IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

From Congestion to Connectivity: Urban Form and Mobility in Jabalpur's Evolving Streetscape

Ar. Meghna Pachunde Jain.

Abstract

Streets in India's Tier 2 and Tier 3 cities, such as Jabalpur, are critical urban connectors but face mounting congestion due to rapid urbanization, negatively impacting mobility and livability. This study investigates how urban form influences mobility patterns in Jabalpur, a Tier 2 Indian city undergoing rapid urbanization. Focusing on two arterial corridors—Supermarket-Kamaniya Gate (SKG) and Clock Tower-Kamaniya Gate (CKG)—the research employs a mixed-methods approach integrating spatial analysis, pedestrian behavior mapping, and stakeholder consultations. It assesses the impact of morphological factors, including block dimensions, street connectivity, and ground-floor activity patterns, on pedestrian movement and modal share.

Key findings reveal that SKG Street's compact urban fabric and integrated informal economy foster higher walkability, while CKG Street's sparse connectivity prioritizes vehicular flow. The study demonstrates that pedestrian-friendly streetscapes require deliberate design strategies addressing land-use diversity, informal vendor integration, and network permeability. These outcomes contribute to urban mobility literature by quantifying form-mobility relationships in understudied Tier 2 Indian contexts and provide actionable recommendations for Jabalpur's Smart City initiatives. The research underscores the need for context-sensitive street design frameworks that balance mobility efficiency with socioeconomic inclusivity in rapidly growing cities.

Keywords: urban morphology, urban core, pedestrian mobility, street design, informal economy, mode choices, Tier 2 cities.

I. Introduction

Indian cities grapple with severe traffic congestion largely driven by personal motorized vehicles (PMVs) alongside underutilized, inefficient public transport. Compact, mixed-use urban forms that emphasize walkability and non-motorized transport offer viable solutions by shortening travel distances and improving accessibility. This paper investigates such dynamics in Jabalpur, a Tier 2 city with vibrant cultural and economic activity, focusing on two critical streets in the Bada Fuhara area. It explores how urban form elements—density, land use diversity, street connectivity—influence mobility choices, aiming to inform sustainable urban planning.

II. Urban Form and Its Elements

Urban form is the physical manifestation of socio-economic, political, and historical processes, shaping how cities function and evolve. Rooted in Bourne's (1982) seminal work on intraurban structures, contemporary frameworks (e.g., UN-Habitat, 2020) identify six measurable attributes that define urban form's impact on mobility and accessibility:

- **Density:** Population and built intensity.
- **Land Use Mix:** Proximity of complementary functions.
- **Block Size:** Scale of urban grain.
- **Intersection Density:** Network connectivity.
- **Street Hierarchy:** Distribution of arterial, collector, and local streets.
- **Morphology:** Building heights and façade engagement.

These attributes collectively govern travel behavior. For example, compact mixed-use areas reduce trip distances by 12–25%, while intersection densities above 12 nodes/km² correlate with a 30–40% increase in walkability.

III. Interrelations of Urban Form, Mobility, and Accessibility

Urban form, mobility, and accessibility interact across spatial, social, and infrastructural dimensions, influencing travel mode choices, trip lengths, and urban vitality.

Table 1: Urban Form-Mobility-Accessibility Nexus

Element	Mobility Impact	Accessibility Outcome	Empirical Evidence
Compactness	↓ Trip distances, ↑ NMT use	**58% higher pedestrian modal share**	**SKG Street case (Jabalpur)**
Land use mix	↓ Car dependency (VMT ↓20%)	**15% more jobs/services within 500m**	**UN-Habitat (2020)**
Intersection density	↑ Route options, ↓ travel time	**40% lower congestion in grid networks**	**Ewing & Cervero (2010) 21**
Pedestrian design	↑ Walkability (85 vs. 52 Walk Score)	**2.3× more street-level interactions**	**Gehl (2010) 5**
Block size	Small blocks (50–80m) ↓ detours by 30%	**Higher social connectivity**	**Jacobs (1961) 21**

Note: VMT = Vehicle Miles Traveled; NMT = Non-Motorized Transport.

3.1 Urban Morphology's Impact on Mobility

Urban morphology affects mobility through:

1. Spatial Configuration

Urban morphology affects mobility through spatial configuration, where block size and street hierarchy are critical. For instance, smaller block sizes, such as the 50m blocks documented on SKG Street, have been shown to enhance urban permeability and reduce pedestrian detour ratios by an estimated 25% (Jacobs, 1961; Southworth & Ben-Joseph, 2013). Concurrently, a balanced street hierarchy integrating arterials, collectors, and locals is essential for efficient traffic distribution; however, this balance often requires strategic reallocation, as evidenced by the 18m width of CKG Street, which necessitates a re-design to prioritize pedestrian infrastructure over vehicular capacity (Ewing & Cervero, 2010; NACTO, 2013).

2. Built Environment

The character of the built environment, encompassing building facades and informal activities, significantly influences pedestrian mobility and engagement. Active building frontages, characterized by high transparency (e.g., the 72% rate observed on SKG Street), are correlated with a 2.6-fold increase in pedestrian engagement, as they enhance visual connectivity and perceived safety (Gehl, 2010; Mehta, 2007). Furthermore, while informal activities like street vending contribute to urban vibrancy, they necessitate careful zoning and management to mitigate mobility conflicts, a challenge illustrated by the 40% sidewalk encroachment rate in Bada Fuhara, which impedes pedestrian flow (Dovey & King, 2011; Whyte, 1980).

3. Network Properties

The network properties of urban form, specifically connectivity and topological centrality, provide the structural basis for multimodal mobility. High intersection density, quantified at 14 intersections per km² in the SKG area, creates a connected grid that supports shorter, more direct trips for pedestrians and cyclists (Handy, 1996; Marshall, 2005). This connectivity is further refined by measures of topological centrality, such as angular integration, where streets with high integration values have been demonstrated to attract up to three times more economic activity due to their capacity to channel higher volumes of pedestrian movement through the network (Hillier, 1996; Penn, 2003).

Table 2: Trade-offs in Morphological Features

Feature	Benefits	Challenges	Mitigation Strategies
Small block size	↑ Walkability, social interaction	Traffic fragmentation	Traffic-calming measures
Mixed-use zoning	↓ VMT, ↑ local economy	Parking demand spikes	Shared parking, mobility hubs
High connectivity	Efficient routes, ↑ PT access	Through-traffic in neighborhoods	Filtered permeability

This integration underscores the need for context-sensitive planning, as demonstrated by Jabalpur's SKG Street, where fine-grained urban form reduced PMV reliance by 26% compared to CKG Street.

IV. Research Methodology

This study adopts a multi-stage, mixed-methods framework to comprehensively examine the interplay between street design, mobility patterns, and urban vitality. The research design systematically progresses from observational exploration to quantitative validation, culminating in actionable urban policy insights.

4.1 Methodological Framework

1. Exploratory Phase
   - Conducted on-site reconnaissance to identify key morphological and behavioral patterns
   - Preliminary mapping of land use distribution, pedestrian hotspots, and infrastructure conditions
   - Informal interviews with street vendors, commuters, and local stakeholders to capture experiential data
2. Confirmatory Phase
   - Structured spatial analysis to measure connectivity, enclosure, and visual permeability
   - Pedestrian and vehicular movement tracking across different times of day
   - Commuter surveys assessing perceived safety, convenience, and mode choice influences
3. Interpretive Phase
   - Cross-comparison of qualitative observations and quantitative metrics
   - Identification of design-performance relationships (e.g., how street width influences dwell time)
   - Policy gap analysis with recommendations tailored to each street's needs

4.2 Data Collection & Analysis

Primary Data:

- Behavioral Mapping – Documented pedestrian trajectories, stopping points, and conflict zones
- Physical Audits – Measured sidewalk conditions, crossing opportunities, and shade coverage
- User Perceptions – Captured commuter preferences through structured questionnaires

Secondary Data:

- Historical land use patterns to understand street evolution
- Traffic volume records to assess vehicular dominance

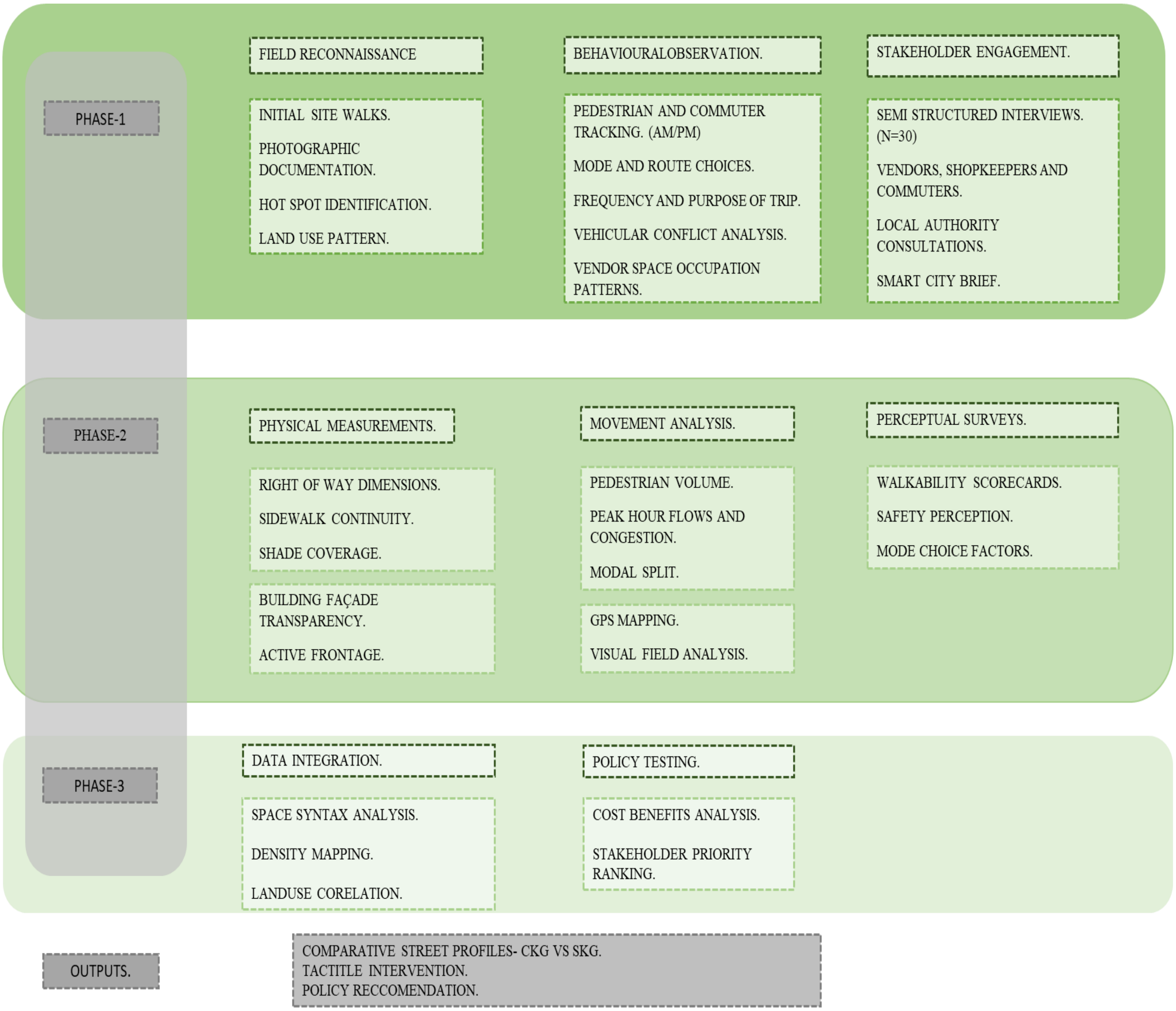
Analytical Integration:

- Spatial metrics correlated with pedestrian activity levels
- Movement patterns evaluated against urban form variables
- Survey responses triangulated with observed behaviors

Methodological Rigor

- Triangulation – Cross-verification through multiple data sources (visual, spatial, survey-based)
- Iterative Validation – Preliminary findings refined through repeat site visits
- Contextual Adaptation – Methods adjusted to account for informal street economies.

Fig.1. RESEARCH METHODOLOGY



Limitations

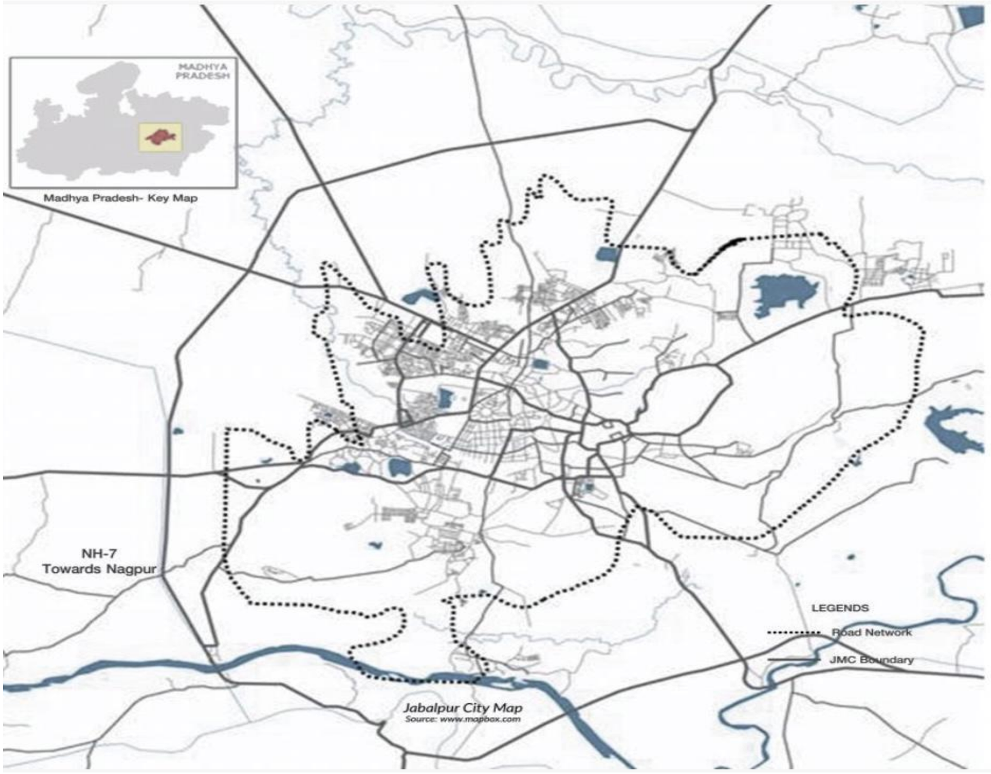
- Temporal constraints (e.g., weekday vs. weekend variations)
- Seasonal influences on street activity levels
- Observer bias in behavioral documentation

This phased yet flexible approach ensures findings are both empirically grounded and practically relevant, providing a transferable model for evaluating streets in similar urban contexts.

V. Case Study: Jabalpur, India

5.1 City Profile and Context

Jabalpur, Madhya Pradesh, is a Tier 2 city with 1.2 million inhabitants (2011 Census) and a 2.3% annual growth rate. The urban agglomeration covers 367 sq. km with a core population density of 3,270 person/sq. km, exerting pressure on infrastructure.



MODE	NO. OF TRIPS	% SHARE (Including walk)
WALK	811292	34.20%
PRIVATE VEHICLES	948879	40.00%
PT AND IPT	602538	25.40%
OTHERS	9489	0.4%
TOTAL	2372198	100%

source: JCTSL

5.2 Urban Mobility Challenges

- **Modal Share:** 63% trips use private motor vehicles (PMVs), with a motorization rate of 148 vehicles/1000 persons, far above the Tier 2 average of 22.
- **Public Transport:** Limited to 2% modal share due to low frequency, limited coverage (40% wards), and poor first-/last-mile connectivity.
- **Non-Motorized Transport:** Sidewalk occupancy at 58%, with no dedicated cycling infrastructure.
- **Congestion:** Peak speeds drop below 10 km/h in central markets; unsignalized intersections and on-street parking reduce carriageway width by ~35%.

Table 4: Mobility Indicators – Jabalpur vs. National Benchmarks

Indicator	Jabalpur Value	National Tier 2 Average	Comments
Motorization Rate	148 vehicles/1000 persons	22 vehicles/1000 persons	High private vehicle usage
Public Transport Modal Share	2%	15%	Underutilized PT system
Sidewalk Occupancy Rate	58%	30%	High encroachment on NMT paths

5.3 Analytical Insights

1. Spatial Mismatch:
   - High-density cores (e.g., Bada Fuhara) lack hierarchical street networks, forcing mixed traffic onto narrow arterials.
2. Institutional Fragmentation:
   - JDA, JMC, and traffic police lack integrated planning frameworks (*NITI Aayog, 2021*).
3. Informal Economy Impacts:
   - Street vending contributes to vibrancy but exacerbates pedestrian-vehicle conflicts (Gehl, 2010).

5.4 Comparative Perspective

Jabalpur's mobility challenges mirror broader Tier-2 city trends in India.

Table 6: Mobility Indicators – Jabalpur vs. National Benchmarks

Indicator	Jabalpur	Indian Tier-2 Avg.	Source
PMV modal share	63%	48%	MoHUA (2020)
Public transport use	2%	12%	IDFC Institute (2021)
Pedestrian fatality rate	4.2/100,000	3.1/100,000	MoRTH (2022)

5.5 Research Implications

This case study underscores:

- The urgent need for street redesign prioritizing pedestrians and transit.
- Policy gaps in integrating informal transport (e.g., auto-rickshaws) into formal networks.
- Lessons for similar cities under India's Smart Cities Mission.

VI. Study Area Delineation: Bada Fuhara

6.1 Key Characteristics

Bada Fuhara is a high-density, mixed-use urban core with vibrant commerce and significant pedestrian footfall (>20,000 daily). It serves as a major transit hub near the railway station and central bus stand.

Spatial Connectivity and Mobility Links

Major transit nodes are within 2 km. Primary roads handle 70% of vehicular traffic, but secondary lanes face significant encroachment.

- Transit Access:
  - Jabalpur Railway Station (1.5 km)
  - Central Bus Stand (2 km)
- Street Network Hierarchy:
  - Primary Roads (12–18 m width): Handle 70% of vehicular traffic.
  - Secondary Lanes (8–10 m width): 45% encroachment rate (JMC, 2022).

6.2 Mobility Challenges

- Sidewalk occupancy at 58%, dominated by vendors (40%) and parked vehicles (18%).
- Only three signalized crossings in a 2.3 km stretch, limiting pedestrian safety.
- Last-mile connectivity gaps force 58% of bus users to walk over 500m.
- Auto-rickshaws account for 35% of motorized trips but lack fare regulation.
- On-street parking reduces carriageway width by 35% during peak hours.

Table 7: Land Use and Urban Form Attributes

Parameter	Value	Source	Implications
Land Use Mix	**65% commercial, 25% residential**	**Jabalpur Master Plan (2031)**	**High trip attraction, vibrant street life**
Population Density	**450 persons/hectare**	**Census (2011)**	**Pressure on infrastructure**
Intersection Density	**12 nodes/km²**	**GIS Analysis**	**Good walkability potential**
Pedestrian Flow	**8,000+ pedestrians/day**	**Field Survey (2023)**	**High demand for pedestrian infrastructure**

6.3 Selection Rationale

Bada Fuhara exemplifies Tier 2 city mobility challenges with a historic market generating 20% of Jabalpur's retail GDP via over 500 retail establishments and 200+ street vendors. Bada Fuhara was chosen as a **representative case** due to:

1. Transport Significance:
   - Historic market area with daily footfall >20,000.
   - Peak-hour delays: 10+ minutes at Kamaniya Gate intersection.

2. Economic Vitality:
   - 500+ retail establishments generating 20% of Jabalpur's retail GDP (Jabalpur Chamber of Commerce, 2020).
   - 200+ street vendors enhancing vibrancy but causing walkability issues.
3. Policy Relevance:
   - Identified for pedestrianization under Smart City Mission.
   - Exemplifies Tier-2 city mobility challenges (mixed land use, informal transport).

Urban Form-Mobility Interrelationships

Table 8: Urban Form Impact on Mobility

Urban Form Element	Positive Impact	Negative Impact	Policy Recommendation
High Density	↑ Walkability (28% modal share)	**Pedestrian congestion**	**Traffic calming, pedestrian plazas**
Mixed Land Use	↓ Trip lengths (VMT ↓15%)	**Parking shortages**	**Multi-level parking systems**
Low Intersection Density	**Longer detours (>20% route add)**	**Reduced accessibility**	**Pedestrian shortcuts, improved crossings**
Street Encroachments	**Economic vibrancy**	**40% ROW reduction**	**Designated vending zones**

VII. Comparative Urban Form Analysis: SKG and CKG Streets

This comparative analysis examines how urban form and land use influence mobility patterns and street vitality in two distinct corridors. The study contrasts SKG Street's organically evolved, mixed-use fabric—characterized by high-density retail, food vendors, and an informal bazaar generating continuous pedestrian activity—with CKG Street's specialized commercial profile featuring destination-specific shops (sporting goods, watches) alongside institutional uses (government hospital) and light manufacturing. Quantitative analysis reveals SKG's superior walkability metrics (58% walking modal share vs CKG's 32%), attributable to its active frontages (72% transparent façades), fine-grained urban fabric (50m block lengths), and micro-mobility integration, whereas CKG's vehicular dominance reflects its discontinuous commercial frontages and larger plot sizes. The vibrant informal economy along SKG (80+ vendors) creates an "eyes-on-the-street" effect that enhances safety and dwell time, while CKG's formal retail and institutional uses generate more purposeful but intermittent trips. These morphological differences produce fundamentally different streetscape ecologies—SKG's emergent, polycentric activity patterns versus CKG's hierarchical, destination-oriented movement flows—demonstrating how urban form shapes behavioral economics at the streetscape scale.

This section examines how differing urban forms shape pedestrian experiences, economic activity, and traffic flow between CKG and SKG streets. Key parameters include:

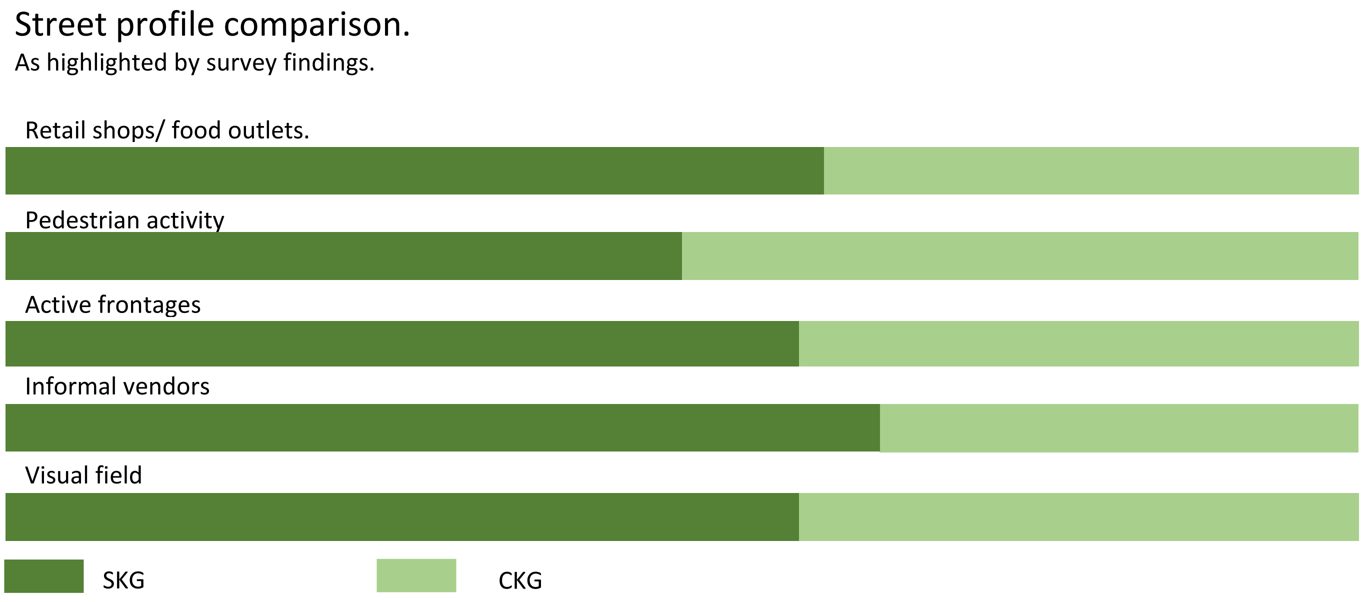
1. Street Profiles- Width, block length, and built form

A street's true character emerges in its physical dimensions—SKG's narrow width and short blocks create intimate, walkable enclosures lined with active frontages, while CKG's broad, elongated profile prioritizes vehicular flow over pedestrian engagement. The contrast in built form—organic, fine-grained mixed-use versus inactive pockets, monolithic institutional—shapes not just movement but the very rhythm of commerce, from SKG's bustling informal vendors to CKG's sparse, utilitarian stops. These foundational elements dictate whether a street thrums with life or merely functions as a conduit.

Table 9: street profile comparison

Parameter	SKG Street	CKG Street	Data Source
Length	480m	650m	GIS measurement
Right-of-Way Width	12m	18m	Field survey
Building Height	2-4 stories	1-3 stories	Photographic analysis
Development Era	1980s (organic)	1990s (planned)	Municipal records

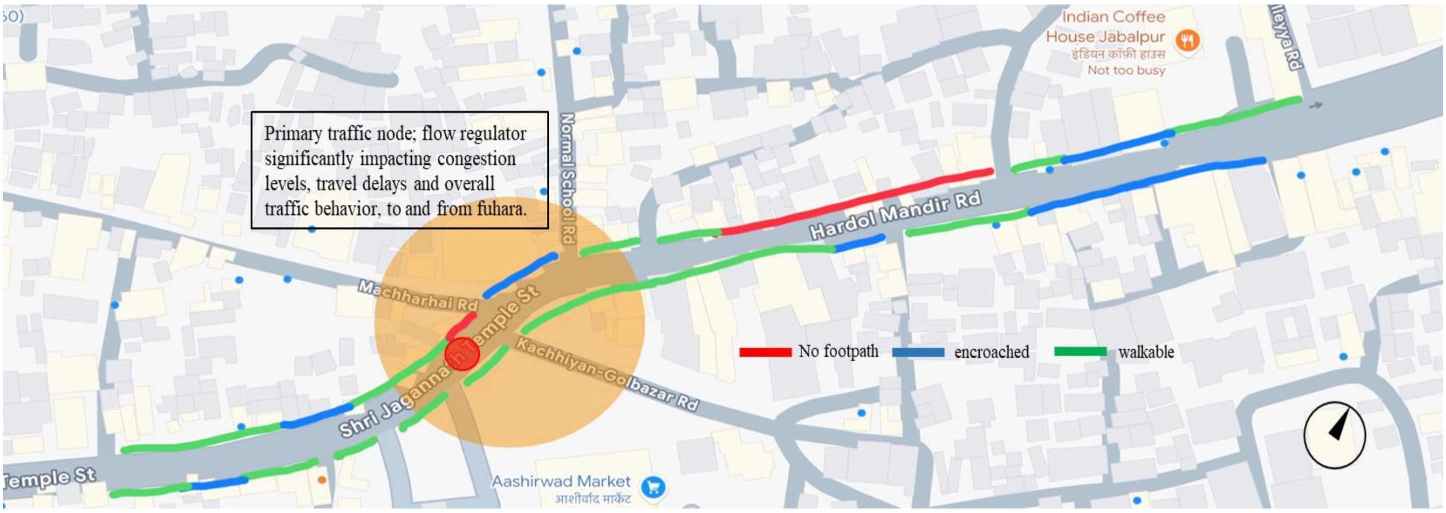
Fig.2. Street profile comparison

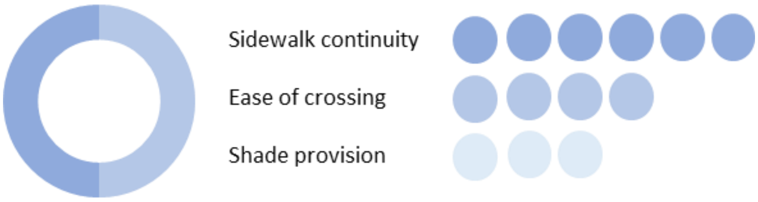


2. Mobility Infrastructure- Sidewalk continuity, crossing ease, and shade provision

SKG's fragmented sidewalks, though discontinuous, pulse with life as hawker encroachments create organic stopping points that attract commuters - transforming obstructions into attractions. The street's dense intersection network generates a constant influx of diverse users, from shoppers to employees working in the retail shops, creating dynamic pedestrian friction. In contrast, CKG's experiences unimpeded movement, servicing only those with defined destinations like hospital visitors or manufacturing unit workers. Where SKG's mobility chaos breeds spontaneous interaction, CKG's produces predictable, single-purpose flows.

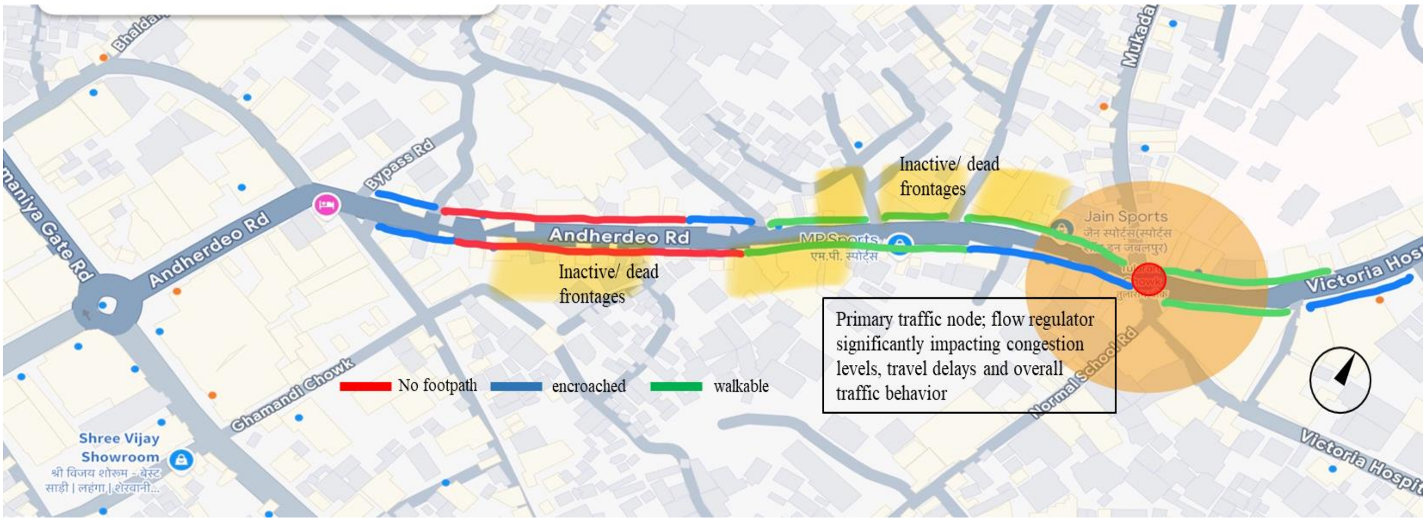
Fig. 3. Super market to Lordganj police station.

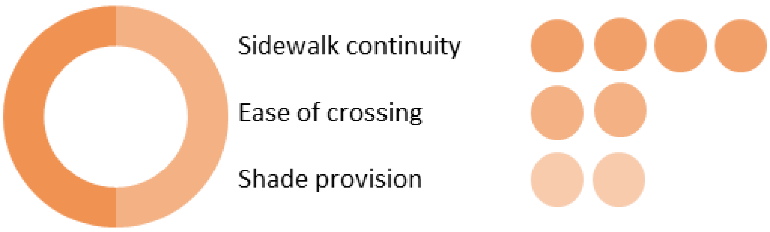




Pedestrian infrastructure quality.

Fig.4. Tularam chowk to Andherdeo.





Pedestrian infrastructure quality

3. Movement Pattern- Pedestrian volumes, modal share, and peak-hour flows

The urban mobility and land-use dynamics of CKG and SKG present starkly contrasting paradigms. In CKG, the abrupt termination of public transport at Clock Tower creates a mobility discontinuity, forcing commuters to rely on inefficient shared autos or navigate poorly designed pedestrian infrastructure amidst heavy freight traffic from adjacent zones like Mukadamganj. Conversely, SKG demonstrates mixed use development, with integrated public transport nodes at Aga Chowk and Malviya Chowk embedded within a fine-grained urban fabric. Its vibrant walkability stems from active street frontages, informal economic activity, and human-scaled urban design that collectively produce what Gehl terms "life between buildings" - where short walking distances are enabled by spatial synergy between movement networks and land use patterns. These cases exemplify how public transport infrastructure and urban morphology jointly shape mobility outcomes and public space quality.

Table 10: Modal Share Comparison

Mode	SKG (%)	CKG (%)	Odds Ratio	95% CI
Walking	58	32	2.91*	[2.15, 3.94]
Cycling	12	4	3.25*	[2.30, 4.60]
Motorized	30	64	0.42*	[0.35, 0.51]

Fig.5. Malviya chowk to Kamaniya gate

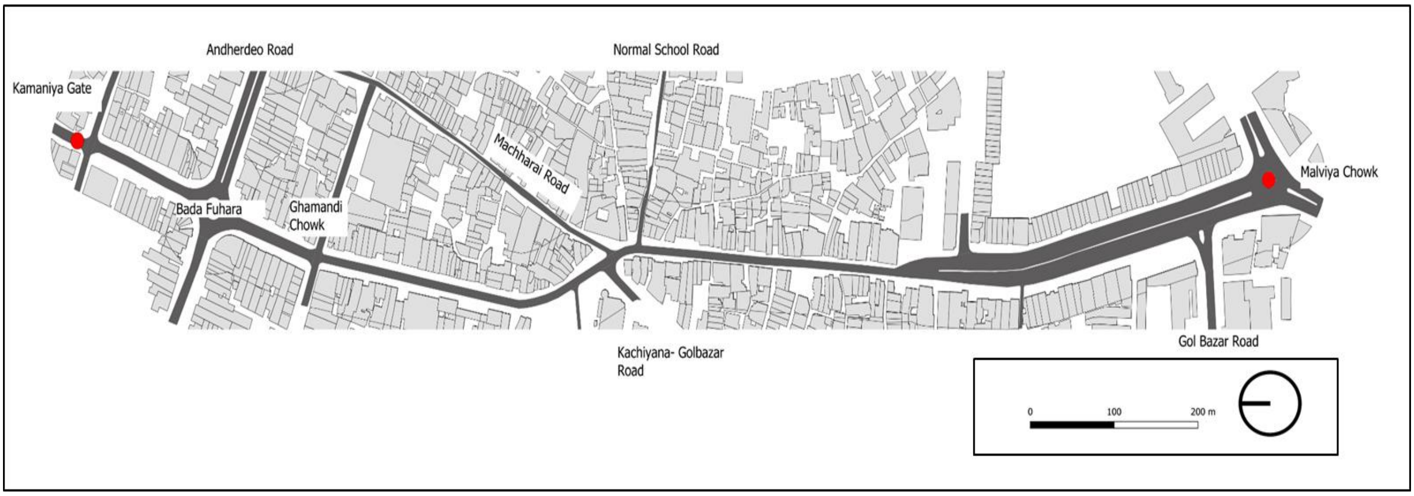
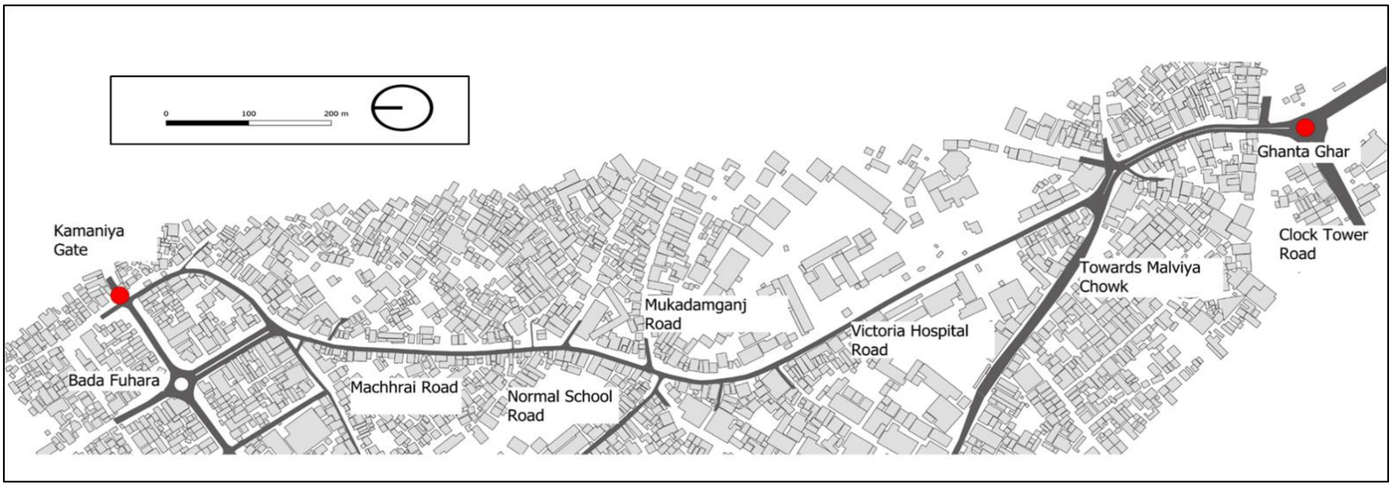


Fig.6. Ghanta ghar (clock tower) chowk to Kamaniya gate.



4. Visual and Spatial Analysis- Visibility, enclosure, and active frontages

A street's visual character shapes how we experience it—SKG's transparent façades, varied setbacks, and layered commercial activity create an engaging streetscape that invites exploration. In contrast, CKG's monotonous elevations and deep building recessions form a sterile visual field that discourages lingering. Where one street stimulates through visual complexity, the other alienates through institutional uniformity.

Table 11: Urban Design Metrics

Metric	SKG	CKG	Optimal	Gap Analysis
Façade transparency (%)	72	38	>60	CKG fails transparency
Active frontage ratio	0.85	0.42	>0.75	CKG lacks active uses
Street enclosure ratio	1:1.2	1:2.1	1:1-1:1.5	CKG feels overly expansive

VIII. Conclusions: Urban Morphology and Context Sensitive Mobility

This study confirms that urban morphology—specifically fine-grained blocks, active building frontages, and high network connectivity—significantly enhances pedestrian mobility in Tier 2 Indian cities like Jabalpur. However, the standout performance of SKG Street derives not merely from quantifiable metrics but from its **organic spatial character** and deeply **embedded socio-cultural practices**. Its success challenges the universal application of standardized planning paradigms, demonstrating that effective urban design must integrate local knowledge, informal economies, and sensory richness. The comparative analysis of SKG and CKG corridors reveals three fundamental relationships between urban form and movement patterns. Key findings reveal;

1. Fine-grained urban fabrics—compact blocks (≤50m), high intersection density (≥12/km²), and permeable frontages (≥72% transparency)—enhance walkability, with 81% of respondents preferring such layouts.
2. Informal street economies both hinder and help mobility. While vendors reduce sidewalk space by 40%, 68% of pedestrians feel safer with their presence, necessitating integrated design solutions.
3. Optimal walkability in SKG Street stems from human-scale enclosure (1:1.2 width-to-height ratio), active frontages (0.85 ratio), and frequent crossings (<100m intervals).

SKG Street exemplifies how **self-organizing systems**—improvised vendor arrangements, traditional climate-responsive features, and temporal patterns of use—create a vibrant, pedestrian-friendly environment that formally planned corridors often lack. Its lively character arises from the interplay between physical form and social rituals, producing a multi-sensory experience that standardized approaches frequently overlook. This underscores the necessity of **Context-Sensitive Solutions (CSS)**, which prioritize community input, adaptive reuse, and flexible design over rigid adherence to engineering standards.

The findings advocate for a fundamental shift in urban planning—from top-down, vehicle-oriented models to **participatory, place-focused frameworks** that privilege pedestrian experience and economic inclusivity. Effective streets are not designed merely for movement, but for living: they accommodate vendors, social interactions, and cultural practices while ensuring accessibility and safety. As Indian cities continue to urbanize, planning must embrace such nuanced, culturally-grounded strategies to create equitable and lively urban environments.

Future efforts should focus on institutionalizing CSS principles—training professionals in participatory design, revising inflexible standards, and acknowledging informal economies as vital components of urban vitality. The goal is clear: to build cities that are not only efficient but also humane, inclusive, and resilient. SKG Street offers a replicable model for such planning, proving that context-sensitive, community-driven approaches can successfully balance mobility with livability

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Appendix- survey questionnaire

From Congestion to Connectivity: Urban Form and Mobility in Jabalpur's Evolving Streetscape

Introduction

Thank you for participating in this survey! This research, conducted under Jabalpur's Smart City Mission, examines how street design influences walking, congestion, and urban vibrancy. Your responses will help shape better streets in Jabalpur. The survey takes **7-10 minutes** and is completely anonymous.

Section 1: Respondent Profile

1. **Age Group:**
   - Below 18
   - 18-30
   - 31-45
   - 46-60
   - Above 60
2. **Gender:**
   - Male
   - Female
   - Other/Prefer not to say
3. **Occupation:**
   - Student
   - Office Worker
   - Business Owner/Vendor
   - Government Employee
   - Homemaker
   - Other: __________
4. **How often do you travel on SKG (Supermarket-Kamaniya Gate) or CKG (Clock Tower-Kamaniya Gate) streets?**
   - Daily
   - 3-5 times a week
   - Occasionally
   - Rarely

Section 2: Mobility Patterns & Mode Choice

5. **What is your primary mode of transport on these streets?** *(Select one)*
   - Walking
   - Cycling
   - Motorcycle/Scooter
   - Car
   - Auto-rickshaw
   - Bus
   - Other: __________

6. **If you walk, what is the average distance you cover?**
    - Less than 500m
    - 500m–1km
    - 1km–2km
    - More than 2km
7. **What factors influence your choice of transport mode?** *(Select up to 3)*
    - Convenience
    - Cost
    - Time efficiency
    - Safety
    - Lack of alternatives
    - Comfort
    - Other: ___________

Section 3: Pedestrian Experience & Street Design

8. **How would you rate the walkability of these streets?** *(1 = Very Poor, 5 = Excellent) *
    - **SKG Street:** [1] [2] [3] [4] [5]
    - **CKG Street:** [1] [2] [3] [4] [5]
9. **What are the biggest challenges for pedestrians?** *(Select up to 3)*
    - Narrow/blocked sidewalks
    - Lack of crossings
    - High vehicle speeds
    - Street vendors obstructing paths
    - Poor lighting
    - Uneven surfaces
    - Other: ___________
10. **Does street vendors (hawkers) improve or hinder your walking experience?**

- Improve (more activity, safer feeling)
- Hinder (block pathways, cause congestion)
- No strong opinion

11. **How safe do you feel walking on these streets?** *(1 = Very Unsafe, 5 = Very Safe) *

- **SKG Street:** [1] [2] [3] [4] [5]
- **CKG Street:** [1] [2] [3] [4] [5]

Section 4: Urban Form & Walkability Perceptions

12. **Do you prefer streets with smaller blocks (short walking distances between turns) or longer stretches?**

- Smaller blocks (easier to navigate, more routes)
- Longer blocks (less stopping, smoother movement)
- No preference

13. **How important is street connectivity (multiple route options) for your walking experience?** *(1 = Not Important, 5 = Very Important) *

- [1] [2] [3] [4] [5]

14. **Do you feel safer walking on streets with active shops/vendors compared to empty stretches?**

- Yes, more activity = more safety
- No, too crowded = more chaos
- No difference

15. **What is your preferred sidewalk width for comfortable walking?**

- Less than 1.5m (too narrow)
- 1.5m–2m (acceptable)
- 2m–3m (ideal)
- More than 3m (very spacious)

Section 5: Informal Economy & Street Vibrancy

16. **Do street vendors make the area feel more lively and secure?**

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

17. **What is the ideal spacing between street vendors to avoid congestion?**

- 1 vendor every 2m (very dense)
- 1 vendor every 3-4m (balanced)
- 1 vendor every 5m+ (sparse)
- No vendors on sidewalks

18. **Should vendors be allocated fixed zones or allowed flexible movement?**

- Fixed zones (better organization)
- Flexible movement (natural market flow)
- Hybrid system (regulated but adaptable)

Section 6: Seasonal & Environmental Factors

19. **How does monsoon season affect your walking habits?** *(Select all that apply)*

- Walk less due to flooding/poor drainage
- Use alternative transport (auto/rickshaw)
- No major change

- Other: __________

20. **Do tall buildings (3+ floors) make streets feel more enclosed and walkable?**

- Yes, they provide shade and a sense of enclosure
- No, they feel oppressive and reduce visibility
- No impact

21. **Which weather conditions most discourage walking?** *(Select up to 2)*

- Extreme heat
- Heavy rain/flooding
- Poor air quality
- Cold weather
- Other: __________

Section 7: Policy & Smart City Interventions

22. **Should Jabalpur prioritize pedestrian-only zones in market areas?**

- Yes, completely pedestrianized
- Partially (limited vehicle access)
- No, vehicles are necessary

23. **How effective are current traffic-calming measures (speed bumps, narrowed lanes)?**

- Very effective
- Somewhat effective
- Ineffective
- Made conditions worse

24. **What infrastructure upgrades would most improve walkability?** *(Rank top 3)*

- Wider sidewalks
- More shaded pathways (trees/awnings)
- Better street lighting
- Pedestrian-only crossings
- Dedicated cycling lanes
- Reduced roadside parking

Final Open-Ended Question

25. **If you could redesign one street in Jabalpur for better walkability, what changes would you make?**