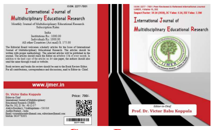
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BEYOND THE BICYCLE LANE: A COMPARATIVE ANALYSIS OF ACTIVE TRANSPORTATION INFRASTRUCTURE IN INDIAN AND U.S. WEST COAST CITIES

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Abstract

Active transportation is increasingly positioned as a response to climate change, traffic injury, public-health inequity, and urban congestion. Yet the relationship between infrastructure provision and actual walking and cycling differs sharply across urban contexts. This article compares active transportation infrastructure in selected Indian cities (Delhi, Pune, Bengaluru, and Chennai) and U.S. West Coast cities (Seattle, Portland, San Francisco, and Los Angeles). Using a structured comparative case-study approach and evidence from peer-reviewed research, official plans, design guidance, and program evaluations, the analysis examines six dimensions: latent and observed demand, network continuity, safety and speed management, institutional capacity, social equity, and climate responsiveness. The findings reveal an infrastructure-demand paradox. Indian cities sustain extensive walking and cycling, much of it by necessity, while frequently failing to provide continuous, obstruction-free, and safely maintained facilities. West Coast cities typically possess more mature standards, stable planning institutions, and increasingly sophisticated protected networks, but their active-mode investments operate within metropolitan landscapes shaped by low-density development, long trip distances, and automobile dependence. Neither context therefore represents a transferable model in its entirety. Indian cases demonstrate the importance of designing for the large population that already walks, cycles, and accesses transit on foot, while West Coast cases illustrate the value of network planning, quick-build implementation, speed management, and institutionalized funding. The article argues that successful active transportation policy must move beyond project counts toward universal, connected, climate-responsive networks that treat walking and cycling as essential mobility rather than discretionary recreation.

Keywords: active transportation; walking; cycling; complete streets; India; U.S. West Coast; transportation equity; urban mobility

1. Introduction

Walking, cycling, and other forms of human-powered mobility occupy an unusual position in contemporary transportation planning. They are simultaneously the oldest forms of urban movement and among the most prominent elements of current climate, health, and road-safety policy. Investments in sidewalks, protected bicycle lanes, safe intersections, neighborhood greenways, traffic calming, bicycle parking, and first- and last-mile connections can reduce exposure to traffic violence, expand access to public transport, increase physical activity, and lower transportation emissions (Fitch-Polse & Agarwal, 2025; Pucher & Buehler, 2010). These benefits, however, do not arise from isolated facilities. They depend on whether active transportation infrastructure forms a continuous, legible, accessible, and socially inclusive network.

Comparisons between India and the United States often begin with income, motorization, or engineering standards. Such comparisons can obscure the more analytically important contrast between travel demand and institutional response. In many Indian cities, walking and cycling remain indispensable for low-income households, informal workers, schoolchildren, transit riders, and people making short neighborhood trips. Much of this activity occurs despite fragmented footpaths, hazardous crossings, encroachment, poor lighting, mixed traffic, and weak maintenance. Indian urban policy has repeatedly recognized the principle of moving people rather than vehicles, but implementation remains uneven across jurisdictions and corridors (Ministry of Urban Development, 2014; Tiwari, 2001). By contrast, several U.S. West Coast

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cities have formal bicycle and pedestrian plans, complete-streets policies, Vision Zero programs, dedicated funding, and increasingly detailed design guidance. Nevertheless, decades of automobile-oriented land use and roadway investment continue to limit the share of trips that can conveniently be made without a car.

This article asks three questions. First, how do Indian and U.S. West Coast cities differ in the physical form, continuity, and governance of active transportation infrastructure? Second, how do those differences interact with safety, social equity, climate, and travel behavior? Third, which practices can be transferred across contexts, and which require substantial adaptation? The purpose is not to rank two national systems or to treat either group of cities as internally uniform. Instead, the article uses paired urban cases to identify recurring structural differences and shared implementation challenges.

The central argument is that the two contexts exhibit an infrastructure-demand paradox. Indian cities often have substantial existing active travel but insufficient protection, whereas West Coast cities often have comparatively stronger protection in selected networks but weaker metropolitan-scale demand because origins and destinations are dispersed. This distinction matters for policy. In India, the first obligation is frequently to protect mobility that already exists and prevent active travelers from being displaced by motorization. On the West Coast, infrastructure must both protect current users and make walking and cycling feasible for a broader population. In both settings, the decisive unit of success is not an individual sidewalk or bicycle lane but the complete trip.

2. Conceptual Framework and Method

2.1 Defining active transportation infrastructure

Active transportation infrastructure includes more than sidewalks and bicycle lanes. For this study, it encompasses five interacting layers: linear facilities, including sidewalks, cycle tracks, bicycle lanes, trails, and low-stress streets; intersection treatments, including raised crossings, refuge islands, leading pedestrian intervals, protected intersections, and bicycle signals; network-support facilities, such as wayfinding, bicycle parking, bikeshare, lighting, shade, drainage, and repair stations; access connections to transit, schools, employment, markets, and public services; and operating policies that shape infrastructure performance, including speed limits, parking management, curb regulation, freight loading, maintenance, and enforcement. This broader definition reflects evidence that facility type, intersection exposure, motor-vehicle speed, and continuity collectively determine perceived and actual safety (Cicchino et al., 2020; Pucher & Buehler, 2016).

2.2 Comparative dimensions

The cases are evaluated through six dimensions. The first is demand and urban form, including trip length, density, mixed land use, and dependence on public transport. The second is network quality, particularly continuity, physical separation, accessibility, intersection design, and maintenance. The third is safety, including exposure to high-speed traffic and the extent to which a safe-system approach is embedded in street design. The fourth is governance and delivery, covering plans, standards, funding, interagency coordination, and maintenance responsibility. The fifth is equity, including who relies on active modes, who receives investment, and whether projects reduce or reproduce spatial disadvantage. The sixth is climate responsiveness, including heat, rainfall, shade, drainage, air pollution, and links to emissions reduction.

2.3 Case selection and evidence

Delhi, Pune, Bengaluru, and Chennai were selected because they illustrate distinct Indian approaches: metropolitan-scale planning and institutional fragmentation in Delhi, complete-streets and bicycle-plan innovation in Pune, technology-led growth and contested street space in Bengaluru, and municipal complete-streets institutionalization in Chennai. Seattle, Portland, San Francisco, and Los Angeles represent a range of West Coast conditions, from compact and relatively high active-mode environments to highly dispersed metropolitan urbanism. They also provide mature examples of modal plans, neighborhood greenways, quick-build programs, Vision Zero, and voter- or grant-supported capital delivery.

The study synthesizes peer-reviewed literature, government policies and plans, municipal program reports, and documentation from transportation research and practice organizations. Because definitions and data collection methods differ between India and the United States, the article does not construct a single quantitative ranking. Mode-share data based only on commuting are especially inadequate because they omit school, care, shopping, access-to-transit, and informal-work trips. The analysis therefore uses reported figures selectively and emphasizes institutional and spatial comparison. This approach supports analytical generalization but does not substitute for corridor-level audits, household travel surveys, or crash-exposure modeling.

3. The Indian Context: High Use, Uneven Protection

3.1 Structural conditions

Indian urban transportation combines density, mixed land use, extensive public-transport use, rapidly rising motorization, and highly heterogeneous traffic. Pedestrians, cyclists, cycle-rickshaws, motorcycles, cars, buses, freight vehicles, vendors, and parked vehicles frequently compete within the same right-of-way. Short distances and mixed uses can make walking and cycling practical, yet street design and management often allocate disproportionate space to motor-vehicle movement and storage. Tiwari (2001) described many low-income residents as captive pedestrians whose mobility needs were insufficiently represented in transport investment. Two decades later, the underlying equity problem remains recognizable, even as active mobility is more visible in national and city policy.

The National Urban Transport Policy emphasized the movement of people rather than vehicles and acknowledged the lack of safe, conflict-free space for pedestrians and cyclists (Ministry of Urban Development, 2014). National street-design guidance has likewise recognized heterogeneous traffic and the need to accommodate nonmotorized users. The policy problem is thus not simply an absence of technical knowledge. It is a persistent gap among standards, capital allocation, construction practice, utility coordination, enforcement, and maintenance.

Climate conditions add another layer. Extreme heat, monsoon rainfall, localized flooding, dust, and air pollution can make short trips physically stressful. A nominal sidewalk that lacks shade or drainage may be legally present but functionally unusable. Likewise, a cycle track that becomes a parking lane, vending strip, construction zone, or receptacle for debris does not provide a reliable network. Indian active transportation planning therefore requires an operations-and-maintenance perspective as much as a design perspective.

3.2 Delhi: Ambition constrained by fragmentation

Delhi demonstrates both the need for active transportation and the difficulty of delivering it across a fragmented metropolitan governance system. The city has high densities, extensive bus and metro systems, and large volumes of walking for access and transfer. Research on the health and environmental co-benefits of active transportation in Delhi found meaningful existing time spent walking, alongside substantially lower cycling levels, and identified the potential benefits of mode shift (Bhat et al., 2022). Yet arterial roads, grade-separated junctions, long crossing distances, severe air pollution, and discontinuous facilities create significant barriers.

Delhi has implemented streetscape improvements and bicycle facilities on selected corridors, but project quality and durability vary. A redesigned segment can provide high-quality paving, lighting, landscaping, and separation while still failing at intersections, bus stops, driveways, or the boundary between implementing agencies. Maintenance failures can rapidly erase the value of capital investment. This is not merely an aesthetic concern. Debris, broken surfaces, standing water, parked vehicles, and utility works can force pedestrians and cyclists into moving traffic.

The Delhi case reveals a governance principle with wider relevance: an active transportation network cannot be managed as a collection of beautification projects. It requires clear ownership across the full asset life cycle, including design review, construction inspection, utility reinstatement, encroachment management, and routine repair. It also requires network planning that connects metro stations, bus corridors, neighborhoods, schools, and markets rather than concentrating improvements around prominent central locations.

3.3 Pune: Complete-streets leadership and the implementation gap

Pune is one of India's most frequently cited active-mobility cases. The city adopted Urban Street Design Guidelines and advanced an ambitious complete-streets program intended to transform more than 100 km of streets. Its bicycle plan envisioned a 300 km network, with facility types differentiated by traffic speed and context (Institute for Transportation and Development Policy India, 2018a, 2019). Redesigned corridors such as Jangli Maharaj Road demonstrated how footpaths, crossings, landscaping, transit access, vending accommodation, and cycle facilities could be integrated within a constrained right-of-way.

Pune's importance lies not only in individual designs but also in the attempt to institutionalize a common street language. Citywide guidelines can reduce the tendency for each corridor to become an isolated consultant exercise. They can also improve procurement by specifying dimensions, materials, accessibility, and the relationship among frontage, pedestrian, furniture, cycling, parking, and carriageway zones.

Nevertheless, Pune also illustrates the difficulty of moving from exemplary corridors to a connected network. Ambitious kilometer targets do not guarantee continuity, and implementation can be weakened by intersections, parking pressure, construction quality, or incomplete links. Cycling demand is especially sensitive to the weakest segment because a protected track that ends at a fast junction transfers risk to the user. Pune's experience therefore supports a shift from measuring kilometers delivered to measuring destinations connected, dangerous crossings treated, and population placed within reach of a low-stress network.

3.4 Bengaluru: Latent demand amid contested rights-of-way

Bengaluru's compact older neighborhoods, large employment centers, expanding metro, and severe congestion create substantial potential for active access. At the same time, rapid peripheral growth, discontinuous street grids, large technology campuses, high traffic volumes, and overlapping institutional responsibilities complicate delivery. Sidewalk conditions vary sharply, and pedestrians frequently encounter utility boxes, trees placed without adequate clear width, open drains, driveway conflicts, parked motorcycles, and abrupt grade changes. Cycling projects have often been episodic, with recreational corridors or pilot facilities failing to form a comprehensive commuter network.

The city demonstrates why first- and last-mile planning should be treated as core transit infrastructure. Metro investment does not automatically produce accessible stations. The practical catchment of a station depends on continuous footpaths, safe crossings, lighting, shade, bicycle access, parking, and connections through large blocks or gated developments. A short missing connection can dramatically reduce access even when the station is geographically close.

Bengaluru also highlights the politics of scarcity. Reallocating road space from traffic or parking to walking and cycling is often framed as a loss of vehicle capacity, although many users already reach employment districts on foot, by bicycle, or through transit transfers. Tactical projects and corporate active-mobility programs can build support, but lasting change requires metropolitan agencies, the municipal corporation, traffic police, transit agencies, and utility providers to share performance targets.

3.5 Chennai: Municipal institutionalization of complete streets

Chennai provides one of the clearest Indian examples of institutional commitment to walking. The city adopted a nonmotorized transport policy that prioritized walking and cycling and established an objective of expanding safe footpaths across major roads. It subsequently implemented more than 40 km of complete-streets improvements and used tactical urbanism to test intersection designs before permanent construction (C40 Cities, n.d.; Institute for Transportation and Development Policy India, 2018b).

Chennai's approach is significant for three reasons. First, it elevated walking within municipal policy rather than treating footpaths as residual components of road projects. Second, it combined physical projects with institutional processes, including design standards and capacity building. Third, it recognized intersections as central elements of the walking network. These features distinguish a program from a collection of sidewalk contracts.

The limitations remain substantial. Chennai's heat and intense rainfall demand shade, drainage, durable materials, and rapid maintenance. Footpaths must also accommodate vendors and other legitimate street functions without eliminating a continuous accessible path. Where street management treats these functions as mutually exclusive, enforcement may displace livelihoods without producing durable pedestrian space. A more inclusive approach uses zoned design, predictable loading and vending areas, universal-access standards, and accountable maintenance.

4. U.S. West Coast Cities: Stronger Institutions Within Automobile-Oriented Regions

4.1 Regional conditions

West Coast cities have been influential in U.S. active transportation practice. Protected bicycle lanes, neighborhood greenways, road diets, bikeshare, safe-routes-to-school programs, quick-build materials, leading pedestrian intervals, and Vision Zero strategies are now common elements of municipal plans. National design guidance has also moved from a narrow emphasis on confident adult cyclists toward all-ages-and-abilities networks and protected intersections (National Association of City Transportation Officials, 2025).

The regional constraint is urban form. Even where central neighborhoods are walkable, metropolitan employment and housing are distributed across large areas connected by high-speed arterials and freeways. Many trips exceed comfortable walking or cycling distances, while zoning and parking requirements have historically separated destinations. The infrastructure challenge is therefore twofold: improve safety within cities and change the land-use and transit relationships that determine whether active modes are useful.

The United States also faces a severe pedestrian-safety problem, disproportionately affecting low-income communities, unhoused people, older adults, people with disabilities, and racialized populations. Vision Zero and complete-streets commitments do not ensure implementation. Projects remain vulnerable to fragmented ownership, state-controlled arterials, parking opposition, uneven funding, and slow capital-delivery processes.

4.2 Seattle: Integrated modal planning and topographic constraints

Seattle's Bicycle Master Plan proposed a connected system of approximately 100 miles of protected bicycle lanes and nearly 250 miles of neighborhood greenways (Seattle Department of Transportation, 2017). The 2024 Seattle Transportation Plan integrated earlier bicycle, pedestrian, transit, and freight plans into a single framework, reflecting an effort to manage modal tradeoffs within one citywide strategy (Seattle Department of Transportation, 2024).

Seattle's network combines protected lanes in central areas, multiuse trails, neighborhood greenways, and traffic-calmed connections. The approach recognizes that low-stress cycling can be provided either through separation on major roads or through speed and volume reduction on local streets. The city has also used school connections, equity criteria, and high-injury-network analysis to prioritize investment.

Topography, waterways, bridges, rail corridors, and discontinuous street grids create choke points. A neighborhood may contain comfortable local routes but remain separated from downtown or adjacent districts by a bridge, interchange, or steep grade. These constraints make network completion unusually important. E-bikes can mitigate hills, but only if secure parking, safe routes, and equitable access are available. Seattle also illustrates the challenge of Vision Zero implementation. Speed-limit reductions and street redesigns have improved safety on some corridors, but systemwide outcomes depend on treating high-speed arterials, many of which serve transit and freight as well as general traffic.

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4.3 Portland: Neighborhood greenways and the limits of modal reputation

Portland has long been regarded as a leading U.S. bicycling city. Its network includes conventional and protected bicycle lanes, off-street paths, and a large system of neighborhood greenways. These greenways use traffic diversion, speed humps, lower speed limits, wayfinding, and protected crossings to create quieter routes for walking, bicycling, and rolling (Portland Bureau of Transportation, n.d.). This model can extend a low-stress network at lower cost than reconstructing every street, provided major-road crossings are safe and motor-vehicle volumes remain low.

Portland's case shows how civic identity, advocacy, technical staff, and long-range planning can reinforce one another. It also demonstrates that reputation can conceal geographic inequity. Central and inner neighborhoods historically received more complete networks, while parts of East Portland have wider arterials, missing sidewalks, fewer safe crossings, and greater traffic-safety burdens. The city has increasingly directed investment toward these areas, but legacy infrastructure creates high costs and long delivery timelines.

Portland also shows the fragility of implementation under fiscal and political pressure. Individual links may be altered or delayed because of parking, freight, or neighborhood objections. A network composed of negotiated exceptions gradually loses coherence. Strong policy direction, transparent prioritization, and outcome monitoring are therefore necessary even in a city with a mature bicycling culture.

4.4 San Francisco: Compact urbanism, quick-build delivery, and connected-network goals

San Francisco combines compact land use, extensive transit, short trip distances, and constrained parking, all of which support active travel. By 2024, the city reported 133 miles of bikeways, including 50 miles of protected facilities, as well as a large bikeshare system (San Francisco Municipal Transportation Agency, 2024). Its Slow Streets program uses traffic calming and access restrictions to create low-stress corridors, while its quick-build program employs paint, posts, signal changes, and parking reconfiguration to deliver safety improvements faster than full reconstruction.

The city's evolving Biking and Rolling Plan has articulated a goal of a safe, connected network within one-quarter mile of every resident (San Francisco Municipal Transportation Agency, 2024b). That access-based measure is more meaningful than raw mileage because it links infrastructure to population coverage. San Francisco has also paired bicycle investment with pedestrian measures such as daylighting, high-visibility crossings, leading pedestrian intervals, and lower speed zones.

Yet the compact city is not uniformly low stress. High-injury corridors, freeway approaches, steep hills, transit-bicycle conflicts, delivery activity, and complex intersections create concentrated risk. Equity is also central. Historically marginalized neighborhoods may experience high traffic exposure while receiving projects later or encountering distrust rooted in enforcement and displacement. Quick-build methods can address urgent risks, but meaningful engagement and post-installation evaluation are required to distinguish speed of delivery from procedural exclusion.

4.5 Los Angeles: Network building at metropolitan scale

Los Angeles presents the sharpest test of active transportation policy among the selected West Coast cities. Its enormous geographic scale, polycentric employment pattern, wide arterials, freeway barriers, and long trip distances make citywide network formation difficult. At the same time, many Los Angeles neighborhoods are dense, mixed-use, and transit-dependent, and a large share of households would benefit from safer short trips and transit access.

Mobility Plan 2035 established enhanced networks for bicycles, transit, vehicles, and pedestrians, while subsequent programs have used level-of-traffic-stress and latent-demand analysis to identify neighborhood connections (Los Angeles Department of City Planning, 2016; Los Angeles Department of Transportation, n.d.). State active-transportation grants have supported protected bikeways, sidewalk improvements, bicycle parking, and related facilities. Recent policy has also strengthened the obligation to implement planned networks when streets are resurfaced or otherwise improved.

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Los Angeles demonstrates why citywide averages can mislead. Some neighborhoods have strong walking demand but face exceptionally dangerous arterials; others have paths or bicycle lanes that serve recreation but fail to connect everyday destinations. Successful implementation requires safe crossings of major roads, connections to rail and bus rapid transit, shade and heat mitigation, and coordination among the city, county, Metro, and Caltrans. The most promising strategy is not to make every regional trip bicycle-sized. It is to create complete local networks around transit, schools, commercial districts, and community services while reforming land use to shorten trips over time.

5. Comparative Findings

5.1 The infrastructure-demand paradox

The most important contrast is not simply the quantity of infrastructure. It is the relationship between provision and need. Indian cities possess a large base of people who already walk or cycle, including those for whom no affordable alternative exists. Infrastructure investment is therefore protective and distributive: it can reduce injury risk, travel stress, and time burdens for existing users. In West Coast cities, investment is both protective and inducive. It must serve existing users while persuading a wider population that active travel is safe, convenient, and socially normal.

This difference affects evaluation. A new Indian footpath may formalize and protect thousands of existing daily trips without producing a visible increase in walking. A West Coast protected bicycle lane may be judged partly by new ridership. If both are evaluated only through before-and-after mode shift, the Indian project's equity and safety value may be understated. Conversely, if a U.S. project is evaluated only by construction mileage, its failure to change access or use may be overlooked.

5.2 Network continuity is more important than flagship quality

Both contexts suffer from fragmented networks, although the causes differ. Indian fragmentation frequently results from discontinuous footpaths, encroachment, utility cuts, missing crossings, inconsistent municipal boundaries, and corridor-by-corridor capital works. West Coast fragmentation more often reflects phased investment, political compromise, state or regional ownership of arterials, and gaps at bridges, interchanges, or jurisdictional boundaries.

The user experiences these causes identically: the safe facility ends. Research indicates that protected and separated infrastructure can improve safety, but design details and intersection exposure matter (Cicchino et al., 2020; Lusk et al., 2011). A network should therefore be audited as a sequence of complete trips. Useful performance measures include the share of residents within a short distance of a low-stress network, the number of schools and transit stations connected, the percentage of high-injury crossings treated, and year-round facility availability.

5.3 Safety requires speed management and intersection redesign

Separation is essential on high-speed, high-volume roads, but separation alone is insufficient. Intersections, driveways, bus stops, curb access, and loading zones concentrate conflicts. West Coast cities increasingly use protected intersections, signal phasing, daylighting, pedestrian head starts, raised crossings, and 20- or 25-mph zones. Indian complete-streets projects employ many of the same tools, but consistent application and enforcement are less common.

The transferable principle is a safe-system hierarchy: reduce traffic speed and volume first where possible; provide physical separation where speeds or volumes remain high; eliminate turning conflicts; make pedestrians and cyclists visible; and design for predictable human error. Education and enforcement cannot compensate for geometry that permits dangerous speeds. Enforcement-centered approaches also raise equity concerns when they disproportionately burden marginalized groups.

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5.4 Governance determines whether design survives

West Coast cities generally have more institutionalized modal plans, dedicated staff, recurring funding, design standards, public reporting, and formal project pipelines. Indian cities have produced sophisticated policies and exemplary designs, but responsibility is often dispersed among municipal corporations, development authorities, public works departments, traffic police, transit agencies, state road agencies, and utilities. The result can be strong project design but weak asset stewardship.

The distinction should not be overstated. U.S. cities also face fragmented authority, particularly on state highways and regionally significant corridors, and projects can take many years. Indian cities, meanwhile, can sometimes implement corridor transformations rapidly when political leadership, funding, and technical assistance align. The broad lesson is that a plan requires an implementation architecture: a responsible agency, multiyear funding, enforceable standards, utility coordination, maintenance budgets, public performance measures, and a mechanism for resolving modal conflicts.

5.5 Equity has different travel expressions but similar spatial consequences

In India, inequity is visible in the mismatch between who uses active modes and who receives road space. Walking and cycling are often associated with low income, while road widening and parking serve households with greater vehicle access. Women, older adults, children, people with disabilities, and informal workers face additional constraints related to harassment, lighting, caregiving trips, surface quality, and the need to stop or carry goods.

On the U.S. West Coast, active transportation has sometimes been framed through environmental lifestyle or recreational cycling, which can obscure the needs of people who walk, use mobility devices, ride transit, or bicycle out of economic necessity. Historically disinvested neighborhoods frequently contain the most dangerous arterials and the least complete pedestrian networks. In both contexts, equitable planning should prioritize exposure and need rather than political visibility. It should also prevent improvements from becoming disconnected from housing affordability and anti-displacement policy.

5.6 Climate-responsive design cannot be an afterthought

The climate case for active transportation is well established, but facilities must also adapt to climate. Indian cities require continuous shade, heat-reflective and slip-resistant surfaces, monsoon drainage, rest opportunities, drinking water in high-use areas, and maintenance capable of responding to flooding and debris. California cities face extreme heat and wildfire smoke; Portland and Seattle face heavy rain, dark winter conditions, and increasingly frequent heat events. Trees and green infrastructure can improve comfort and manage stormwater, but poorly placed trees, roots, bioswales, or furniture can reduce accessible width.

Climate resilience should therefore be treated as a functional requirement. A route that is unusable during the hottest hours or after routine rainfall is not a reliable transportation facility. Agencies should track shade coverage, surface temperature, drainage performance, seasonal maintenance, and access to transit and cooling destinations alongside conventional network mileage.

6. Policy Implications and Cross-Context Learning

6.1 Priorities for Indian cities

Indian cities should begin by protecting the trips already being made. This requires continuous, universally accessible footpaths; safe at-grade crossings at desire lines; protected cycle facilities on high-speed roads; low-speed neighborhood streets; and reliable connections to transit, schools, markets, and employment. Capital programs should fund maintenance and utility reinstatement from the outset rather than treating them as later operational problems.

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Citywide street-design standards should be paired with an asset owner and a transparent network-completion program. Quick-build methods can address urgent gaps, but materials must be suited to heavy use, monsoon conditions, and local maintenance capacity. Informal vending, loading, paratransit, and social activity should be designed into the street through allocated zones rather than displaced into the pedestrian clear path or removed without livelihood planning.

Finally, evaluation should recognize existing users. Measures should include injury exposure, accessibility, time savings, comfort, continuity, women's and children's mobility, and access to transit, not only increases in cycling. A social-equity weighting can direct investment toward corridors where active travelers are numerous and crash risk is high.

6.2 Priorities for U.S. West Coast cities

West Coast cities should accelerate the transition from disconnected facilities to all-ages-and-abilities networks. Quick-build programs can close gaps rapidly, but permanent capital work is needed where concrete separation, drainage, accessibility, or intersection reconstruction is required. State-controlled arterials and freeway crossings need binding interagency delivery agreements because they often determine whether local networks function.

Active transportation planning should also be integrated more closely with housing, zoning, and transit investment. Safe infrastructure cannot overcome every long trip. Cities can increase the usefulness of walking and cycling by permitting more housing near employment and transit, supporting mixed-use neighborhood centers, reducing excessive parking, and creating secure bicycle storage at homes and stations.

Equity practice should move beyond geographic targeting to include project governance, affordability, and enforcement. Community engagement must shape route selection and design, while decision rules should prevent small, well-resourced groups from vetoing safety projects that address documented risk. Bikeshare and e-bike programs should include affordable access, adaptive devices, and service in historically underserved neighborhoods.

6.3 A shared implementation framework

Across both contexts, six principles emerge. First, plan networks around complete trips and essential destinations. Second, match protection to motor-vehicle speed and volume, with safe intersection treatments as a nonnegotiable element. Third, measure access, safety, reliability, and equity rather than construction mileage alone. Fourth, assign lifecycle responsibility from planning through maintenance. Fifth, integrate active modes with transit, land use, curb management, and climate adaptation. Sixth, institutionalize rapid learning through pilots, before-and-after evaluation, and transparent public reporting.

These principles allow contextual adaptation. A low-speed shared street in a dense Indian market may need vending zones, freight windows, drainage, and intensive pedestrian management. A Portland neighborhood greenway may depend on diversion, school crossings, and arterial signalization. The physical details differ, but both succeed only when the street's operating system supports the intended users.

7. Discussion

The comparison challenges a common development narrative in which Indian cities are expected to follow a linear progression toward the infrastructure systems of high-income U.S. cities. Such a pathway would be counterproductive if it reproduced automobile dependence before rebuilding space for active modes. Indian cities possess a strategic advantage: dense land use, short trips, extensive transit use, and a large culture of walking remain present. The policy task is to modernize safety and accessibility without extinguishing those conditions.

West Coast cities offer important institutional lessons but not a complete spatial model. Their design guidance, modal programs, quick-build techniques, safe-system policies, and public reporting are valuable. Their dispersed metropolitan form, high vehicle ownership, and infrastructure inequities are warnings. Similarly, Indian cities offer evidence that active

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transportation can remain central to daily life, but high use should not be romanticized when it reflects constrained choice or exposure to danger.

The infrastructure-demand paradox also suggests a broader research agenda. Comparative studies need exposure-based crash rates rather than fatality counts alone; trip-purpose data beyond commuting; measures of network stress and continuity; gender- and disability-disaggregated user experience; and longitudinal evidence on maintenance. Researchers should also examine how informal street economies interact with accessibility and how heat adaptation changes walking and cycling behavior. Consistent international indicators would improve comparison, but they must not erase local street functions.

This study has limitations. The selected cities are not representative of all Indian or U.S. urban areas, and substantial differences exist within each city. Official network mileage can include facilities of very different quality. Plans indicate institutional intent but not necessarily delivery. Moreover, differences in travel surveys and crash reporting limit direct quantitative comparison. These limitations reinforce the article's principal methodological claim: infrastructure must be assessed through network function, user exposure, and governance, not headline mileage alone.

8. Conclusion

Active transportation infrastructure in Indian and U.S. West Coast cities reflects contrasting histories of urbanization, motorization, public investment, and street governance. Indian cities generally retain substantial walking and cycling demand but expose many users to discontinuous, obstructed, and hazardous conditions. West Coast cities generally possess stronger formal planning systems and more developed low-stress infrastructure, but operate within metropolitan environments that make many trips difficult without a car.

The comparison does not yield a single superior model. It reveals complementary lessons. Indian cities should protect and dignify active mobility before rising motorization displaces it, using continuous networks, safe crossings, universal accessibility, climate-responsive design, and accountable maintenance. West Coast cities should connect their strongest projects into comprehensive networks while aligning transportation with compact land use, transit, affordability, and equitable access. Both must treat walking and cycling as basic urban infrastructure.

The appropriate measure of progress is therefore not how many kilometers of sidewalk or bicycle lane a city constructs. It is whether a child, an older adult, a worker, a transit rider, or a person using a mobility device can complete an everyday journey safely, comfortably, affordably, and throughout the year. When planning is organized around that standard, active transportation becomes more than an environmental program. It becomes a foundation of urban citizenship.

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