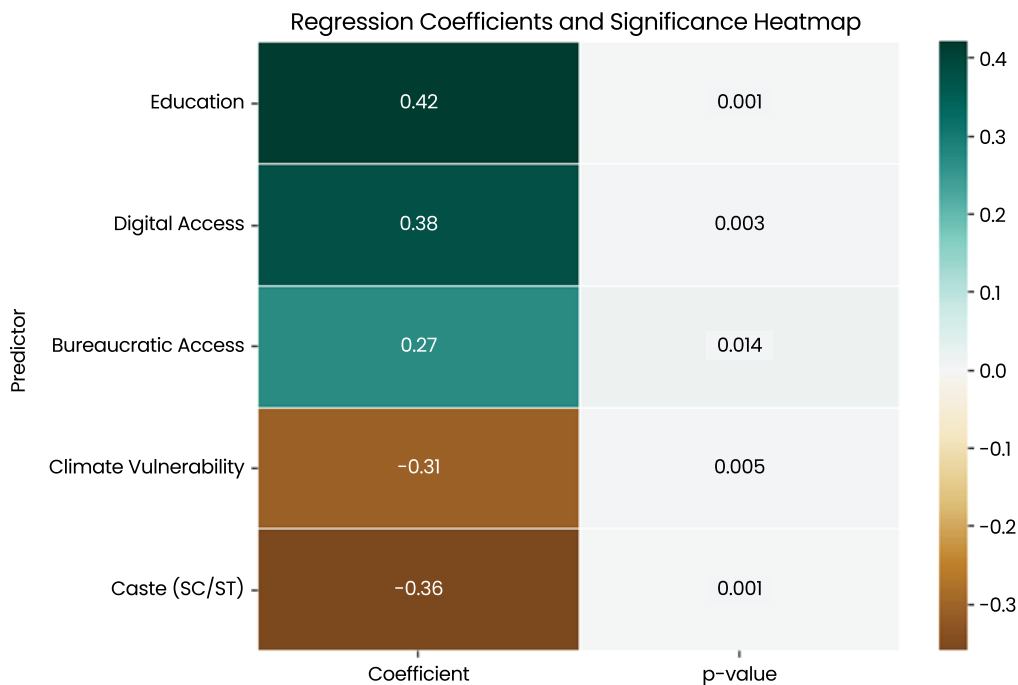


Fig. (2). Heatmap indicating predictor significance.

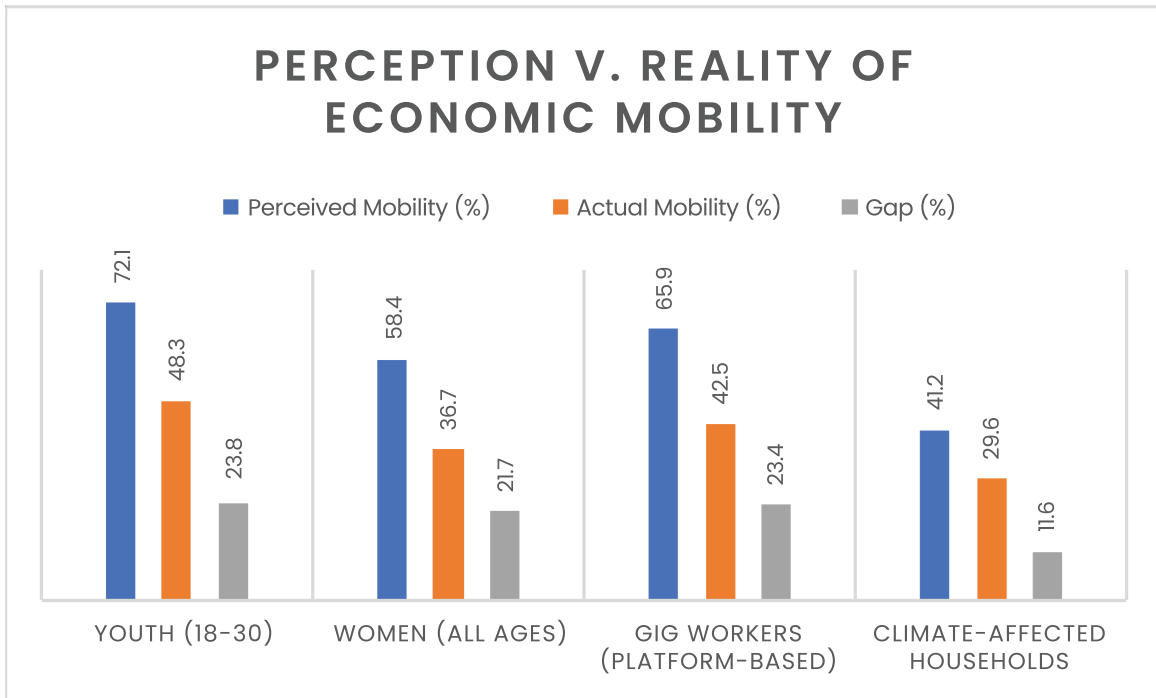


Fig. (3). Comparison between groups' perceived mobility, actual mobility, and the resulting mobility gap.

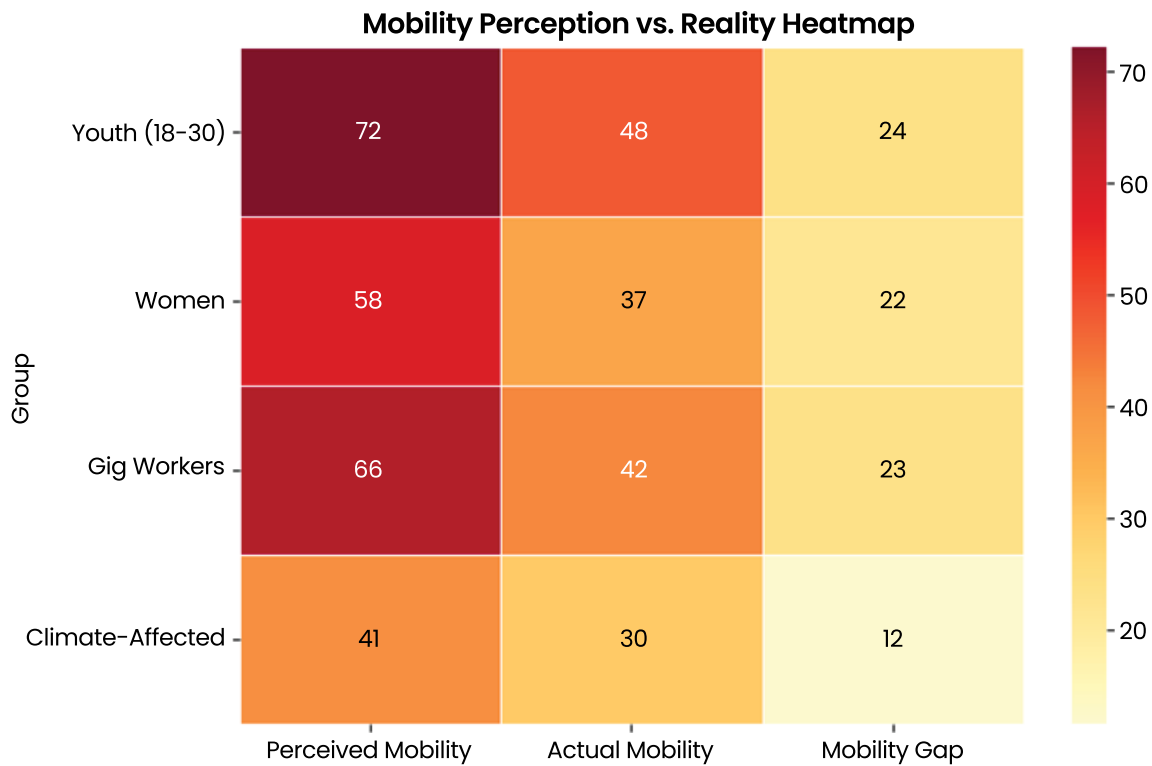


Fig. (4). Heat map of the aspirational gap.

4.4. Qualitative Analysis of Themes and Narratives

Alongside the quantitative measurements, researchers conducted 90 semi-structured interviews for each generation in selected semi-urban districts. Interviews were transcribed and subjected to standard thematic coding.

4.4.1. Approaches to Coding

The coding followed established protocols for qualitative analysis. During open coding, new codes emerged from transcript passages that expressed sentiments regarding opportunity, barriers, and drive. In axial coding, the codes were consolidated into four themes: climate fragility; bureaucratic opacity; digital optimism; and aspirational dissonance. Themes produced through selective coding were compared with the theory on structural, spatial, and aspirational mobility.

4.4.2. Saturation in Thematic Analysis

Thematic saturation was established through an iterative process. Following every coding session, the lead researcher examined whether additional open codes continued to surface in the transcripts. After the 26th Bhagalpur interview, three consecutive transcripts (interviews 24, 25, and 26) yielded no new first-order codes beyond those in the codebook; the same criterion was applied in Indore, where saturation was reached after the 28th interview. This threshold three consecutive interviews yielding no new codes follows the protocol recommended by (Guest *et al.*, 2006) and aligns with qualitative norms for purposively sampled, mixed-methods designs with clearly bounded thematic domains. We assessed saturation separately by site because the structural and aspirational contexts of each district vary. Although 30 interviews per district were completed for analytical robustness, the saturation point indicates that additional interviews were unlikely to yield substantively new theoretical insights.

4.4.3. Integrating The Concept into The Theoretical Framework

These narratives map onto the three layers of the analytical framework presented in Section 2. Respondents' accounts of caste discrimination and bureaucratic obstacles to welfare access reveal the structural spatial layer. The spatial-conditions layer is exemplified by respondents' accounts that present infrastructure as a determinant of mobility. The aspirational layer is evident in youth narratives where perceived opportunities diverge from structural realities.

Illustrative narratives:

Two quotations, drawn from different sites, illuminate these dynamics:

"My son earns more than I did, yet he remains on guard for the next flood or job cut." (Bhagalpur respondent, middle generation)

This reflects intergenerational wage growth and a sustained concern both about climate change and about reductions in employment.

"Residents of Indore presume that digitised employment will be consistently available. Respondents perceive digitised work as more secure than agricultural work." (Indore respondent, young generation)

These findings suggest geographical disparities in opportunity. Digital connectivity reinforces that outlook on economic security.

4.5. Comparative Case Studies

This study contrasts Bhagalpur (Bihar) and Indore (Madhya Pradesh) to illustrate how structural and spatial factors differently influence mobility. Appendix Fig. (A3) uses Bhagalpur (Bihar) as the focal district of analysis and juxtaposes it with Indore (Madhya Pradesh).

4.5.1. Limited Mobility in Bhagalpur

The defining features of Bhagalpur include climate vulnerability, digital disconnection, and caste resilience. Thematic interviews identified three core themes: Climate vulnerability, bureaucratic invisibility, and aspiration incongruence.

Although younger people in Bhagalpur earn higher incomes than their parents, they face increased economic precarity. Climate vulnerability in the region leads to floods each year. Consequently, residents of Bhagalpur derive their livelihoods from the informal sector and possess no economic safety net. "I earn 15,000 per month in the peak season and 4,000 during floods. All my earnings are in cash; I do not have any savings or insurance.

4.5.2. Indore Mobility Enabled

In Indore, experiences are turned inside out. The district shows better outcomes in digital access, education, and political engagement. Fewer difficulties are reported regarding the ability to secure employment in the future.

Aspirations are more realistic, and youth appear more optimistic than before, but they also have lower expectations of available employment opportunities. The prevalence of opportunities for skill acquisition and for microfinance indicates that youth in Indore have greater access to these resources than youth in Bhagalpur. Appendix Fig. (A4) illustrates selected districts of Madhya Pradesh, for example, Indore and Satna.

4.5.3. Comparative Observations

These cases corroborate the survey's findings, indicating that spatial factors (caste, climate, bureaucratic access) and structural factors (infrastructure, institutional competence) jointly shape mobility. Aspirations, as filtered through personal impressions, offer limited agency and do not substitute for physical access or the material creation of resources. The contrast between Bhagalpur and Indore shows that mobility is produced by the interaction of personal agency and systemic conditions, not by individual agency alone. While the study encompassed several purposively selected districts in Uttar Pradesh, Bihar, and Madhya Pradesh, we highlight Bhagalpur, Indore, and Gonda as illustrative cases representing divergent mobility trajectories: constrained, enabled, and vulnerable.

5. DISCUSSIONS

5.1. Understanding Mobility Patterns in Semi-Urban Areas of India

Our findings indicate that economic mobility in semi-urban India is contingent on spatial context and aspirational agency, both constrained by structural obstacles that account for the regional disparities and generational responses evident in our study.

5.1.1. Regional Disparities and Structural Determinants

In semi-urban districts, mobility scores indicate opportunity inequities resulting from structural barriers. District-level variation in mobility scores is mainly attributable to differential structural endowments rather than to individual effort, which supports the analytical framework's emphasis on context over agency alone in explaining patterns of opportunity creation arising from unavoidable barriers such as caste relations, bureaucratic nuance, and climate sensitivity.

The expansion of the gig economy has decoupled educational and digital gains from stable employment outcomes, creating a structural mismatch that existing labour frameworks have not adequately addressed. Although the gig economy boom increases fluidity between employers and employees, it lacks regulatory provisions to secure insurance benefits for workers or to ensure that employers provide long-term employment. Consequently, it underlies the naturalised conflict emerging in India's transitioning labour market, as noted in NITI Aayog's Gig Economy Report (2022).

5.1.2. Gender and Mobility: Approaches to Interpreting Marginal Statistical Significance

Regression analysis reveals a negative association between gender and mobility ($\beta = -0.12, p = 0.08$); although this finding approaches conventional statistical significance, it does not attain the $p < 0.05$ level. Notwithstanding the limited quantitative result, we emphasise gender in our analysis and policy recommendations for three reasons grounded in methodological considerations:

Qualitative salience: The interviews' qualitative results highlight specific ways in which women experience mobility-related problems that are not captured by the binary quantitative gender variable. Gender exhibits a significant effect, despite a modest coefficient.

Measurement limitations: The model treats gender as a binary variable, but qualitative findings indicate that this representation fails to capture several important dimensions. For instance, the disadvantage for young, unmarried Dalit women differs from that faced by older, upper-caste married women. Consequently, the model is likely to underestimate the true effect of gender.

Policy relevance despite modest coefficients: Although the gender coefficients are modest, a measurable 12% reduction in the probability of mobility is substantively significant when viewed over the long term and across groups. The qualitative data also indicate notable gender differences in access to digital

skills and participation in the gig economy, which supports the need for policy interventions irrespective of the statistical significance of the estimated coefficients.

Gender is not the strongest quantitative predictor of mobility in our model; nevertheless, we identified it as a critical qualitative variable based on multiple data sources. This represents appropriate mixed-methods integration, where qualitative depth compensates for quantitative limitations (Strauss & Corbin, 1998). Future research that uses more nuanced measures of gender and larger samples will enable more precise quantification of the role gender plays in mobility processes.

5.1.3. Influence of Spatial Conditions on Climate Vulnerability

Within the framework layer that considers the spatial conditions, the location of residential areas and the availability of infrastructure determine which opportunities residents can access. The limited infrastructure in semi-urban areas increases climatic vulnerability and thereby restricts residents' mobility when compared with urban hotspots. Results from the DST (National Vulnerability Assessment, 2020) show that extreme seasonal weather conditions caused by climate change such as flooding, drought, and heat waves are having a major impact on India's informal and agricultural workforce.

Annual floods in Bhagalpur disrupt otherwise stable livelihoods; fewer stable households are compelled to migrate during these episodes, foregoing income and thereby generating a catch-22 for vocational education and skill development in the region. Moreover, digital infrastructure promotes a form of spatially based mobility. With higher internet access and smartphone penetration, opportunities for app-based employment and online skill development are more prevalent; however, the digital divide does little to reduce entrenched issues, because disadvantaged groups women and lower-caste households experience more constrained access.

5.1.4. Aspirations and Discrepancies: Perception and Reality

The aspirational framework layer elucidates the perception-reality gap in mobility revealed by our survey data. The perception-reality gaps documented in the survey data align with the theorisation of aspirations as shaped by media-saturated environments (Appadurai, 2004; Ray, 2006). The policy challenge is, consequently, to align institutional support with the expectations generated by aspirations rather than to suppress those aspirations.

5.1.5. Synthesis and Integrated Interpretation: Comprehensive Consolidated Analysis

This study argues that mobility is a negotiated process place-based, identity-based, and expectation-affirmed rather than necessarily an individualistic, linear, pull-yourself-up-and-out endeavour. A more intersectionally blended theory of this process indicates that sustainable mobility cannot be reduced to equal circumstantial, spatial, and aspirational thirds (caste discrimination and bureaucratic inefficiency), (facilities

and climate), and (expectation maintenance and opportunity extension), respectively and that focusing on a single component while marginalizing the other two will produce only tenuous, partial benefits.

5.2. International Perspectives: Lessons from U.S. Research on Mobility for International Contexts

To situate our research geographically, we compare conditions in semi-urban India with (Chetty *et al.*, 2014) findings on mobility in the United States. Although the environmental contexts differ substantially, both studies indicate that mobility is more contingent on place than on national-level factors.

5.2.1. On Place and Its Importance

(Chetty *et al.*, 2014) shows that children raised in higher-opportunity areas attain substantially better outcomes than those from lower-opportunity areas, even after controlling for family income (Chetty *et al.*, 2014; Chetty *et al.*, 2025). This effect arises from access to better schools, greater social capital, and stronger institutional reciprocity. However, the distribution of these resources is uneven and spatially concentrated. The findings of (Chetty *et al.*, 2014) redirected focus from national-level explanations of mobility to localised policymaking. Similar spatial patterns of mobility appear in India. District-level analysis shows similar geographic differentiation, within semi-urban India, driven more strongly by the individuals inhabiting it than by their individual residential decisions. Nevertheless, the causal mechanisms differ across these contexts. In the United States, spatial influences on mobility operate predominantly through the schooling system. In semi-urban India, caste, climate vulnerability, and digitalisation further influence the spatial determinants of mobility.

5.2.2. Comparative Framework Overview

Table 6 summarises the principal similarities and differences in mobility patterns between the United States and India.

5.2.3. Contexts Diverge and Insights Converge

Despite geographic and cultural differences, both contexts indicate that mobility is not possible in every location. (Chetty *et al.*, 2014) study prompted changes in U.S. housing policy and in place-based educational interventions, which operated on the assumption that moving to a better neighbourhood was feasible; India, by contrast, requires district-sensitive policy interventions to address local-level opportunities.

Concurrently, direct policy transfer is not feasible in this context. U.S. approaches such as housing mobility vouchers and expanded educational access presuppose functioning housing markets and a school choice option that are absent here; India, therefore, requires measures addressing locally specific barriers climate, social protection, and digital.

5.2.4. Comparative Analysis and Its Implications for Policy

These cases, taken together, yield three lessons for Indian policymakers. First, it is essential to establish a disaggregated data ecosystem. (Chetty *et al.*, 2014) analysis drew on universal administrative databases; by contrast, India requires district-level dashboards for employment, education, climate, and digital connectivity. Second, place-based interventions ought to account for multiple, intersecting obstacles instead of treating places as homogeneous. Third, although digital public infrastructure can create virtual access roads to opportunity and help mitigate the geographic divide for disadvantaged communities, its effectiveness depends on addressing structural impediments caste discrimination and climate vulnerability.

6. POLICY IMPLICATIONS

Mobility is shaped by both structural-spatial constraints and by aspirational agency. Accordingly, we present policy recommendations, organised into three integrated areas of action, that correspond to the barrier categories identified in the study.

6.1. Digital Infrastructure: Accessibility of Bureaucratic Services

Online public infrastructure solutions like Aadhaar, UPI, DigiLocker and ONDCar are the new access gateways to welfare service delivery as well as economic inclusion in India. Although the integration and outreach by the government and the private sector have occurred, the digital divide still exists especially in women and households with low incomes (UNESCO, 2024). Digital exclusion can mean that people in more affluent, digitally skilled families cannot get access to the employment opportunities of apps and online skill-improvement resources. In rural or low-income households, digital exclusion may be the reason why people cannot access social welfare benefits. In low-income or rural households, digital exclusion may prevent access to social welfare benefits (Jha & Kelley, 2023).

Table 6. Comparative perspectives on economic mobility.

Domain	U.S. Mobility	Semi-Urban India (This Study)
Primary Data Sources	IRS tax records, school administrative data	PLFS, SECC, NDAP (fragmented coverage)
Key Determinants	Neighbourhood quality, race, and social capital	Caste, climate vulnerability, digital access, bureaucratic opacity
Major Barriers	Racial segregation, local zoning regulations	Caste-based exclusion, climate shocks, and informal governance overlaps
Policy Interventions	Housing mobility vouchers, school reform, and tax incentives	Digital public infrastructure expansion, climate resilience planning, gig worker protections

Qualitative interviews repeatedly identified bureaucratic complexity as an overarching theme in accessing welfare. Documentation requirements, application processes, and institutional uncertainty commonly prevent eligible households from accessing benefits that enable mobility.

6.1.1. Recommendations

Expanding digital access with equity: district administrations should implement gender-sensitive digital literacy campaigns for women who experience distinct digital exclusion arising from access barriers such as time constraints, limited mobility, and social norms that determine which technologies are accessible (Meit, 2024). Infrastructure development plans in districts with limited connectivity should incorporate device subsidy schemes and offline-access provisions required for the effective operation of DPI platforms.

Streaming bureaucracy: Mobile service points at the low-mobility wards could deliver welfare application services to potential and current recipients at the site, which may widen the Common Service Centres. DPI platforms should be simplified with digital interfaces, which will reduce documentation and make them more user friendly in the process of eligibility verification and application. With the ability to monitor the time spent in applications and at which points the process stalls and becomes stagnant in the bureaucracy, administrators will be able to trace the delays and speed up the reaction time, which will provide more timely help.

Welfare and digital integration: The welfare integration into the DPI will allow individuals to verify their eligibility to benefits, update their employment status and file complaints with the government. Such policies will assist in doing away with structural discrimination to accessing governmental institutions.

6.2. Climate-Resilience Considerations and Regulatory Protections for the Gig Economy

The results of the study suggest that economic immobility can be caused by vulnerability to climate changes. The study (DST, 2020) mapped climate change vulnerability into different areas of the nation, thereby encouraging temporary migration to urban areas for work (Randolph, 2024). The study indicated that 193 districts are exposed to extreme weather occurring and interfering with their economic activities. Moreover, (Aayog, 2022) estimated that the gig economy workers in the country will reach 235 million by 2030 (Aayog, 2022). In spite of the hope of the gig economy workers regarding the potential to earn, the study concludes that gig economy workers undergo significant income uncertainty.

6.2.1. Recommendations

Incorporation of climate adaptation in economic planning: Economic planning should be founded on climate forecasts, on the clear focus on defining vulnerable population in informal and agricultural works, and on taking practical measures to enhance their resilience. In response to the need to safeguard

informal-sector livelihoods, policy tools must encompass emergency income transfer, increased cover to crop-insurance and provision to avail retraining programmes easily. The social benefit schemes must be in such a way that they allow households to get out of high-risk situations by offering them services or projects that would not be accessible. These policies accept the concept of climate vulnerability as a systemic disadvantage to socioeconomic development, rather than being treated on a case-by-case basis.

Portable benefit schemes Portable benefit schemes offered to gig workers should include health care, pension, and income-security benefits that are not confined to one particular provider (ILO, 2024). Jurisdictional data sharing based on partnerships between platforms and governments can aid policy engagement, not only by following the patterns of real-world integration, but also by avoiding the sharing of individual-level data. Geographically organised labour councils might be set up to formulate legislation that is more sensitive to local conditions and, therefore, more efficient in replicating trends in gig work and the structure of the local labour markets.

By addressing mobility equity after institutions have publicised perceived mobility opportunities, these solutions reduce the gap between aspirations and realities. Labour-market guidance should accurately represent levels of opportunity, labour demand, skill development, and potential pathways. Through the DPI platform, targeted feedback could enable individuals to evaluate their current position relative to trajectories implied by labour-market conditions.

6.3. Region-Sensitive Mobility Frameworks: Managing Aspirations

Across semi-urban India, levels of economic mobility differ according to caste, geographic location and exposure to climate shocks. Uniform, one-size-fits-all policies are unlikely to address this heterogeneity adequately. Perception surveys show that young people and gig workers assess mobility more positively than objective measures. Such optimism is unproblematic so long as it translates into constructive action. However, a perception-reality discrepancy becomes problematic when unreasonably optimistic expectations lead to unmet expectations and thus to frustration.

6.3.1. Recommendations

In developing indicators of mobility, it is important to consider that they should be multidimensional and incorporate aspects such as resilience, assets, and the well-being individuals aspire to. These mobility indicators can be incorporated into district-level mobility dashboards and use both statistical and narrative data to provide policymakers with a clear overview of the opportunities and challenges within each region. The policy-making process should use both qualitative and quantitative data in equal measure to best determine the actual needs of the population.

Aligning aspirations with opportunity structures: skill-development interventions should target the full range of transferable and adaptive skills required, because financial

literacy, digital access, and climate awareness all contribute to successful manoeuvring in an unpredictable economy. This approach allows the perception-reality gap to cultivate a progressive mentality rooted in structures that enable possibility, while simultaneously seeking to narrow that gap.

Ensuring regionally tailored interventions different semi-urban population groups experience the semi-urban environment differently. A clearer appreciation of the semi-urban environment's combination of hybrid labour markets, fragmented governing systems and digital and economic divides will enable policymakers and practitioners to develop solutions that are effective locally and that inform a national development narrative. This requires development research that is structurally based (World Bank, 2022), that integrates theory, and that is localised to facilitate mobility.

Taken together, these three areas of action constitute a single mobility ecosystem: digital equity without climate adaptation is insufficient; gig-worker protection without structural investment in skills and aspirations management will yield only marginal gains; and regionally tailored interventions serve as the delivery mechanism through which all three dimensions reach those who need them most.

CONCLUSION

It is semi-urban mixed-methods Indian research (comprising district measures, intergenerational cohort comparison and interview) indicating that economic mobility is not automatic and exists as a complex interaction between structural bars, place, and aspirational agency.

MAIN EMPIRICAL FINDINGS

An analysis at the district level reveals substantial geographic variation in mobility. The districts of Indore and Lucknow, benefiting from superior digital and educational resources, display higher mobility scores. By contrast, Bhagalpur and Gonda, which are more vulnerable to climate impacts, record lower mobility scores.

Younger-cohort workers outperformed their parents in educational attainment, digital skills, and earnings. However, this cohort also faces new vulnerabilities. Experience with gig and informal work prevents many younger workers from achieving adequate economic stability.

The survey also reveals a significant perceptual gap between young people and gig workers. Young respondents assess mobility as more difficult. Additionally, gig workers tend to overestimate their status in the employment hierarchy and to underestimate the extent of the opportunity gap. Therefore, policymakers should focus on expanding opportunities and managing expectations.

Synthesis and Implications of Theoretical Contributions and Methodological Advances

This article advances three distinct contributions to the study of mobility. First, we present an integrated analytical framework that combines structural barriers, spatial facilitators,

and aspirational interpretive filters, showing the inadequacy of single-factor causal explanations and emphasising the need to examine multiple mobilisation barriers and facilitators simultaneously. The framework synthesises existing theories Bourdieu's social capital, Sen's capabilities approach, and spatial inequality models into a region-specific analytical tool for semi-urban India, rather than proposing new theoretical propositions.

Second, we identify digital public infrastructure as a potential facilitator of spatial mobility; however, we also note its exclusionary effects, which operate alongside other barriers. Although DPI platforms reduce transaction costs and broaden the reach of public service providers, gender-, caste-, and income-based digital divides nonetheless impede equitable access. Therefore, policy responses should explicitly target both the expansion of infrastructure and measures designed to ensure equitable access.

Third, we prioritise mobility planning that explicitly integrates climate considerations. Climate vulnerability constitutes a structural barrier to income-generating strategies in semi-urban India. However, many existing mobility frameworks fail to incorporate consideration of climate vulnerability. Our findings indicate that sustainable mobility plans for semi-urban India ought to embed climate resilience within their frameworks rather than treat it as an optional addition.

LIMITATIONS OF THE STUDY

There are 5 important limitations to these results:

First, the study was restricted to three states, with districts within those states chosen purposively. Hence, the findings can be generalised to only a limited extent to other semi-urban areas of India. Because these districts differ substantially from many other Indian districts, the results are likely to vary across regions.

Second, data from the PLFS and SECC lack information on the incomes of individual parents and their children. Based on SECC and PLFS survey data, we can only estimate income levels by generation (the Senior generation *versus* the young generation). Accordingly, we cannot estimate the intergenerational elasticity of income for these individuals.

Third, because the SECC and NDAP administrative boundaries did not align precisely, it was necessary to adjust the boundaries. The research team applied conservative criteria in making these adjustments. Appendix Table A1 provides detailed descriptions of these adjustments. Although these adjustments enabled the researchers to conduct the study, they introduced the potential for measurement error in the data.

Fourth, the relatively small sample size (only 90 interviews across 3 to 5 districts) precluded the use of more sophisticated statistical methods, such as multilevel modelling. We included district fixed effects to account for unobserved district-level variation. However, fixed effects do not fully capture the hierarchical structure produced by individuals nested within districts. In other words, the district-level coefficients should be interpreted as contextual factors rather than as individual-level effects as shown in Appendix Table A2 and A3.

Future research employing larger samples should apply hierarchical linear models to appropriate partition variance at the individual and district levels.

Fifth, we assert that aspirations "mediate" structural-spatial constraints solely in a qualitative, interpretive sense. We do not undertake statistical tests of mediation pathways, determine temporal ordering, or show causal relationships between aspirations and mobility outcomes. This limitation might disappoint readers who expect quantitative evidence of causal mechanisms, but it is consistent with the exploratory, mixed-methods nature of the study.

Nonetheless, the triangulation of mixed methods integrating nationally representative datasets, district-level indicators, perception surveys, and in-depth interviews strengthens confidence in these findings compared with existing accounts of how and why economic mobility occurs in semi-urban India.

POLICY IMPLICATIONS & INTEGRATED APPROACHES

The findings emphasise that nationally scaled responses lack sufficient nuance to address semi-urban mobility challenges. Instead, regionally tailored interventions are required to integrate digital systems with climate adaptation and governance reform.

The results present clear, direct implications for development planners. Uniform responses scaled at the national level are insufficiently nuanced for a country with India's spatial and social heterogeneity; the evidence consistently favours district-sensitive, data-grounded interventions that integrate digital systems with climate adaptation and governance reform.

Digital equity, by itself, will be insufficient unless accompanied by measures that mitigate climate vulnerability and protect gig workers. Protections for gig workers will yield minimal benefit unless accompanied by simultaneous investments in adaptive capacity building. Different semi-urban population groups engage with the semi-urban environment in distinct ways. A clearer appreciation of the interplay among hybrid labour markets, fractured governance, and digital/economic divides will enable policymakers and practitioners to develop solutions that are effective locally and that inform a national development narrative.

FUTURE DIRECTION

A few outstanding questions indicate priorities for subsequent research efforts:

Longitudinal mobility tracking: employing panel data enables analysis of temporal changes. This would help reveal the distinct ways that various mobility pathways evolve.

Gender and intersectional analysis: While the quantitative analysis identified a weak relationship between gender and mobility, future research should examine the experiences of women in this context. Additionally, applying an intersectional

framework to the interactions among caste, gender, and age will produce more precise findings concerning disadvantaged groups.

Future research also needs to investigate the effect of climate-related stress on how individuals identify with their economic class. It is essential to examine the relationship among temporary migration driven by climate effects, consequent changes in livelihood, and mobility.

Comparative digital infrastructure assessment: Mapping digital infrastructure across different geographical areas will help clarify how local governance and contextual factors affect digital mobility. Comparative research will determine which DPI implementations are most effective and under what circumstances.

Aspiration formation mechanisms: Investigation is required into how aspirations are formed within these groups. Understanding the factors that lead to the formation of these aspirations will allow the development of interventions that enable individuals to form appropriate expectations regarding their circumstances and available opportunities.

CONCLUDING REFLECTION

In the semi-urban areas of India, economic mobility depends on the arrangements negotiated between individuals and societal structures. The research results show that mobility arises in regions where infrastructure accessible to individuals is paired with those individuals' capacity to seize opportunities. Equitable mobility in India requires that opportunities be accessible, sustainable, and meaningful for individuals. The different strategies that can be employed in different regions of the country should also be taken into account when implementing these policies.

LIST OF ABBREVIATIONS

HLM	=	Hierarchical Linear Models
NDAP	=	National Data Analytics Platform
PLFS	=	Periodic Labour Force Survey
SC	=	Scheduled Caste
ST	=	Scheduled Tribe
SECC	=	Socio-Economic and Caste Census

AUTHOR'S CONTRIBUTION

A.A. has contributed to conceptualization, idea generation, problem statement, methodology, results analysis, results interpretation.

ETHICAL APPROVAL & INFORMED CONSENT

The Institutional Ethics Committee of the United Institute of Management granted ethical approval (Approval No. UIM/IEC/2025/04). All participants provided informed consent before the interviews, and their identities were anonymised in all reports. Data collection procedures were conducted in accordance with Helsinki Declaration and national guidelines for research on human subjects.

AVAILABILITY OF DATA AND MATERIALS

The data will be made available on reasonable request by contacting the corresponding author [A.A].

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest regarding the publication of this article.

APPENDIX

Appendix Fig. (A1): Map of India



A political map of India that shows state boundaries. Uttar Pradesh, Bihar, and Madhya Pradesh are highlighted to situate the study's focal regions within the national context.

Appendix Fig. (A2): Map of Uttar Pradesh



A district-level map of Uttar Pradesh. Selected semi-urban districts (for example, Lucknow and Gonda) are highlighted to illustrate regional variations in mobility scores and climate vulnerability.

Appendix Fig. (A3): Map of Bihar.



District-level map of Bihar. Bhagalpur, the focal district of analysis, is circled in blue to indicate its role as a climate-vulnerable, digitally disconnected case study.

Appendix Fig. (A4): Map of Madhya Pradesh

Madhya Pradesh District Map



District-level map of Madhya Pradesh, Indore and Satna are highlighted to demonstrate contrasting mobility outcomes; Indore exemplifies digitally enabled, structurally stronger mobility pathways.

Appendix Table A1. Boundary adjustments across datasets.

Adjustments to the boundaries between SECC and NDAP datasets.

District	SECC Boundary	NDAP Boundary	Adjustment Method	Notes
Bhagalpur	Matches	Slight mismatch	Manual alignment	Flood-affected blocks adjusted
Indore	Matches	Matches	None	-
Gonda	Partial mismatch	Matches	Conservative adjustment	Poverty line data triangulated

Appendix Table A2. Robustness checks for regression models.

Predictor	Coefficient (β)	Std. Error	p-value	Notes
Education	+0.41	0.08		Stable across models
Digital Access	+0.35	0.09		Consistent
Climate Vulnerability	-0.30	0.11	0.004	Strong negative effect

Alternative regression specifications, including district-level fixed effects, were estimated. These results confirm the stability of the predictors across different model specifications.

Appendix A2: Aspirational Gap Heatmap (Fig. 4 in Findings)

Fig. (4) displays the aspirational gap heatmap located in the Findings section. It compares perceived and actual mobility among youth, women, gig workers, and climate-affected households. This figure supplements Table 5 and is not reproduced elsewhere in the report.

Distribution of respondents across selected semi-urban districts in Uttar Pradesh, Bihar, and Madhya Pradesh. These data complement Table 1 in the main text.

Appendix Table A3. Sampling distribution by district.

District	Senior Cohort	Middle Cohort	Young Cohort	Total Interviews
Bhagalpur	10	10	10	30
Indore	10	10	10	30
Gonda	10	10	10	30

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