

## CHAPTER 112

### Reframing Urban Mobility: A PRISMA-Guided Systematic Review of Active Mobility in Million-Plus Cities

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#### ABSTRACT

Million-plus cities increasingly grapple with urban congestion, air pollution, and declining public health, prompting a renewed focus on active mobility—encompassing walking, cycling, and other human-powered modes—as a strategic response. This study conducts a systematic literature review using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to examine how active mobility is conceptualized, implemented, and experienced in large urban agglomerations. From an initial pool of 335 records, 50 peer-reviewed, high-impact studies were selected and thematically analyzed across seven domains: infrastructure design, safety and perceived risk, land use and density, environmental sustainability, social equity, behavioural and cultural factors, and governance mechanisms. The review reveals that while the benefits of active mobility are well-documented—ranging from health improvements and emissions reduction to enhanced inclusivity—its widespread adoption remains uneven. Implementation is often hindered by fragmented governance structures, socio-cultural resistance, and infrastructural inadequacies. Particular attention is given to the intersectionality of mobility, where disparities in infrastructure provision and safety perceptions disproportionately affect marginalized groups. Furthermore, behavioural change and cultural narratives around car ownership continue to act as barriers. The study emphasizes the need for integrated, equity-driven, and context-specific policy approaches that position walking and cycling as central to sustainable urban futures. The findings offer a comprehensive knowledge base to inform both future research and urban transport policies aimed at fostering healthier, safer, and more liveable cities through active mobility.

**Keywords:** Active mobility; PRISMA; Walking; Cycling; Urban transport; Systematic review.

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#### 1.0 Introduction

An evident change has been seen in how cities approach non-motorized forms of travel over the last ten years. United Nations Sustainable Development Goals, a global framework (most importantly SDG 11) have played a role in bringing active mobility into sharper policy focus.

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SDG 11 focuses on sustainable cities and communities. Scholars across different disciplines have since taken an interest in this shift, exploring how cities are adapting their infrastructure, governance, and day-to-day practices to better accommodate walking and cycling (Harms & Klooster, 2024; Boehmer & Rowell, 2023). But this transition has not been very straightforward, especially in the million-plus cities. These large urban environments often face mix of challenges, ranging from inadequate footpaths and absent cycle lanes to safety concerns and sprawling urban forms (Goel & Tiwari, 2023; Bosch & Van Acker, 2023). Apart from these practical issues, the research space in itself remains somewhat fragmented, with studies dispersed across disciplines, making it harder for policymakers to draw unified conclusions.

To respond to this gap, the current paper undertakes a systematic literature review using the PRISMA framework. It takes the focus specifically to studies that address active mobility for the million-plus cities. The objective here is to bring together key findings, trace major themes, and highlight persistent barriers. Along with that, this review hopes to support both future academic work and the development of more informed mobility policies. Active mobility brings in array multiple urban benefits—from easing congestion and reducing emissions to improving public health and fostering inclusiveness (Pucher & Buehler, 2010; Nogueira & Borges, 2024). What follows is a step-by-step breakdown: Section 2 walks through the methodology; Section 3 identifies thematic patterns from the literature; Section 4 offers deeper analysis and reflection; and finally, Section 5 concludes with practical suggestions aimed at urban practitioners and decision-makers.

## **2.0 Methodology**

### **2.1 Systematic literature review approach**

This study adopts the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Moher *et al.*, 2009) to ensure a rigorous, transparent, and replicable review process. The primary objective is to identify scholarly literature that examines active mobility in urban areas with populations exceeding one million, with a focus on walking, cycling, and non-motorized transport planning.

### **2.2 Search strategy and inclusion criteria**

The literature search was conducted using the Web of Science and Scopus databases, chosen for its comprehensive indexing of multidisciplinary research. The following Boolean search string was used: “active mobility” AND (“million plus cit\*” OR “cit\*”). The initial search generated a total of 335 records. To refine the dataset, subject areas unrelated to the study; such as materials science, chemistry, and physics were excluded, which removed 95 records. An additional 15 non-English language entries were also filtered out. After applying these criteria, a total of 225 records remained and were further screened for relevance through a review of their titles and abstracts.

## 2.3 Screening and exclusion

Records were excluded if they were: duplicates or retracted works, book chapters ( $n = 23$ ), review articles ( $n = 5$ ), editorials or errata ( $n = 3$ ) and non-peer-reviewed content. This led to the exclusion of 33 documents. Of the 192 reports sought for full retrieval, 3 could not be accessed, leaving 189 records for eligibility assessment.

## 2.4 Final selection

After full-text review, 166 studies were included in the review. Out of these, 50 papers were identified as highly relevant and subjected to in-depth thematic analysis, as they offered direct insights into active mobility challenges, solutions, or frameworks applicable to million-plus cities.

## 2.5 PRISMA flow diagram

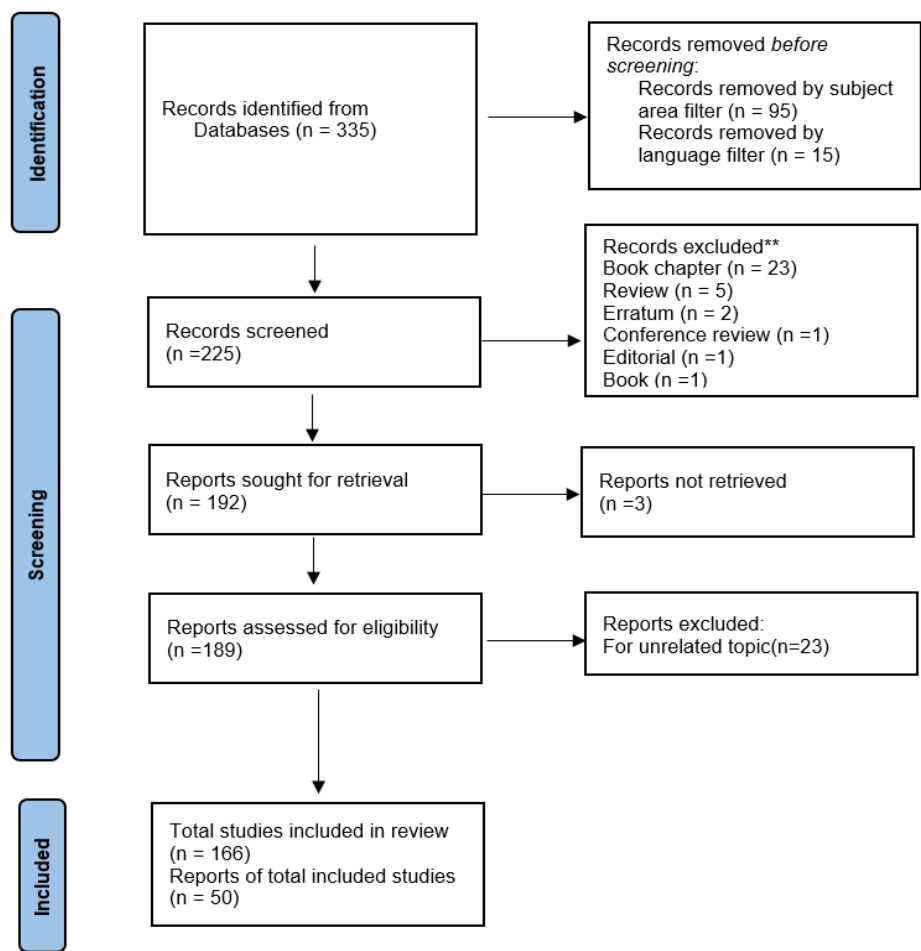
The entire process is summarized in Figure 1, which illustrates the document selection journey from identification to inclusion.

## 3.0 Thematic Findings

The 50 selected studies offer a nuanced understanding of the multidimensional factors shaping active mobility in million-plus cities. These factors have been clustered into seven key themes: Infrastructure and Design, Safety and Perceived Risk, Urban Density and Land Use, Environmental Sustainability, Social Equity and Inclusion, Behavioural and Cultural Factors & Governance and Policy Frameworks based on recurrence in literature and relevance to urban transport systems. Infrastructure continues to be the foundational enabler of active mobility. Studies such as Fonseca *et al.* (2023) and Castrellon & Sanchez-Diaz (2023) emphasize that cities with dedicated, connected, and well-maintained cycling lanes, sidewalks, and intersections show higher rates of walking and cycling. For instance, Jain *et al.* (2022) observed that pedestrian skywalks and foot-over-bridges in Indian megacities are often underutilized due to design disconnects and poor accessibility. Similarly, Zhao & Li (2022) found that multimodal integration, particularly between bike networks and public transit stations in Chinese urban clusters, significantly enhances usage. Safety concerns—ranging from vehicular threats to gendered experiences of public space—remain one of the most critical deterrents.

Goel & Tiwari (2023) and Zhou *et al.* (2020) suggest that traffic-calming measures, lighting, and zoning for non-motorized traffic improve user confidence. Lankarani *et al.* (2021) used data from Tehran to show that high pedestrian fatality rates are directly linked to missing crosswalks and unregulated speed zones. Similarly, Chakraborty *et al.* (2022) highlight how safety fears, especially harassment, prevent women from engaging in walking as a mode of commuting in Indian cities. Urban density shapes mobility patterns by influencing the spatial layout of everyday destinations. High-density, mixed-use environments encourage walking and cycling by minimizing travel distances (Wang & Yang, 2023; Bosch & Van Acker, 2023).

Figure 1: PRISMA Flow diagram for Systematic Review



Martens & Hurkmans (2022) found that Dutch cities with well-implemented mixed-use zoning saw up to a 60% increase in cycling trips. In contrast, suburban sprawl and segregated land uses act as barriers, especially when distances between homes, schools, and workplaces are too vast for non-motorized modes. Active mobility has become increasingly tied to sustainability discourse. Cities that have invested in walking and cycling infrastructure report measurable reductions in air pollution and carbon emissions (Kim & Cho, 2023; Nogueira & Borges, 2024). These modes also align with climate adaptation goals. In several European studies, active mobility is viewed not only as a transport alternative but also as a resilience-building strategy for reducing vehicular dependency during climate or health crises.

A recurring critique across studies is the neglect of active mobility needs among marginalized communities. Teixeira & Nunes (2024) and Ray & Mukherjee (2023) argue that

inclusive urban design—one that considers gender, income, age, and ability—is central to mobility justice. Soni & Acharya (2021), studying Mumbai, revealed that over 70% of slum dwellers lacked basic walking infrastructure, directly compromising access to jobs, education, and healthcare. Such disparities indicate that without equity lenses, active mobility interventions risk being exclusionary. Cultural attitudes and personal behaviour significantly impact active mobility uptake.

**Table 1: Key Themes, Challenges, and Representative Studies**

Theme	Challenges Identified	Sample Studies
Infrastructure and Design	Discontinuity, poor quality, lack of integration	Fonseca <i>et al.</i> (2023); Jain <i>et al.</i> (2022); Zhao & Li (2022)
Safety and Perceived Risk	Collisions, crime, harassment, unsafe crossings	Goel & Tiwari (2023); Lankarani <i>et al.</i> (2021); Chakraborty <i>et al.</i> (2022)
Urban Density and Land Use	Sprawl, lack of nearby destinations	Wang & Yang (2023); Bosch & Van Acker (2023); Martens & Hurkmans (2022)
Environmental Sustainability	Emissions, noise, poor air quality	Kim & Cho (2023); Nogueira & Borges (2024)
Social Equity and Inclusion	Neglect of vulnerable groups	Teixeira & Nunes (2024); Ray & Mukherjee (2023); Soni & Acharya (2021)
Behavioural and Cultural Factors	Car-centric culture, low prestige of cycling	Oliveira & Ferreira (2023); Mertens & Declercq (2023); de Geus <i>et al.</i> (2023)
Governance and Policy Frameworks	Fragmented policies, lack of inter-agency coordination	Peters & Mertens (2023); Shrestha & Singh (2023)

In several cities, car ownership remains an aspirational symbol, while walking or cycling is associated with lower social status (Oliveira & Ferreira, 2023). Mertens & Declercq (2023) emphasize the need for behavioural nudges, such as employer-led incentives or community campaigns. In Brussels, de Geus *et al.* (2023) found that fitness goals, climate concerns, and social visibility were primary motivators for sustained cycling behaviour, especially among younger demographics. Governance remains a linchpin in the active mobility ecosystem. Peters & Mertens (2023) and Shrestha & Singh (2023) argue for cross-sectoral collaboration, where municipal transport, urban planning, and public health departments jointly design and monitor mobility strategies. Many cities still lack dedicated agencies or budgets for non-motorized transport. The literature suggests that institutional clarity, stakeholder engagement, and monitoring mechanisms are critical for translating mobility plans into actual infrastructure and behaviour change. The literature reveals that active mobility in million-plus cities is shaped by a complex interplay of infrastructure quality, safety perceptions, governance

frameworks, and socio-cultural norms. While investments in pedestrian and cycling infrastructure are essential, studies highlight that infrastructure alone is not sufficient to encourage widespread adoption. Challenges such as poor connectivity, discontinuous paths, and inadequate design often result in underutilization (Fonseca *et al.*, 2023; Zhao & Li, 2022). For instance, pedestrians in the Global North—such as Copenhagen and Amsterdam—demonstrate that active mobility thrives when supported by long-term planning, political consistency, and civic engagement (Pucher & Buehler, 2010).

In contrast, cities in the Global South often face governance gaps, informal land use, and fragmented transport systems that hinder sustained investment. However, success stories like Bogotá's *Ciclovía* show that even low-cost, temporary interventions can reshape public perceptions of mobility (Montes *et al.*, 2012). Cultural attitudes also play a role, with cycling often perceived as inconvenient or low-status in many regions. Behavioural studies suggest that cycling uptake increases when supported by social incentives, visibility campaigns, and health or environmental motivations (Mertens & Declercq, 2023; de Geus *et al.*, 2023). Without addressing these deeper norms, infrastructure alone is unlikely to shift modal choices meaningfully. Finally, several studies emphasize that active mobility should be viewed as a public health and sustainability strategy rather than just an alternative to car travel. Walking and cycling can support long-term health goals, reduce emissions, and improve air quality (World Health Organization, 2022; Nogueira & Borges, 2024). Planning approaches must move beyond isolated projects and instead adopt integrated, cross-sectoral frameworks that align transport, health, equity, and climate objectives. However, global best practices are not always directly applicable—cities must adapt these strategies to local social, climatic, and spatial conditions (UN-Habitat, 2020). In essence, cities need to shift from car-centric thinking to human-centred mobility planning that embeds active transport into the fabric of urban life.

#### 4.0 Discussion

Active mobility in million-plus cities is not just a function of infrastructure deployment but of deeper social, spatial, and institutional dynamics. The literature throughout points to a strong relation between the presence of pedestrian-friendly environments and the frequency of walking and cycling. Still, building physical infrastructure alone rarely guarantees meaningful impact. When infrastructure such as footbridges and cycle tracks, aren't aligned with how people actually navigate the city or when they lack proper links to nearby transit options, they often remain underutilised (Jain *et al.*, 2022; Zhao & Li, 2022).

This shows that simply building physical infrastructure doesn't always lead to meaningful change. This emphasizes the need to equip infrastructure planning within a broader ecosystem of land use, accessibility, and behavioural design. In cities like Amsterdam or Copenhagen, often refer to as models for active mobility (Pucher & Buehler, 2010), infrastructure has evolved in tandem with compact urban form and policy commitment. In

contrast, most global south cities suffer from fragmented implementations—isolated footpaths, unprotected crossings, and cycle tracks that end abruptly, revealing a disconnect between vision and execution. Moreover, the discussion around safety reveals a stark divergence between statistical safety (i.e., crash data) and perceived safety. While traffic calming and better lighting can reduce accidents (Zhou *et al.*, 2020), subjective fears, especially among women, the elderly, and youth, remain high. Studies from Tehran (Lankarani *et al.*, 2021) and Indian urban areas (Chakraborty *et al.*, 2022) show that unsafe intersections and harassment deter non-motorized travel, even in well-lit or pedestrianized zones. Public spaces are experienced differently by everyone. For many women, LGBTQ+ individuals, and those from lower-income communities, something as routine as walking or cycling can feel layered with unease—sometimes because of previous experiences, but often simply due to the atmosphere of a place. It's not always about what's visible; it can be about what's sensed. In these cases, simply adding infrastructure won't do much on its own. What's often missing are social supports—like having visible community presence, designing spaces that actually reflect who uses them, or even just giving people a say in how things are planned. These steps might not be quick fixes, but they could help people feel that walking or cycling is actually meant for them.

Questions of equity and governance run through nearly every discussion on active mobility, shaping not just access but also how people experience walking and cycling in cities. While there's no shortage of work on physical planning, far fewer studies take a closer look at who actually benefits. Not much has been written about how mobility feels different depending on who you are. A few studies—Soni & Acharya (2021), and more recently, Teixeira & Nunes (2024) have pointed this out, especially in the context of low-income communities, slums, and people with disabilities. What they've found is very clear, but still disturbing. In parts of Mumbai, for instance, more than 70% of people living in informal settlements don't have a paved footpath within a kilometre of their homes (Soni & Acharya, 2021). That means walking, something most of us take for granted, isn't just inconvenient; it's difficult, even unsafe.

Also the problem isn't just physical. There's something deeper going on. A pattern, maybe. High-visibility infrastructure gets prioritized—things that look impressive, often at the cost of smaller, everyday improvements that would actually help people move around more easily. That sort of bias often feels embedded in the way urban planning unfolds. It might not be deliberate most of the time, but the outcomes still reflect it, especially in what gets prioritized and what gets overlooked. Governance adds on as one more layer of complexity. Active mobility is a shared responsibility of transport, health, and urban development, making coordination a constant struggle (Peters & Mertens, 2023). No one truly takes full ownership. It ends up overlooked, because it doesn't sit perfectly within anyone's domain: part of it is handled by transport departments, a part by health agencies, and some by urban planning. But without clear coordination, things just stall. Departments don't always talk to each other, and the result is a lot of good ideas left halfway implemented. Culture makes it even more complicated. In many places, even in poorer neighbourhoods, owning a car still feels like a big achievement. For



a lot of people, owning a car isn't really just about convenience or getting from one place to another. It's a symbol—something that says you've made progress or reached a certain place in life. That feeling runs deep and doesn't change overnight. Travel choices of people are often shaped by emotional ties, cultural meanings, and personal aspirations, where practical concerns like cost or speed also play a part (Oliveira and Ferreira, 2023, and de Geus *et al.*, 2023). Changing that kind of thinking takes time. Local programs like bike-to-school efforts, small walking campaigns can help to bring in shift in people's, but only if they're consistent and grounded in what they actually care about. So maybe the real challenge isn't just designing better infrastructure or writing better policy. It's understanding how people live, what they value, and what they fear. When planners start from that point, walking and cycling stop being abstract goals—they become part of the everyday lives' cities are meant to support.

## 5.0 Conclusions

This review underscores the increasing recognition of active mobility (specifically walking and cycling) as a vital element in sustainable transport planning for large urban centres. With growing concerns about public health, climate change, and liveability, integrating non-motorized transport into mainstream mobility systems is no longer optional. The review of 50 studies demonstrates that while the benefits of active mobility are well-documented, its widespread adoption is often obstructed by challenges related to infrastructure quality, safety, fragmented governance, and persistent socio-cultural resistance. Seven major themes were identified as key influencers of active mobility outcomes: infrastructure design, safety, land use and density, environmental sustainability, equity, behavioural patterns, and governance mechanisms. These factors are deeply interconnected.

For instance, the lack of safe and accessible infrastructure tends to affect vulnerable groups the most, while car-dominant norms discourage walking or cycling even where facilities are present. In cities of the Global South, additional hurdles such as inconsistent policies, gaps in inter-agency coordination, and unreliable data further complicate implementation. Addressing these challenges calls for a comprehensive set of actions that align policy, design, and behaviour. First, there is a need to invest in high-quality, inclusive infrastructure. Urban streets should be equipped with continuous footpaths, protected cycling lanes, accessible crossings, and direct connections to public transit. Infrastructure must accommodate all users (including children, the elderly, and persons with disabilities) through universal design standards. Second, safety should be embedded into urban design rather than treated as a corrective add-on. Measures such as traffic calming, well-lit streets, and gender-responsive planning are essential to reducing accidents and enhancing the overall perception of safety.

It is equally important for authorities to respond to harassment and monitor high-risk zones, particularly in cities where public safety is a recurring concern (Chakraborty *et al.*, 2022). Third, active mobility must be rooted in equity. Many people in informal settlements or low-



income neighbourhoods depend on walking as their primary mode of travel. These populations are often excluded from mainstream transport planning. Incorporating participatory methods and local audits into planning processes can help surface everyday mobility challenges that remain invisible in top-down approaches (Soni & Acharya, 2021). Fourth, changing how people perceive walking and cycling is just as important as building infrastructure. Behaviour change initiatives such as school-based programs, car-free days, and awareness campaigns can play a major role in shifting norms. Successful examples like Bogotá's Ciclovía show how temporary road closures can challenge entrenched car culture and promote a more inclusive view of street use (Montes *et al.*, 2012). Fifth, institutional coordination is crucial. Cities need dedicated active mobility units supported by multi-sectoral teams and long-term funding.

Urban mobility should not sit solely within traffic departments but should intersect with public health, education, climate action, and social welfare (Peters & Mertens, 2023). A collaborative framework ensures that walking and cycling are treated as public goods rather than traffic flow problems. Sixth, it is essential to adapt global best practices to fit local realities. Strategies from cities like Amsterdam or Copenhagen offer useful guidance but cannot be replicated without considering regional variations in culture, climate, and urban form. Cities in the Global South need to develop tailored frameworks that reflect their specific conditions, supported by context-aware research and planning tools (Nogueira & Borges, 2024). Lastly, active mobility must be positioned within broader policy goals. It directly contributes to multiple Sustainable Development Goals, particularly SDG 3 (Good Health and Well-being), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). National and local mobility policies should reflect this alignment through clearly defined outcomes, monitoring mechanisms, and dedicated resources (World Health Organization, 2022; UN-Habitat, 2020). In sum, the transition to active mobility is not just a matter of infrastructure—it is equally about shifting mindsets, institutions, and governance models. For million-plus cities aiming to become more liveable and resilient, walking and cycling must move from being peripheral alternatives to becoming central, foundational components of everyday urban life.

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