Towards Sustainable Cities:

Evaluating the Current Status of Pedestrian Infrastructure in Indian Cities

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Written for
Bengawalk

The authors are students of the Young Researchers for Social Impact (YRSI) Program conducted by Young Leaders for Active Citizenship (YLAC). YRSI identifies promising high schoolers and builds their capacity as critical thinkers and problem solvers to produce thought-provoking solutions to pressing issues that affect our societies today. This study was undertaken as part of the July 2024 edition of the program.

Disclaimer: The views expressed in this study are solely those of the authors, and do not represent the views of YLAC as an organisation.

Abstract

This study places pedestrian infrastructure at the heart of urban mobility concerns, recognizing its crucial role in promoting walking trips over public or private transport modes in India and worldwide. It underscores the necessity of prioritising footpaths and safe crossings, particularly in the context of accessibility, safety, and social equity, advocating for these to be reinforced by pertinent urban planning policies.

We try to interrogate how pedestrian infrastructure is socially influenced by gender, economic disparity, culture, and mentality. Given the constraints of public transport, many individuals are compelled to walk as a last resort. Sustainable pedestrian infrastructure plays a crucial role in reducing carbon emissions and enhancing overall wellness.

By comparing cities such as Tokyo, Copenhagen, and Bogotá, this paper highlights that creating a walkable city necessitates prioritising pedestrian needs and investing heavily in infrastructure while integrating it with public transport. To enhance walkability in Indian cities, integrated urban mobility plans focusing on pedestrian routes and community-led initiatives are essential. Implementing these strategies would lead to improved pedestrian safety, reduced vehicular congestion, and lower carbon dioxide emissions, thereby promoting sustainable urban growth.

CONTENTS

1 Introduction

Pedestrians are India's largest road user demographic, with an urban mobility study in 2019, reporting that 63% of all trips were walking trips[1]. Thus, it is important to acknowledge the significance of pedestrian infrastructure and why people resort to walking instead of using public or private transport.

Comfortable, convenient and safe pedestrian infrastructure is key to enabling mobility and activity in cities[2]. This includes, but is not limited to, well-maintained footpaths, safe crossings, bus stops, and suitably placed kerb ramps. When planned and implemented per proper guidelines like the Indian Road Congress's (IRC) Draft Guidelines for Pedestrian Facilities[3], such infrastructure enables equitable access to public amenities, employment and education, community interaction and economic opportunities[4] (such as newspaper sellers and street vendors). Furthermore, well-built pedestrian infrastructure contributes to improved pedestrian safety, – Japan, in 2023, reported 973 pedestrian casualties[5] compared to India's 29,200 in 2021[6]– environmental sustainability, (see Section 2) and last-mile connectivity.[7]

For instance, in New York and Bogotá, it has been demonstrated that strategic investments in pedestrian infrastructure can cut huge urban carbon emissions (See Section 3). However, despite its numerous government initiatives, India lacks good pedestrian infrastructure. 30% of the roads have good footpaths[8] which means that pedestrians are exposed to harsh weather conditions, pollution and hazardous environments. Other factors such as bad planning, poor resource allocation and corruption hinder progress.

Limitations in public transport, as well as social factors like gender, economic disparity, culture, and mentality, significantly influence the parts of the population that adopt walking as their predominant mode of transportation (see Section 4). In the aforementioned 2019 study, researchers ranked the quality of infrastructure, frequency of service, lack of seamless travel, duration of commute and

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[1] *Walking in Indian cities – a daily agony for millions*. (2022, July 26). https://www.thehinducentre.com/the-arena/current-issues/walking-in-indian-cities-a-daily-agony-for-millions/article65551959.ece#twentyeight

[2] *Pedestrian environment*. (n.d.). VTA. https://www.vta.org/cdt/street-design-home-page/pedestrian-environment

[3] *Indian Road Congress' Draft Guidelines for Pedestrian Facilities.* (2020). https://www.irc.nic.in/admnis/admin/showimg.aspx?ID=345

[4] *Complete Street Policy Framework | Complete Streets Toolkit - Volume I*. (2019, May 27). P12-13. Issuu. https://issuu.com/itdp.india/docs/volume_i_-_complete_streets__policy?utm_medium=referral&utm_source=itdp.in

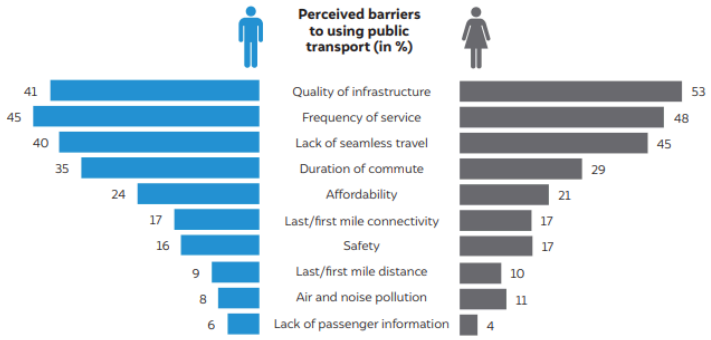
[5] Statista. (2024, April 30). *Case fatality rate in traffic accidents in Japan 2023, by road user*. https://www.statista.com/statistics/1259598/japan-case-fatality-rate-traffic-accidents-by-road-user/#:~:text=Case%20fatality%20rate%20in%20traffic%20accidents%20in%20Japan%202023%2C%20by%20road%20user&text=In%202023%2C%20the%20road%20users,fatalities%20added%20up%20to%20973

[6] *Bosch releases India's first Pedestrian Accident Study during the 7th UN Road Safety Week*. (n.d.). Bosch Media Service - India. https://www.bosch-press.in/pressportal/in/en/press-release-5824.html

[7] *Ease of Moving Index, India Report 2022*.(April 2023). P128. Ola Mobility Institute. https://olawebcdn.com/ola-institute/easeofmoving-2022.pdf

[8] *Clean Air Initiative for Asian Cities (CAI-Asia) Center. (2011). Walkability in Indian cities. In Clean Air Initiative for Asian Cities (CAI-Asia) Center. https://cleanairasia.org/sites/default/files/2021-05/35.%20Walkability%20in%20Indian%20Cities.pdf*

affordability as the most significant perceived barriers to using public transport– with women expressing higher dissatisfaction rates for the same[9].



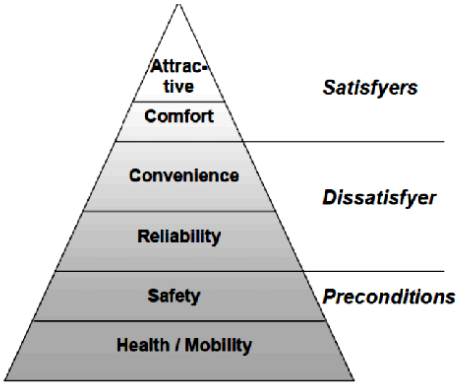
CEEW The Council, *How Urban India Moves,* https://www.ceew.in/sites/default/files/ceew-study-on-sustainable-transportation-mobility-in-urban-india-2022Oct19.pdf

Together, these factors contribute to the widespread demand and usage of pedestrian infrastructure.

3 Correlation between Pedestrian Infrastructure and Sustainability

What significance does sustainability hold in pedestrian infrastructure?

A sustainable design approach for pedestrian infrastructure measures how friendly an area is for pedestrians in terms of- safety, convenience, health. Cities worldwide are investing in pedestrian infrastructure to encourage pedestrian-friendly areas. This shift is the result of the cities' inability to meet their sustainability goals and the ongoing climate crisis.

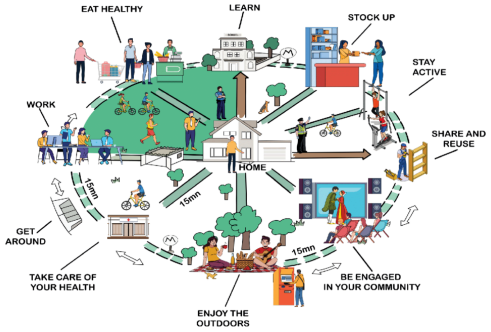


Figures - uploaded by Francesco CastelluccioAuthor content

Pedestrians should live in an atmosphere that reflects their needs and expectations while also keeping the environment in mind. For instance, the concept of 15-minute cities has become popularised over the past few years due to several purported benefits. It has gained relevance in today's world and has been adopted by various cities across the globe like Vancouver, Portland, and

[9] Soman, A., Kaur, H., Ganesan, K., & Council on Energy, Environment and Water. (2019). *How Urban India moves: sustainable mobility and citizen preferences*. Council on Energy, Environment and Water. https://www.ceew.in/sites/default/files/ceew-study-on-sustainable-transportation-mobility-in-urban-india-2022Oct19.pdf

Paris[10]. These 15-minute cities are planned in a manner which prioritises “proximity and accessibility” to essential services. The sole purpose of this concept is to reduce dependence on automobiles and suggest sustainable alternatives. For example, it prioritises the use of renewable fuels over the exploitation of fossil fuels to ensure better quality of life. It also plays a vital role in reducing traffic and greenhouse gas emissions. This concept has proven to be ideal for a healthy, socially interactive lifestyle.



15 Minute Cities - Buro Happold

Additionally, the quality of life of residents largely depends on the pedestrian infrastructure in the city. But with increased traffic, congestion and population, the implementation of a sustainable transport system is in question. Therefore, the key to reducing the problems mentioned above is an efficient pedestrian infrastructure model- one which promotes economic, social and environmental aspects in a community.[11] An efficient pedestrian infrastructure model focuses on covering these three main aspects by reducing long commutes, increasing the physical activity level of the residents, and most importantly, prioritising the valuable time of all city residents by introducing elements that promote great efficiency of use of time. [12] Hence, Chrono-urbanism, an emerging urban planning concept, prioritises the temporal aspects of city life. By focusing on efficient time management for residents, it advocates for urban practices and designs that improve the overall quality of life in urban environments.

Both 15-minute cities and Chrono-urbanism share many similarities. Primarily, both planning models follow a people-centric and an environment-friendly approach.

[10] Caselli, B., Carra, M., Rossetti, S., & Zazzi, M. (2022). Exploring the 15-minute neighbourhoods. An evaluation based on the walkability performance to public facilities. *Transportation Research Procedia*, *60*, 346–353. https://doi.org/10.1016/j.trpro.2021.12.045

[11] Prendeville, S., Cherim, E., & Bocken, N. (2018). Circular Cities: Mapping six cities in transition. *Environmental Innovation and Societal Transitions*, *26*, 171–194. https://doi.org/10.1016/j.eist.2017.03.002

[12] Alonso, T. (2022, June 29). *Chrono-urbanism: What if we start measuring cities in minutes?* Ferrovial. https://blog.ferrovial.com/en/2022/07/chrono-urbanism-measuring-cities-in-minutes/

Image from the Street Moves project in Sweden. Utopia Architects.

Notably, pedestrians and cyclists are great providers to a sustainable urban society but the number of people who opt for using pedestrian infrastructure is much fewer compared to those who prefer vehicular transport. Globally, more than 50% of the commutes by the urban population are by cars.[13] People are constantly turning a blind eye towards sustainable modes of transport which henceforth is destroying our planet steadily.

Streets that are safe for walking and cycling are the key to fighting pollution thereby, improving the air quality in those areas. Strategic investments create a band of networks for walking and cycling- leading to lessening the load on vehicles and thus, reducing gas emissions.

New York, Bogota and various other cities around the world have shown evidence that increased rates of walking and cycling are linked with increased sustained investment.[14] A study by ITDP explored a 'high shift scenario' and found that if all cities took steps to increase cycling towards the levels of the best, urban carbon emissions could fall by 7% by 2030 and 11% by 2050.

Furthermore, it is argued that choosing pedestrian transport over vehicular transport comes with many additional benefits- better physical and mental health (See Section 3.2). People who switch from vehicles would also experience a reduction in financial costs since they would no longer have to pay an additional sum of money for parking and fuel as frequently as they did before. Keeping all these factors in mind, cities like Jakarta, Tehran, and many more have weekly car-free days to ensure sustainable urban growth. India too should follow in these footsteps.

With the degradation of the environment and its consequent effects globally, cities across the world are building and encouraging the use of green pathways, lanes and green spaces.

Green sustainability | SICK

The only way to ensure the future of transportation is Green Mobility–"the movement of people and goods in any energy-efficient transportation mode with a low environmental effect." It focuses on

13 *More than half of commutes globally are made by car, study finds*. (n.d.). Yale E360. https://e360.yale.edu/digest/cars-commutes-study#:~:text=The%20study%20 analysed%20transport%20data,revealed%20huge%20variation%20between%20regions.

14 International Yearbook of Soil Law and Policy 2022. (2024). In *International yearbook of soil law and policy*. https://doi.org/10.1007/978-3-031-40609-6

modes of transport that are not entirely dependent on fossil fuel consumption and gas emission thereby, highlighting the United Nations Concept of “Moving People than Vehicles”.

Unfortunately, even after understanding the paramount significance proper pedestrian infrastructure holds, Indian cities are unable to take long-term, sustainable action. Over the years, numerous efforts have been made by the Government of India to promote sustainable pedestrian infrastructure and combat environmental issues but with increased traffic, congestion and population- it has now become imperative to hasten this process if we wish to see India achieve net zero by 2070- a target which was set by the Prime Minister of India at the 26th session of the United Nations Framework Convention on Climate Change (COP 26) in November, 2021.[15]

Although government-run initiatives like national-level street programs, pilot street transformations, and policy changes have helped, the past decade has still seen a spike in the number of vehicles on Indian roads, from 178 million to 368 million. Facts like these show that there is a major need to encourage sustainable mobility in India.

While seemingly feasible in theory, numerous challenges complicate the practical implementation of effective pedestrian infrastructure models. It is a complicated process that involves designing an efficient and sustainable transport system that addresses the specific needs of the cities’ residents. Along with that, the implementation of a well-planned model is costly, time-consuming and requires a lot of effort.

Therefore, instilling good pedestrian infrastructure at some places in India where there is currently no scope may seem like a far-fetched dream but with proper planning, utilisation of available resources and community support- it is achievable.

3 Effects of Improper Pedestrian Infrastructure

The Precursor to the Problem of Improper Pedestrian Infrastructure:

While population growth rates appear to be abating, the socio-economic demands of a growing middle class suggest that our desire to extract finite resources shows no signs of slowing down.

There is now a critical need to decouple economic growth from the extraction and use of natural resources. Infrastructure development is particularly resource-intensive, and in 2015 the construction sector alone accounted for half of the global material footprint.[16] Increasing the resource efficiency of infrastructure can be a major driver of the transition to sustainable development.

Traditionally, infrastructure is developed on a project-by-project basis through siloed planning, which is a highly inefficient approach as it does not highlight the main aim of the infrastructure, creating scarcity in resources to build high-quality projects.

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[15] *National Statement by Prime Minister Shri Narendra Modi at COP26 summit in Glasgow*. (n.d.). Ministry of External Affairs, Government of India. https://www.mea.gov.in/Speeches-Statements.htm?dtl/34466/National+Statement+by+Prime+Minister+Shri+Narendra+Modi+at+COP26+Summit+in+Glasgow

[16] Division, E., Partnership, S. I., & Partnerships, D. C. (2019). *Making infrastructure resource efficient - Policy brief October 2019*. https://wedocs.unep.org/handle/20.500.11822/32687;jsessionid=4353A2F25024641DD2828249CB376A55

Out of 5 million km of road length across India, less than 0.1% are built keeping in mind pedestrian safety and convenience or to promote walking.[17] Furthermore, shrinking pedestrian infrastructure makes walking inconvenient as more road space is taken over by motor vehicles. Poor planning and lack of integration of the informal economy which operates on the roadside, and lack of signage additionally impedes pedestrian safety.

In terms of capital, a budget of 2,70,434 crore (0.5% increase from the previous year) was allocated to the Ministry of Road and Transportation for 2023 and 2024.[18] This is a mere 6% out of the gross 45,03,097 lakh crore expenditure in 2023-24 by the government of India. On the other hand, the budget for increasing the number of roads and highways has increased 500% since 2014.[19] Roads are being built at 34 km/day in New Delhi in 2023-24[20], leaving little space for pedestrian walkways and sidewalks.

Increases in funding for biking and walking have been shown to lead to boosted rates of biking and walking, and improvements in bicyclist and pedestrian safety. In 2005, Congress provided $25 million for four communities in the United States (Columbia, Missouri; Marin County, California; Minneapolis area, Minnesota; and Sheboygan County, Wisconsin). The funds leveraged a variety of activities such as bicycle and pedestrian planning, infrastructure, and programming. The estimated outcomes of the investment were 22.8% and 48.3% increases in the number of pedestrian and bicycle trips across the four communities- demonstrating how an increase in investment is crucial to improve infrastructure for non-motorised transport.

Why are resources not being allocated properly?

The Ministry of Roads and Highways in India have prioritised motorised over non-motorised transportation by gradually increasing the number of roads/highways/bridges in metropolitan cities while the quality and quantity of pedestrian infrastructure have remained the same.[21]

Lack of resource allocation towards building pedestrian amenities stems from the surge in the use of transport, both public and private, as the idea of walking to complete daily tasks becomes increasingly obsolete. Such factors display a clear inadequacy of resources to produce quality pedestrian infrastructure.

The consequences of insufficient and poor-quality pedestrian infrastructure are vast and dire. Below, we have detailed problems such as lack of last-mile connectivity, health issues, and lowered accessibility. The loop of poor infrastructure plays an imperative role in fully highlighting the problem. Due to the lack of investment in pedestrian infrastructure, people are unmotivated to walk,

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[17] PLANNING FOR SUSTAINABLE PEDESTRIAN INFRASTRUCTURE. https://www.urbanmobilityindia.in/Upload/Conference/a8f88ad3-842c-4af4-ba24-94454b22d005.pdf

[18] Budget 2024: Focus on rapid infrastructure growth to continue, roadways likely to see increased capex. *Financial Express*. https://www.financialexpress.com/business/roadways-budget-2024-focus-on-rapid-infrastructure-growth-to-continue-roadways-likely-to-see-increased-capex-3541531/#:~:text=In%20the%20Interim%20Budget%2C%20the,new%20allocation%20only%200.5%25%20higher.

[19] Better roads likely saving Rs 2.4-4.8 trillion in logistics costs annually: FM. *Financial Express*. https://www.financialexpress.com/india-news/better-roads-likely-saving-rs-2-4-48-trillion-in-logistics-costs-annually-fm/3489712/#:~:text=by%20Rs%204.8.-,Since%202014%2C%20there%20has%20been%20a%20500%25%20increase%20in%20the,91%2C287%20km%20between%202004%2D14.

[20] Dash, D. K. (2024, April 3). National highways construction touched 34 km per day in 2023-24. *The Times of India*. https://timesofindia.indiatimes.com/india/national-highways-construction-touched-34-km-per-day-in-2023-24/articleshow/108990468.cms

[21] Assessing the Quality and Safety of Pedestrian Infrastructure in Indian City, Lucknow. (2023). In *Research Gate* (WCTR 2023). Research Gate.

which in turn discourages the government from investing further as the lack of non-motorised transport indicates a "lack of demand." This inevitable loop heightens the unavailability of pedestrian infrastructure.

3.1 Accessibility and Last-Mile Connectivity, with Emphasis on Persons with Disabilities (PwDs)

Both private and public transport users are dependent on pedestrian infrastructure for first and last-mile connectivity. Due to gaps in implementation though, this is now a barrier to using public transport (See Fig 1). A survey done in Delhi, Bangalore and Nagpur in 2023 reflects this – there was a lower-than-planned ridership for the respective metro systems, due to poor last-mile connectivity[22]. Additionally, in cases where pedestrians have reduced right of way, it compromises the walkability of the footpath.

This affects the accessibility of public spaces and amenities, especially for Persons with Disabilities. In a report on the urban travel experiences of Persons with Disabilities (PwD) in India, researchers from the OLA Mobility Institute described the specific challenges of those with visual, auditory and locomotor disabilities when travelling independently. Detailed interviews revealed that discontinuous or broken footpaths, lack of low-floor buses and absence of curb ramps make it difficult for wheelchair users to independently move, board, travel and disembark from vehicles[23]. Furthermore, street vendor encroachment and stray animals such as dogs increase the risk of falls and injury[24].

While The Accessible India Campaign in 2015 was launched nationwide as an effort to improve accessibility in and to build environments for PwDs, slow progress and uncertainty regarding the deadline have made its impact questionable[25]. Considering that there are at least 2.68 Crore Persons with Disabilities in India[26], there is an urgent need for prioritisation and incorporation of their specific needs into urban planning and pedestrian infrastructure.

3.2 Pedestrian Health

A lack of pedestrian infrastructure forces people to use motorised public or personal transportation, the result of which is an increase in the number of road injuries & deaths - India registers 10% of a total of 1.25 million global road fatalities according to WHO. Between 2014 and 2019, pedestrian accidents were 36% of all reported traffic incidents.[27] With over 4.4 thousand accidents, potholes were one of the main accident-causing factors in 2022.[28] Bosch study finds 99% of Indian pedestrians

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[22] Madaan, N. (2024, June 14). Survey shows city still lacks pedestrian infra. *The Times of India*. https://timesofindia.indiatimes.com/city/pune/survey-shows-city-still-lacks-pedestrian-infrastructure/articleshow/111008662.cms

[23] Kulkarni, A., Aishwarya Raman, Snehil Singh, Chhavi Banswal, & Arjun Chowdhuri. (2021). ON THE MOVE: Urban travel experiences of Persons with Disabilities and a path to build more inclusive transport systems. In *Ola Mobility Institute*. https://olawebcdn.com/ola-institute/on-the-move.pdf

[24] Kulkarni, A., Aishwarya Raman, Snehil Singh, Chhavi Banswal, & Arjun Chowdhuri. (2021). ON THE MOVE: Urban travel experiences of Persons with Disabilities and a path to build more inclusive transport systems. In *Ola Mobility Institute*. https://olawebcdn.com/ola-institute/on-the-move.pdf

[25] Nath, D. (2022, June 4). *Uncertainty over Accessible India Campaign deadline*. The Hindu. https://www.thehindu.com/news/national/uncertainty-over-accessible-india-campaign-deadline/article65493903.ece

[26] *Disability in India | Office of Chief Commissioner for Persons with Disabilities*. (n.d.). http://www.ccdisabilities.nic.in/resources/disability-india

[27] World Health Organization: WHO. (2019, November 5). *Road safety*. https://www.who.int/india/health-topics/road-safety

[28] Statista. (2023, December 13). *Number of road accidents due to potholes in India 2017-2022*. https://www.statista.com/statistics/1210963/india-road-accidents-due-to-potholes/#:~:text=With%20over%204.4%20thousand%20accidents,also%20decreased%20over%20the%20years%20.

at risk of injury. Such pedestrian fatalities are estimated to have cost the nation more than Rs. two lakh crores in 2020.[29]

Pedestrians have no option but to walk on the carriageways designed for fast-moving motorised traffic exposing them to a high risk of Road Traffic Crashes (RTCs). Yet, road and traffic regulatory agencies continue to invest in grade-separated, signal-free junctions, and elevated roads that are aimed at solving problems posed by vehicular congestion.

Furthermore, pollution levels have peaked due to the lack of quality pedestrian infrastructure. Road transport presently accounts for 12% of India's energy-related CO2 emissions and is a key contributor to urban air pollution.[30] Further, 90% of carbon dioxide (CO2) emissions from transportation come from land vehicles.[31] Inhaling Levels of pollutants such as ultrafine particles, carbon monoxide, NO_2, black carbon, polycyclic aromatic hydrocarbons, and some metals are more elevated near roads.[32] Individually or in combination, these are likely to be responsible for the observed adverse effects on the health of millions of pedestrians who are directly exposed to such toxins daily.

Though there are numerous health benefits of opting to walk instead of using public or private transportation, the private cost of inhaling toxic fumes and risking one's life to injury/death nullifies any possible gain from walking in metropolitan, polluted cities like Mumbai. Human diseases like asthma, lung cancer, bronchitis, headache and fatigue, eye and skin irritation, and cardiovascular and respiratory problems may occur by getting into contact with vehicular emissions[33] - which occurs daily for millions of Indians as they commute.

Lastly, loitering or strolling, which are two important methods of staying fit, especially for senior citizens, is not feasible with poor quality and underdeveloped infrastructure. Regular brisk walking can help one maintain a healthy weight and lose body fat, prevent or manage various conditions, including heart disease, stroke, high blood pressure, cancer and type 2 diabetes, improve cardiovascular fitness, improve muscular endurance, increase energy levels and strengthen the immune system and reduce stress and tension.[34] Additionally, walking helps boost one's mood, by increasing blood flow and blood circulation to the brain and body. It has a positive influence on the hypothalamic-pituitary-adrenal (HPA) axis, which stimulates the stress response in the central nervous system.[35] Thus, it is important to note that strolling contributes to better mental health alongside physical fitness.

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[29] *Walking in Indian cities – a daily agony for millions*. (2022, July 26). https://www.thehinducentre.com/the-arena/current-issues/walking-in-indian-cities-a-daily-agony-for-millions/article65551959.ece

[30] Whitepaper: E-Trucks market in India-JMKResearch. JMK Research & Analytics. https://jmkresearch.com/electric-vehicles-published-reports/whitepaper-e-trucks-market-in-india/#:~:text=The%20global%20transportation%20sector%20is,contributor%20to%20urban%20air%20pollution.

[31] Kumar, M., DECARBONIZING INDIA'S ROAD TRANSPORT: A META-ANALYSIS OF ROAD TRANSPORT EMISSIONS MODELS. In *ICCT WHITE PAPER* [Report]https://theicct.org/wp-content/uploads/2022/05/Meta-study-India-transport_final.pdf

[32] WHO Regional Office for Europe. (2013). *Proximity to roads, NO2, other air pollutants and their mixtures*.https://www.ncbi.nlm.nih.gov/books/NBK361807/#:~:text=Oxidative%20damage%20to%20DNA%20and,and%2C%20ultimately%2C%20cause%20cancer.

[33] Manisalidis, I., Stavropoulou, E., Stavropoulos, A., & Bezirtzoglou, E. (2020b). Environmental and Health Impacts of Air Pollution: A review. *Frontiers in Public Health*, *8*. https://doi.org/10.3389/fpubh.2020.00014

[34] *Walking: Trim your waistline, improve your health*. (2024, March 12). Mayo Clinic. https://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/walking/art-20046261#:~:text=Something%20as%20simple%20as%20a,cancer%20and%20type%202%20diabetes

[35] *Mental benefits of walking*. (2024, February 28). WebMD. https://www.webmd.com/fitness-exercise/mental-benefits-of-walking

4 Social Factors that Influence Pedestrian Infrastructure:

While a technical analysis is important, it is crucial to recognise that pedestrians are the ultimate users of this infrastructure. Henceforth, we must consider key social factors that influence pedestrian infrastructure: gender, economic disparity, and walking culture. Gender impacts safety and accessibility, as women often face unique challenges in public spaces. Economic disparity affects access to well-maintained pedestrian pathways, with marginalised communities often lacking adequate infrastructure. Walking culture shapes how pedestrian spaces are used and valued, influencing overall urban planning and policy decisions.

4.1 Gender

Based on a 2019 survey, women were found to be more likely to use non-motorised and public transport compared to men.[36] This is directly supported by two following statistics: in 2020, out of 10.5 million newly issued driver's licences, 14.9% were women; and out of 236 million valid driver's licences that year, 6.8% were women.[37]

The primary reason for this is the patriarchal structure ingrained within Indian society[38] - thus women may not be actively encouraged to use and drive personal transport. Only 11% of those behind the wheel are women, according to the Road Transport Yearbook 2015-2016. Since most households can afford only one vehicle, priority is given to the male members to learn and operate a vehicle. This means most must resort to modes of transportation like walking to fulfil their mobility needs. These differences are amplified even more in people of lower economic status.

Thus, there is a need for gender sensitivity when it comes to planning pedestrian infrastructure. Women are vulnerable to sexual and physical harassment and assault on roads, due to a lack of adequate safety measures. A lack of street lighting and visibility imposes a disadvantage as research has consistently shown that bright and reliable street lighting can play a crucial role in deterring criminal activity and creating a sense of safety when walking/cycling. When streets are well-lit, potential criminals feel more exposed and are less likely to commit crimes. According to a study conducted by the US Department of Justice, increasing street lighting can reduce crime rates by up to 20%. While improving visibility may assist in reducing the risk of this demographic to such dangers, other appropriate nuances need to be considered and incorporated into the infrastructure plan. In other words, gender-sensitive urban planning should not be solely centred around safety, but must involve other aspects like active mobility and public transport, and assist in reclaiming the space now occupied by motorised vehicles.

4.2 Economic Disparity

According to a study done by the National Library of Medicine 2016, across 3 neighbourhoods in the USA, a general pattern was identified where low-income areas of those neighbourhoods had poorer

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[36] Soman, A., Kaur, H., Ganesan, K., & Council on Energy, Environment and Water. (2019). *How Urban India moves: sustainable mobility and citizen preferences*. Council on Energy, Environment and Water. https://www.ceew.in/sites/default/files/ceew-study-on-sustainable-transportation-mobility-in-urban-india-2022Oct19.pdf

[37] Statista. (2023, December 13). *Number of road accidents due to potholes in India 2017-2022*. https://www.statista.com/statistics/1210963/india-road-accidents-due-to-potholes/#:~:text=With%20over%204.4%20thousand%20accidents,also%20decreased%20over%20the%20years%20.

[38] Soman, A., Kaur, H., Ganesan, K., & Council on Energy, Environment and Water. (2019). *How Urban India moves: sustainable mobility and citizen preferences*. Council on Energy, Environment and Water. https://www.ceew.in/sites/default/files/ceew-study-on-sustainable-transportation-mobility-in-urban-india-2022Oct19.pdf

aesthetics and social elements (graffiti, broken windows, litter) while higher-income neighbourhoods had better sidewalks, crosswalks and operational intersections.[39] In India, the urban poor are often 'captive users' of non-motorised transport. As they are usually unable to afford motorised transport, often walking or cycling is the only alternative. As a result, unsafe roads overwhelmingly affect socially and economically disadvantaged residents. They also potentially lack good access to medical and trauma care.

It has been suggested that disparities in activity-supportive micro-scale features explain why individuals living in low-income urban neighbourhoods experience disproportionately high rates of chronic disease relating to physical activity due to unsafe pedestrian infrastructure, inadequate street lighting and poor landscaping.[40]

The lack of sufficient or accessible zebra crossings forces pedestrians to risk their lives on India's motor-centric roads every day. In India's hierarchy of roadways, its millions of pedestrians are reduced to helpless trundlers. Despite the reality that they constitute the single largest component of commuters, numbering about 45 million, the country's road networks cater more to the smaller segment of 54-lakh users of cars, jeeps or vans.[41]

4.3 Culture of Walking In India

A growing number of alternatives such as e-rickshaws, e-cabs, and car sharing has made walking unappealing and substitutable. Of the 46 countries studied by Stanford University, India was 39th in terms of average steps walked. A recent study by the National Institute of Nutrition in India found that less than 28% of urban men and 15% of women walk a significant number of steps daily.

The mentality of walking has been affected by reduced safety, largely for women, as well. According to a survey conducted by The Neighbourhood Watch, 50% of women feel unsafe in a quiet street close to home, and over 80% of women have experienced street harassment at least once.[42] This lurking danger of walking on the streets has severely hampered the walking culture in India.

Further, globally, India is one of the top markets showing a net increase in intent to use personal vehicles in the next 12 months, says YouGov.[43] Evidently, walking is becoming less and less of an "option" for personal transport owners today.

5. Comparative Analysis: International vs. Indian Context

Copenhagen (Denmark) and Tokyo (Japan) demonstrate the power of prioritising pedestrians. These cities have high walking and cycling rates thanks to considerable investments in dedicated walkways,

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[39] Thornton, C. M., Conway, (2016). Disparities in pedestrian streetscape environments by income and race/ethnicity. *SSM, Population Health*, *2*, 206–216. https://doi.org/10.1016/j.ssmph.2016.03.004

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[43] Livemint. (2021, September 30). Urban Indians to use personal vehicles more than in pre-pandemic times: Survey. *Mint*. https://www.livemint.com/news/india/urban-indians-to-use-personal-vehicles-more-than-in-pre-pandemic-times-survey-11632979234473.html

bicycle facilities, and solid public transit networks;[44] Japan Ministry of Land,[45] facilities, transit, and the benefits are undeniable: better air, less traffic, and a healthier populace. However, duplicating these methods in India, a developing country dealing with growing urbanisation, has distinct obstacles.

Indian cities, in contrast to their well-resourced competitors, face a variety of resource constraints. Tight finances frequently concentrate on developments in motorised transportation infrastructure, while pedestrian needs fall behind. Rapid and uncontrolled urban growth creates fragmented and dangerous walking environments, with disconnected sidewalks and a lack of designated pedestrian space.[46] Politically, the dominance of car-centric planning and the influence of conflicting interests pose considerable challenges to establishing pedestrian-friendly regulations.

These resource restrictions show a wide range of challenges. Heavy traffic congestion, severe air pollution, and a scarcity of designated pedestrian space (less than 0.1% of total road space)[47] all discourage walking. This, in turn, contributes to India's unacceptably high pedestrian and bike fatality rates.[48] Socioeconomic gaps worsen the problem, as affluent neighbourhoods frequently have better walking facilities than low-income areas.[49] This lack of access to safe walking environments disproportionately affects people who walk for a daily commute, compromising their health and well-being.

India may not be able to directly replicate the models of Tokyo and Copenhagen, but there are important lessons to be gained from their achievements. Even in developing environments, low-cost interventions can encourage walking and cycling, as demonstrated by Bogotá's car-free Sundays, or "ciclovías".[50] Putting in place limited-traffic zones or timed pedestrian zones in particular locations could promote walking even more and foster a livelier public space.

To overcome these obstacles, a multifaceted strategy is needed. Financially, it's critical to reallocate funds such that pedestrian infrastructure in urban planning is given priority. Logistically, sprawl issues can be addressed by integrated development plans that prioritise inclusivity, connection, and adapting existing infrastructure. Long-term political success requires supporting public awareness initiatives, actively including communities in the planning process, and pushing for laws that favour pedestrians.
In India, creative finance methods have the potential to release the funds required to develop walkable cities. Along with government support, private sector investment can be leveraged through

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[44] City of Copenhagen. (2023). 62% of Citizens Ride Their Bikes Every Day. Retrieved from [City of Copenhagen]. https://international.kk.dk/artikel/copenhagen-city-cyclists

[45] Japan Ministry of Land, Infrastructure, Transport, and Tourism. (2023). Transport Statistics. Retrieved from [MLIT Japan]. https://www.mlit.go.jp/statistics.html

[46] Institute for Transportation & Development Policy. (2020). India Urban Transport. Retrieved from [ITDP]https://www.itdp.org/publication/india-urban-transport/

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public-private partnerships. Furthermore, looking into congestion pricing or other ways to discourage the use of private vehicles could bring in money for the construction of pedestrian infrastructure. Effective community involvement is essential to the implementation's success. Cities may develop walkable settings that genuinely meet the needs of their population by reaching out to them, resolving their problems, and encouraging a sense of ownership.

Ensuring a healthier, happier, and more sustainable future for everyone is the driving force behind the development of walkable cities in India, not merely infrastructure. India has the potential to transform its cities into lively, walkable places that put the welfare of its citizens first by taking inspiration from other countries, tailoring strategies to the Indian context, and implementing a multifaceted approach that addresses resource constraints and encourages community engagement.

6. Recommendations

To effectively bridge the gap in pedestrian infrastructure and promote sustainable urban mobility, a robust, multifaceted approach is essential. The following suggestions are adapted to the particular opportunities and challenges present in the Indian context, taking inspiration from successful international models.

Integrate Urban Mobility Plans with Public Transport

It is imperative to put into action comprehensive urban mobility plans that give pedestrian infrastructure and public transportation systems top priority. One aspect of this is making sure last-mile connectivity runs smoothly, as this can greatly improve public transportation's usability and accessibility. Cities can offer effective, secure, and practical mobility options for all citizens by establishing an integrated network of pedestrian pathways and public transportation. It is imperative to incorporate pedestrian infrastructure into comprehensive urban mobility plans in the Indian context. India's cities frequently experience unplanned urban growth and poor infrastructure design. Cities can guarantee seamless last-mile connectivity by prioritising pedestrian pathways in conjunction with public transportation systems. This strategy will not only improve accessibility but also reduce pollution and traffic jams, two major problems in India's quickly developing urban centres.

Allocate Dedicated Funding for Pedestrian Infrastructure

India should require that a minimum portion of the road budget—at least 10%—be set aside expressly for the creation and upkeep of pedestrian infrastructure, taking cues from cities such as Copenhagen. Wide, well-kept walkways with safety features like sufficient lighting, clearly marked crossings, and tactile paving for the blind should be constructed with the help of this funding. With India's budgetary limitations and conflicting agendas, it is imperative to require that a minimum of 10% of the budget for road infrastructure be set aside specifically for pedestrian projects. The construction and upkeep of broad, well-planned pathways, the installation of safety features like sufficient lighting and clearly marked crossings, and the inclusion of tactile paving for the blind should all be accomplished with the help of this special funding. Transparent reporting and routine audits on expenditures can ensure accountability and sustained investment. The challenge in India will be to ensure that these funds are not diverted to other projects and are used effectively to benefit pedestrians.

Implement Traffic Calming Measures

Cities should implement traffic calming strategies, such as pedestrian zones, speed bumps, and lowered speed limits in pedestrian-heavy areas, to improve pedestrian safety. By taking these steps,

you can make the area safer for pedestrians and drastically lower the chance of accidents. Pedestrians in many Indian cities are seriously endangered by fast-moving cars and disorganised traffic. Safety can be greatly improved by implementing and strictly enforcing traffic calming strategies like speed bumps, pedestrian-only zones, and lower speed limits in areas with heavy pedestrian traffic. To make sure that these measures are successful and do not contribute to additional traffic jams or driver non-compliance, they must be put into place taking account of local traffic patterns and behaviour.

Foster Community Engagement and Participatory Planning

To ensure that the varied needs and preferences of the community are taken into account, consultation and participatory processes should be incorporated into the planning process for pedestrian infrastructure. Involving local communities in projects like Raahgiri Day can encourage support for environmentally friendly transportation methods as well as a sense of accountability for pedestrian infrastructure. Given the variety of needs and preferences in India, local communities must be included in the planning and implementation process. Involving locals in pedestrian infrastructure projects promotes a sense of ownership and guarantees that their unique needs are met. Events organised by the community can encourage sustainable mobility practices. Still, to sustain momentum and public support, ongoing engagement and education are required.

Promote Car-Free Zones and Events

To promote cycling and walking, cities should establish designated car-free zones as well as ongoing activities like car-free days. These programs can assist in promoting healthier lifestyles, lowering emissions, and reducing dependency on private automobiles. "Ciclovías" in Bogotá are a great illustration of how regular car-free days can change the culture of urban mobility. In addition to encouraging walking and bicycling and easing traffic, designating car-free zones in urban areas and hosting frequent car-free events can also encourage healthier lifestyles. The potential of initiatives like the "ciclovías" serve as examples. These occasions can also be effective awareness-raising campaigns in India, but they must be modified to take into account the logistical difficulties and cultural context of the region. The success of these events will depend on ensuring that they are open to and accessible to all facets of society's success.

Enhance Safety and Accessibility for Vulnerable Groups

The needs of vulnerable populations, such as women, children, and people with disabilities (PwDs), should receive extra consideration. To improve safety and accessibility, this entails constructing curb ramps, low-floor buses, continuous and unobstructed sidewalks, and enough street lighting. In India, it is crucial to make sure that pedestrian infrastructure satisfies the needs of vulnerable groups, such as women, children, and people with disabilities (PwDs). All inhabitants can benefit from walking if there are continuous, unobstructed pathways, low-floor buses, curb ramps, and sufficient street illumination. Safety and accessibility should be given top priority in Indian cities, as these areas typically have inadequate or poorly maintained pedestrian infrastructure, which can greatly enhance the lives of vulnerable people.

Implement Green Pathways and Promote Green Mobility

Investing in green spaces, bike lanes, and pathways will promote non-motorized transportation. Through the improvement of air quality and the reduction of carbon emissions, these initiatives support environmental sustainability. The development of environmentally friendly, fossil fuel-free mobility solutions should be given top priority in cities. By lowering carbon emissions and enhancing air quality, green space development, bike lanes, and pathway construction can promote non-motorized transportation and support environmental sustainability. In India, where urban areas are growing quickly, including green spaces in city planning can improve urban resilience and give

people somewhere to relax. To strike a balance between environmental preservation and development pressures, though, meticulous planning is necessary.

Raise Public Awareness and Advocate for Pedestrian Rights

In India, it is imperative to carry out broad public awareness campaigns to change societal perceptions regarding the significance of pedestrian infrastructure. Walking's many advantages, including better health, less traffic, and environmental sustainability, can persuade more people to make walking their main form of transportation. The rights of pedestrians and the importance of safe, accessible walking environments should be highlighted in advocacy campaigns. Changing public attitudes and behaviours in India, where motorised transport is frequently viewed as a status symbol, will call for persistent efforts and creative solutions.

Reducing traffic, cutting carbon emissions, and improving public health all depend on India's urban landscapes being redesigned with pedestrian infrastructure as the top priority. India can develop walkable cities that put the welfare of all citizens first by taking a comprehensive and integrated approach that includes committed funding, community involvement, traffic calming measures, and creative financing. Putting pedestrians at the centre of urban mobility planning is essential to ensuring a better, happier, and more sustainable future.

Dilutes the rest of the argument

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