SELECTED CONSIDERATIONS ON ADDRESSING CHALLENGES TO FIRST AND LAST MILE ACCESS TO PUBLIC TRANSPORT IN ASIA AND THE PACIFIC
This background note was prepared by Jack Crawford, with valuable substantive contributions from Boonyanin Pakvisal, under the overall guidance of Ariadne Abel, Economic Affairs Officer, Transport Division, ESCAP.
<table>
<thead>
<tr>
<th>List of Figures</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Boxes</td>
<td>III</td>
</tr>
<tr>
<td>Acronyms and Abbreviations</td>
<td>IV</td>
</tr>
</tbody>
</table>

1. **Introduction and Context: Setting the Scene** ................................................................. 1

2. **Determinants of First and Last Mile Access to Public Transport** ........................................ 4
   2.1 Trip Characteristics ........................................................................................................ 5
   2.2 Socio-Economic Characteristics ..................................................................................... 6
   2.3 Mode-Specific Characteristics ....................................................................................... 7
   2.4 Built Environment, Infrastructure, and Station Area Characteristics............................. 8

3. **Regional Landscape of First and Last Mile Access to Public Transport** ............................... 9
   3.1 Active Mobility ............................................................................................................. 9
   3.2 Micromobility ............................................................................................................... 11
   3.3 Informal Transport ....................................................................................................... 14
   3.4 Technological Innovations ............................................................................................ 17

4. **Challenges for First and Last Mile Access to Public Transport in Asia and the Pacific** ........ 18
   4.1 Urban and Transport Planning ....................................................................................... 18
   4.2 Financing for Public Transport ..................................................................................... 19
   4.3 Road Safety .................................................................................................................. 20
   4.4 Data Gaps ..................................................................................................................... 22

5. **Opportunities for Enhancing First and Last Mile Access to Public Transport in the Region** ...... 23
   5.1 Short-Term Opportunities ............................................................................................ 24
       5.1.1 Informing Policy and Investment Decisions with Data ........................................... 24
       5.1.2 Integrating Cost-Effective Private Sector Micromobility Services .......................... 25
   5.2 Long-Term Opportunities ............................................................................................ 26
       5.2.1 Positioning FLM within Emerging Transport Priorities to Unlock Finance ............. 26
       5.2.2 Utilizing Sustainable Urban Mobility Plans ............................................................ 28

6. **Concluding Remarks** ........................................................................................................ 29
LIST OF FIGURES

Figure 1. The First and Last Mile of Public Transport Journeys ................................................................. 1
Figure 2. Regional Average Access to Public Transport (SDG 11.2.1) ................................................................................................................. 2
Figure 3. Analytical Framework for First and Last Mile Access to Public Transport ...................................... 4
Figure 4. Urban Transport Mode Share in Asia, 2015 and 2020 ......................................................................... 6
Figure 5. Technical and Operational Characteristics of Transport Modes ................................................ 8
Figure 6. Share of Vulnerable Road User Fatalities by Sub-Region, 2021 ........................................................... 21
Figure 7. Data Challenges in Formal vs Informal Transport .......................................................................... 23
Figure 8. People Near Bikeways and Public Transport in Singapore, per the Atlas of Sustainable City Transport ...... 25

LIST OF BOXES

Box 1. The Challenges with Active Mobility as an FLM Solution in New Delhi, India ........................................ 11
Box 2. Approaches to Improving the Safety of Micromobility in Singapore and Australia .............................. 14
Box 3. Integration of Informal Microbuses into Public Transport Networks in Jakarta, Indonesia .................. 16
Box 4. ESCAP’s Promotion of the Electrification of Public Transport .............................................................. 18
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$US</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>BRT</td>
<td>Bus Rapid Transit</td>
</tr>
<tr>
<td>E-Scooter</td>
<td>Electric Scooter</td>
</tr>
<tr>
<td>EGM</td>
<td>Expert General Meeting</td>
</tr>
<tr>
<td>ESCAP</td>
<td>United Nations Economic and Social Commission for Asia and the Pacific</td>
</tr>
<tr>
<td>FLM</td>
<td>First and Last Mile</td>
</tr>
<tr>
<td>FUA</td>
<td>Functional Urban Area</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gas</td>
</tr>
<tr>
<td>HLPF</td>
<td>United Nations High-Level Political Forum</td>
</tr>
<tr>
<td>ITDP</td>
<td>Institute for Transportation and Development Policy</td>
</tr>
<tr>
<td>ITF</td>
<td>International Transport Forum</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transport System</td>
</tr>
<tr>
<td>LDV</td>
<td>Low density vehicle</td>
</tr>
<tr>
<td>NDC</td>
<td>Nationally Determined Contribution</td>
</tr>
<tr>
<td>ODA</td>
<td>Official Development Assistance</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate Matter</td>
</tr>
<tr>
<td>RAP</td>
<td>Regional Action Programme for Sustainable Transport Development in Asia and the Pacific (2022–2026)</td>
</tr>
<tr>
<td>SDG</td>
<td>Sustainable Development Goal</td>
</tr>
<tr>
<td>SUMP</td>
<td>Sustainable Urban Mobility Plan</td>
</tr>
<tr>
<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
</tr>
<tr>
<td>VRU</td>
<td>Vulnerable Road User</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>ZEV</td>
<td>Zero-Emission Vehicle</td>
</tr>
</tbody>
</table>
1. The effectiveness of public transport systems depends largely on how conveniently people can access them. These initial and final segments of a journey, known as the first and last mile (FLM), represent the weakest links in multimodal transit networks and pose significant barriers to the adoption of public transport (see Figure 1). If access at the start or end point of a trip is inconvenient, inefficient, or unsafe, this can deter users from using public transport, regardless of the quality of the main transit service. Moreover, ensuring these connections are accessible to all, including for older persons, persons with disabilities, women and low-income populations, is essential for improving the inclusivity, appeal, and wider usage of public transport.

2. The United Nations Sustainable Development Goals (SDGs) position FLM access to public transport as a cornerstone of sustainable development. SDG 11, which aims to foster inclusive, safe, resilient, and sustainable cities, underscores the importance of individuals having access to safe, affordable, accessible, and sustainable transport systems, including—in particular—public transport. The corresponding indicator 11.2.1 measures the proportion of the population that has access to public transport, defined as being within 500 meters of public transport for low-capacity systems, such as bus stops, and within 1 kilometre for high-capacity systems, such as metro stations. This makes FLM both a measure and a driver of inclusion, as it directly influences the ability of all individuals to engage in urban life and access economic opportunities.

3. As measured by SDG 11.2.1, only 44 per cent of the population in Asia and the Pacific have convenient access to public transport. With the exception of Australia and New Zealand, where access rates are considerably

---

3. UN-Habitat (2023), Rescuing SDG 11 for a Resilient Urban Planet. Nairobi, Kenya, p.31
higher at 86 per cent, all sub-regions in Asia and the Pacific underperform against the global average of 52 per cent (see Figure 2).4

4. However, the SDGs, intended to be achieved by 2030, are not expected to be met until 2062 in Asia and the Pacific.5 This underscores the need to strengthen the focus of the region on sectors that substantially impact sustainability, such as transport, which accounted for 23 per cent of global transport-related CO₂ emissions in 2023.6 Facilitating widespread adoption of public transport, with its lower emissions per passenger-kilometre and higher passenger capacity per unit surface area, can go a long way towards reducing emissions. Regional demand for urban passenger bus services for instance is projected to increase by 78 per cent in 2050.7 The International Transport Forum (ITF) highlights the challenge for transport authorities to meet this demand sustainably, pointing to issues of inadequate feeder services to public transport and the limited reach of these services to marginalized communities.8 The number of private vehicle ownership has increased by 1 billion between 2000 and 2020, and is projected to increase by a further 400 million by 2030.9 Reversing this trend depends on the improving availability of, and access to, public transport.10

5. To support the adoption of public transport and promote sustainable urban transport more broadly, FLM access is integrally linked to numerous aspects of sustainable urban transport, including notably road safety, decarbonization – as mentioned above, and climate action. For example, while informal and active transport,
such as motorized two-wheelers and walking, represent an indispensable form of FLM access for many countries, they present considerable safety and environmental challenges. 47 per cent of road fatalities in ESCAP member States are vulnerable road users (VRUs).\textsuperscript{11} Non-compliance with emissions standards is also common; for instance, motorized two and three wheeler fleets have the second largest greenhouse gas (GHG) emissions share of passenger transport in Southeast Asia.\textsuperscript{12}

6. On account of the region’s diversity, the implementation of various solutions to address FLM access challenges have evolved in various forms and at different rates across Asia and the Pacific. For instance, measures range from active mobility and informal transport networks to introducing advanced technologies, such as electric buses and barrier-free transit networks. This variability is further influenced by climatic conditions, which often dictate the feasibility of solutions implemented. In Southeast Asia, for instance, the prevalence of monsoons necessitates solutions that are weather-resistant but may not always align with long-term sustainability or inclusivity goals. These solutions need to be resilient enough to withstand frequent flooding, yet they often lack integration with larger transport networks. Despite this complex and heterogeneous regional landscape, enabling all countries to learn from and adapt to these differences is important for sharing insights and best practices that will support the development of various FLM solutions tailored to local contexts.

7. Furthermore, the focus of the indicator of SDG 11.2.1 on proximity to transit points contributes to measuring the inclusivity of urban areas, however it cannot fully capture the dimensions of accessibility that are unique to the region. For example, in compact urban centres, proximity might correlate well with access. However, in the region’s growing number of sprawling urban areas, proximity does not guarantee that these individuals can utilize these transit services. For example, basic road infrastructure, at the heart of accessibility, is often constrained in areas where roads are narrow and lack sidewalks, pushing pedestrians into the street and limiting the access of larger public transport vehicles.\textsuperscript{13} Furthermore, for the high proportion of marginalized individuals in Asia and the Pacific, comprising 75 million people who live below the poverty line of US$3.10/day,\textsuperscript{14} mere proximity to public transport is often not enough, if public transport is not affordable and, as these groups wish to access employment, education, and healthcare, if public transport is also not well connected enough to serve those destinations.\textsuperscript{15} Therefore, FLM solutions must also provide these individuals, especially women, children, persons with disabilities, and the urban poor, with options that are affordable and safe.

8. It follows that the discussion on the FLM issue should, ideally, consider both the immediate needs and broader socio-economic and environmental conditions of the region, ensuring that solutions are both effective in the

\textsuperscript{11}ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, (Geneva, World Health Organization, 2023)
\textsuperscript{14}Ibid., p.13
short term and sustainable in the long term. Moreover, the specifics of FLM challenges, influenced by local variables such as willingness to walk to transit points, differ not only between countries but also within cities, affected by factors such as the climate and the state of supporting infrastructure. Hence, FLM solutions must be adaptable to local contexts, as solutions effective in one area may not be elsewhere. Thus, enhancing connectivity in Asia and the Pacific necessitates a flexible approach that leverages the current progress and opportunities presented by enhancing access to public transport. Many initiatives across the region, while rich in diversity, often do not incorporate FLM and its benefits of inclusivity and sustainability.

2. DETERMINANTS OF FIRST AND LAST MILE ACCESS TO PUBLIC TRANSPORT

9. When considering the challenge of FLM, it is important to analyse both access (first mile) and egress (last mile) travel characteristics as a variety of factors impact access to public transport across Asia and the Pacific. Previous studies have consistently recognized and documented the factors that have the most impact on journeys. These key characteristics include (i) trip characteristics, (ii) mode-specific characteristics, (iii) socio-economic characteristics, and (iv) built environment and infrastructure characteristics.

10. To thoroughly understand and analyse the barriers to improved FLM accessibility, these four characteristics have been combined within an analytical framework (see Figure 3). This framework not only simplifies the complexity inherent in FLM issues but also highlights the interdependencies between different elements of public transport systems. This classification helps to dissect FLM issues into manageable components, enabling the identification of tailored solutions for different contexts.

Figure 3. Analytical Framework for First and Last Mile Access to Public Transport

Source: ESCAP

11. The decomposition of this complex issue is important for several reasons. It simplifies and clarifies the problem, making it easier to understand each part and how it contributes to the broader picture. This is
particularly important considering also how different central or local government authorities might be addressing different components of the same problem in isolation. Additionally, smaller, more manageable components allow for the setting of specific, measurable goals and outcomes, facilitating monitoring and evaluation to assess the effectiveness of solutions. In this context, the four characteristics can be understood as follows:

### 2.1 TRIP CHARACTERISTICS

12. Trip characteristics refer to elements that define the journey, such as duration, frequency, purpose, and flexibility of timing. These characteristics significantly influence a traveller's decision to choose public transport.

13. An important consideration is the **duration of the journey**, as the impact of access and egress times largely depends on the total trip distance. The inconvenience of access times is reduced for longer trips, which is often the case when travel is needed between cities or urban areas, rather than within them.\(^\text{16}\) The impact of duration is also dependent on the quality and convenience of the mode, as individuals will often tolerate longer access and egress times if the operator provides a better service compared to other options.\(^\text{17}\) What is considered inconvenient will vary between individuals, often based on personal economic situations, which emphasizes the importance of a shelf of FLM solutions that meet the diverse needs and considerations of local populations.

14. Similarly, **frequency of service** is another important trip characteristic. This can reduce the waiting times, uncertainty, and stress associated with public transport use, especially when transit services do not operate on fixed schedules. The frequency of service often depends on the purpose of travel, such as peak times for workers and students, which can influence public transport use as these groups may have different needs to leisure travellers, for example. Additionally, it is important to consider the flexibility of these services to accommodate various lifestyles. This includes the provision of services outside of traditional hours to cater to the needs of, for example, populations in urban peripheries, and informal workers, who may finish after formal public transit provisions have ended, forcing them to use other services that are not located as conveniently.

15. The importance of these trip characteristics is illustrated in the modal share for urban transport in Asia (see Figure 4). The varied uptake of different modes shows that they serve, and are important for, different segments of the population, with some services providing fast and premium options, such as private taxis, while others offer slower but affordable alternatives, like walking.

---


\(^{17}\) Ibid.
2.2 SOCIO-ECONOMIC CHARACTERISTICS

16. Transport choices are impacted by the socio-economic characteristics of commuters. Factors such as income level, employment status, education, and household size play crucial roles in determining the accessibility, affordability, and convenience of different transport modes.18 Higher-income individuals may have more options, including private vehicles or premium public transport services, while low-income commuters might rely more on cost-effective but potentially less convenient options.19

17. Asia-Pacific is home to 60 per cent of the world’s population.20 Within this, there are over 203 million people in extreme poverty,21 697 million people over 60 years of age,22 and 690 million persons with disabilities.23 These populations are disproportionately impacted by inadequate transportation and frequently depend on...
vulnerable transport modes, in terms of safety, such as walking or informal transport, and which may also place limitations on their access to employment, education, healthcare, and social connections.\textsuperscript{24}

18. For women in particular, safety can be a concern when choosing how and when to complete FLM journeys. In Dhaka, female commuters are more likely to choose rickshaws over other modes, the reasons behind which are related to safety, convenience, and comfort.\textsuperscript{25} In India, digital solutions have emerged that help to collect data and indicate the safety score of urban areas to help commuters decide how best to complete their journeys.\textsuperscript{26}

19. Older populations may also require more accommodations in the FLM part of journeys. As Asia and the Pacific is predicted to experience an increase in ageing population in the coming years,\textsuperscript{27} it is increasingly important to consider relevant designs in transport planning. Typically, older persons and persons with disabilities tend to have slower walking speeds and the distances they are comfortable walking are less than expected of the broader population.\textsuperscript{28}

2.3 MODE-SPECIFIC CHARACTERISTICS

20. Mode-specific characteristics encompass the features and limitations inherent to each type of transport mode. These include technical characteristics such as speed, which determines how quickly a mode can transport passengers from one point to another; capacity, the number of passengers a specific mode can carry; range, the distance it is possible to travel without refuelling or recharging; and the infrastructure requirements necessary to facilitate service operations. They also include operational characteristics such as safety, which are the risks of using the service, and environmental impact (see Figure 5).
21. Understanding mode-specific characteristics allows policymakers and planners to effectively manage and integrate FLM solutions. For instance, the interplay between the speed and the capacity of different modes can help in planning routes that maximize efficiency and meet demand. Assessing infrastructure requirements ensures that necessary facilities, such as charging stations for micromobility, or safe and sheltered paths for pedestrians and cyclists, are in place. For example, active mobility, such as walking and cycling, can reduce carbon footprints, improve health, and enhance access to public transport. However, the decline in these modes, influenced by an increase in car ownership, inadequate infrastructure, and unsafe environments, highlights the need for high-quality infrastructure and dedicated public spaces to promote active mobility.\(^{29}\) Similarly, informal transport, such as for-hire motorized two-wheelers, provides flexibility and affordability but also poses road safety challenges. A growing number of micromobility options, such as e-scooters, have also helped to provide flexible and low-cost FLM solutions for accessing public transport.\(^{30}\) However, there remain difficulties with scaling up coverage, gaining local government support, and improving integration with main public transport networks.\(^{31}\)

2.4 BUILT ENVIRONMENT, INFRASTRUCTURE, AND STATION AREA CHARACTERISTICS

22. The built environment of cities also plays an important role in determining how FLM can enhance access to public transport. This includes aspects such as housing density and mixed-use developments, which affect


\(^{31}\) Pavan Kumar Machavarapu and others, “Review on public bike share schemes in large developing cities: A case study of Delhi, India”, *Case Studies on Transport Policy*, vol.10, No.4, (December 2022), available at: [https://doi.org/10.1016/j.cstp.2022.09.009](https://doi.org/10.1016/j.cstp.2022.09.009)
how far individuals need to travel to reach a transit station. Consideration in urban planning for well-maintained infrastructure, like sidewalks and bike lanes, determines the safety and convenience of these journeys. This infrastructure should ideally be wide, unobstructed, well-lit, and given the climate of the region, well-sheltered.

23. The characteristics of the station area itself also have an impact, as features such as lighting, security, and convenient connections to other transit options influence the attractiveness of public transport. Well-lit and secure station areas can enhance the perceived and actual safety of commuters, while the availability of seating, shelters, and real-time information displays can improve comfort. The presence of green spaces and street furniture around transit stations can further enhance the appeal of public transport, where amenities such as benches can mitigate the inconvenience of potentially long waiting times at stations.

24. Finally, ensuring that all individuals, including those with disabilities, can conveniently access public transport involves infrastructure that accommodates wheelchairs, tactile paving for the visually impaired, and stations that are equipped with elevators or ramps. By prioritizing well-designed infrastructure and accessible station areas, the attractiveness of public transport is enhanced.

### 3. REGIONAL LANDSCAPE OF FIRST AND LAST MILE ACCESS TO PUBLIC TRANSPORT

#### 3.1 ACTIVE MOBILITY

25. Active mobility refers to non-motorized forms of transport, such as walking, cycling, and the use of scooters or wheelchairs. These modes, particularly walking and cycling, are the most commonly considered FLM solutions. Their prevalence stems from the ability to cost-effectively provide affordable and environmentally friendly access to transit systems. Moreover, when infrastructure for active mobility is well-implemented, such as safe sidewalks, dedicated bike lanes, and sheltered pedestrian zones, public transport becomes a viable option for a broader segment of the population, such as low-income households.

26. Active transport fulfills various transport planning objectives, including to reduce traffic congestion. In Beijing, China, the development of a 6.5 kilometre elevated bike lane encouraged 23 per cent of commuters to shift away from driving as their primary transport mode, which has eased congestion between dense residential and office districts. These initiatives are key to improving the broader economic performance of cities, as the impacts of traffic congestion on productivity loss are estimated to cost Asia and the Pacific up to 5 per cent of annual regional gross domestic product (GDP). From a health perspective, active mobility is

---


34 Ibid., p.5


also crucial to combat non-communicable diseases such as obesity, heart disease, and diabetes. The World Health Organization (WHO) states that insufficient physical activity causes 8.5 million annual deaths in Southeast Asia alone, which represents a substantial but avoidable pressure on healthcare services, and an insurmountable personal loss to millions of families.

27. One of the most efficient ways to link residents with other travel modes rests in infrastructure for active mobility. In this sense, the potential of non-motorized transport remains untapped in many Asia-Pacific cities that exhibit a high share of active mobility in commutes. This includes Bhopal (India) at 47 per cent and Kathmandu (Nepal) at 42 per cent. Despite this, infrastructure for active mobility is overall underfunded in the region, with many transport planning processes prioritizing private motorized transport. Consequently, the modal share of active transport has stagnated in Asia, from an average of 13 per cent for walking and 2 per cent for cycling in 2015, to 12 per cent and 3 per cent in 2020, respectively. As such, private vehicles are considered the most convenient option and represent nearly 30 per cent of urban trips in Asia, despite most of these trips being shorter than three kilometres, and almost all under ten kilometres.

28. Therefore, active mobility as an FLM solution in Asia and the Pacific presents challenges. The limited space and resources allocated for the construction and maintenance of active mobility infrastructure often force Vulnerable Road Users (VRUs) into main roads; the associated risks and safety issues, therefore, diminish the appeal of active mobility, as in ESCAP member states VRUs account for nearly half of regional road fatalities. Additionally, climatic factors often affect the willingness to walk or cycle. High temperatures, heavy rainfall, air pollution and humidity in many parts of Asia and the Pacific deter individuals from these modes, while urban sprawl necessitates longer commutes that hinder the feasibility of active transport as a sole FLM solution to enhance access. In this sense, it is not always effective to look at what works in other regions, such as Europe, and apply it to the unique characteristics of Asia and the Pacific. In Europe, the viability of active mobility, which represents nearly one-third of trips, is supported by predictable weather and well-planned urban areas, where even in rural areas, over 60 per cent of the European population lives within a 15-minute cycling distance from the closest shops and schools.
29. While active mobility faces hurdles in Asia and the Pacific, it embodies an essential solution to equitable and sustainable mobility that should be integrated into FLM strategies. The creation of protected and sheltered cycle lanes and pedestrian paths, comprehensive safety measures, such as well-marked bike lanes, pedestrian zones, and traffic calming measures like pedestrian crossings, can address safety concerns and encourage more people to opt for non-motorized forms of transport. For marginalized communities, these improvements in active mobility infrastructure could be particularly impactful, in the absence of other available or affordable options.

<table>
<thead>
<tr>
<th>Box 1: The Challenges with Active Mobility as an FLM Solution in New Delhi, India</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Delhi, India, is projected to surpass Tokyo, Japan, as the world's largest city within the next decade. Within the city, walking is a popular means of transport. Walking makes up approximately 35 per cent of the share of transportation in the city, and up to 60 per cent if walking to access public transit is considered. However, over time, walking has become an increasingly difficult transport solution due to the associated number of accidents that occur. Amongst all reported road user types, pedestrians and cyclists comprise the second highest number of road deaths in India, constituting 23 per cent of persons killed in road accidents in 2022 (19 per cent and 4 per cent, respectively). The prevailing risk for pedestrians is the development of road infrastructure in a way that prioritizes motorized vehicles. Researchers have evaluated the pedestrian accessibility to bus stops in New Delhi and found a positive relationship between pedestrian safety and the quality of bus stop access. Against this background, solutions have emerged to increase safety for pedestrians. “Safetipin” is an application that monitors the safety of areas, especially targeted for female commuters. The application allows for tracking and also generates the safest route based on audit data. If the commuter feels unsafe, the application can also suggest a safe place nearby. Over time, the data can help inform government officials and policymakers of areas that can be further improved. Source: Lakgotia, S. et al., (2020)</td>
</tr>
</tbody>
</table>

30. The ITF defines micromobility as compact, lightweight devices with a maximum speed of 45 kilometres per hour and a weight of up to 350 kilograms, which can encompass electric, electrically-assisted, and human-powered propulsion, such as e-scooters or bicycles. The integration of micromobility with existing public transport services is often presented as a valuable step to improve urban mobility systems, as it can provide

---

more direct routes to public transport stops, is more affordable than automobiles, and is more effort-saving than active mobility.\textsuperscript{49} In particular, application-based sharing services and dockless devices have provided users with flexibility as to how they integrate these devices into their daily commutes, and in some cases, users can seamlessly transition to the main transit service through integrated ticketing, thus broadening their application as an efficient FLM solution.

31. Micromobility has seen a modest increase in adoption in Asia, with its modal share rising from 1 per cent in 2015 to 2.2 per cent in 2021.\textsuperscript{50} This growth occurs against the backdrop of declining modal shares for public transport and active mobility, highlighting a shift in travel behaviour towards services that provide the most convenient access. To this end, the largest amount of investment in micromobility globally flows into Asia, at approximately US$3.1 billion, or 37 per cent of global investments.\textsuperscript{51} This presents it as “low-hanging fruit” for countries to implement within existing policies quickly and at little expense to the taxpayer. While research on the use of micromobility in FLM contexts outside of the USA is scarce,\textsuperscript{52} studies from the Republic of Korea have found that shared e-scooters are seen as a competitive alternative to walking.\textsuperscript{53} Similarly, in Singapore, e-scooters were found to be a viable FLM alternative for short-distance trips in the Singapore Central Area, where they accommodate routes with higher levels of transit indirectness, more transfers, and longer access-egress walking distance.\textsuperscript{54}

32. While the private sector development of micromobility presents an opportunity to implement these solutions swiftly and economically within existing policies, regulation is warranted to achieve outcomes that are sustainable and effective. In this sense, the regulatory landscape in Asia-Pacific countries varies widely. For instance, regulations concerning speed limits, mandatory helmet use, and the legal status of micromobility devices on roads and pedestrian sidewalks differ significantly from one country to another. This regulatory disparity influences how safely these devices can be integrated into the urban transport ecosystem, often resulting in a patchwork of laws that micromobility operators and users must navigate. In countries such as Japan and the Republic of Korea, strict regulations on micromobility ensure relatively high safety standards but may also limit the adoption and effectiveness of these modes. In contrast, less stringent regulations in places such as India and Indonesia offer more flexibility but pose greater safety risks. While regulations are necessary for ensuring safety in public spaces, overly restrictive or inconsistent policies can hinder the potential of micromobility to serve as a viable FLM solution.

33. The infrastructure required to support micromobility, such as designated lanes, parking docks, and charging stations, must be thoughtfully integrated into the existing urban fabric of cities. As such, micromobility can comprise a “off-the-shelf” solution, enabling cities to dictate how and where these devices are docked, such as away from the densest urban areas, and the regulation surrounding their use. The use of private companies in providing these services can encourage the adoption of advanced technologies and infrastructure, such as GPS vehicle tracking, mobile applications to monitor service availability, and advanced battery technologies that extend vehicle range and efficiency. However, in developing countries barriers include a lack of safe and well-maintained roads and sidewalks, which can pose significant risks to micromobility users. Additionally, the spatial constraints in urban areas often limit the feasibility of installing parking stations without disrupting pedestrian flows. Therefore, micromobility infrastructure should not impede access to public spaces or create new hazards.

34. Micromobility infrastructure is often dependent upon broader electric mobility developments within urban transport systems. For instance, the success of micromobility hinges upon the preparedness of utility companies to maintain a power grid capable of handling the increased demand spurred by electric micromobility. However, it is crucial to critically evaluate the sustainability claims of micromobility. Although e-scooters are often marketed and presented as economical, sustainable, and convenient for short trips in congested urban areas,55 studies suggest that if these devices generate new trips or replace trips that would have otherwise been made by walking or cycling, they could inadvertently increase emissions.56 Yet, it is also important to balance the potential increase in emissions with the improvements in convenience, accessibility, and socio-economic outcomes. Micromobility solutions that encourage more people to access opportunities via public transport can lead to improved employment, education, and health outcomes, which are critical components of sustainable development and the broader achievement of the SDGs.

Box 2: Approaches to Improving the Safety of Micromobility in Singapore and Australia

Singapore has made significant strides in integrating micromobility to enhance FLM access, particularly through the adoption of e-scooters. With approximately 100,000 private e-scooter owners, these devices have become a crucial part of the urban mobility landscape. However, this led to an increase in accidents, which prompted stringent government regulations. The authority’s approach to managing this is to treat private e-scooters similarly to motor vehicles, necessitating registration plates and vehicle testing. Restrictions include bans on the use of micromobility on pedestrian sidewalks and limits on their utility for travel.

In contrast, Brisbane was the first city in Australia to allow a dockless e-scooter sharing in 2018. The city implemented a duopoly system within the inner city, selecting two operators through a competitive assessment that evaluated the quality of devices, mobile applications, and operational logistics. Unlike Singapore, Brisbane permitted riding on pavements but not on vehicular roads. This approach has seen e-scooters gain popularity and expand to additional locations without significant public resistance, which is a stark difference from the reception in many other cities around the world.

The experiences of Singapore and Brisbane highlight the diverse regulatory landscapes shaping the adoption of micromobility. These case studies illustrate the necessity for regulations that are not only enforceable but also flexible enough to support the growth of new transport technologies while mitigating potential public safety risks. Brisbane's model, focusing on partnerships and strategic planning, suggests a paradigm shift towards cooperative governance in micromobility management that could be considered by other Asia-Pacific cities.

Source: Leung, AC and Burke, M (2021)

3.3 INFORMAL TRANSPORT

35. Informal transport comprises a diverse array of vehicles operated by private individuals, which serve as a critical component of urban mobility ecosystems. A variety of services have prevailed in different countries, which shows the adaptability of this sector to local contexts; an important prerequisite for any FLM solution. In Viet Nam, pedal-powered rickshaws, known as pedicabs, provide lifts in areas whose narrow alleys are impassable by motor vehicles. In places such as the Philippines, minivans called jeepneys compete directly with public buses on fixed routes not served by these formal services. In many other cities, informal motorbike taxis at intersections provide feeder connections between main bus routes and communities. The classification of these modes as “informal” reflects the context in which this sector operates; often absent of any necessary vehicle standards or commercial licenses. Despite this, informal transport is often recognized for the flexibility and local accessibility it offers; ensuring that residents can connect to broader transport networks and access destinations and opportunities in areas where formal public transport leaves voids.

57 United Nations Habitat, Informal Transport in the Developing World (2000, p. 3)
36. The primary advantage of informal transport is the essential mobility it provides for marginalized communities. In many cities, formal buses are not the primary or even secondary transport mode, whereas the modal share of informal transport reaches 58 per cent in Dhaka, Bangladesh, 50 per cent in Jakarta, Indonesia, and 40 per cent in Kuala Lumpur, Malaysia.\(^{58}\) To this end, informal transport is often leaned upon by formal operators to provide feeder connections.\(^{59}\) As these feeder services tend to carry fewer customers than denser core services, formal operators value that informal provisions improve access to their main routes while offloading the costs of the inefficient feeder services.\(^{60}\)

37. Informal transport, therefore, significantly enhances urban mobility by offering a spectrum of services that cater to the diverse preferences and economic situations of its users. These services are highly adaptable to community needs, where some commuters may value speed and comfort for a premium fare, while others choose slower, more economical routes that save costs.

38. Despite the ability of informal transport to improve access to public transport, considerations for inclusivity and sustainability are often overlooked. In New Delhi, India, these vehicles are estimated to emit more carbon monoxide per kilometre than even fully loaded buses, while in Dhaka, Bangladesh, auto-rickshaws have been estimated to emit 30 times more pollutants than a normal car.\(^{61}\) Safety is another critical concern due to the hyper-competitive nature of the sector. Operators often drive aggressively and operate unsafe vehicles. Long hours also cause driver fatigue, which is a significant contributor to accidents. Safety is also compromised when too many customers are allowed on board, while a lack of proper vehicle maintenance exacerbates these safety issues, leading to a high incidence of accidents and injuries.\(^{62}\)

39. As with all FLM solutions, what is effective in one region may not prevail in another. In this sense, the popularity of the informal sector is a reflection of diverse economic development across Asia and the Pacific. The share of informal employment ranges from 94 and 93 per cent in Nepal and Cambodia to 19 and 32 per cent in Japan and the Republic of Korea, respectively, while the average share of informal employment in the region’s developing countries is 71 per cent, versus 22 per cent in developed ones.\(^{63}\) In India, rickshaws are recognized as a means of providing people with limited skills and education an escape from extreme poverty.\(^{64}\) The prevalence of the informal sector in this country means that a ban on these services would put 2 million people out of work, while also eliminating the cheapest mode of transportation after walking.\(^{65}\) Hence, the question often under discussion is not primarily about formalizing these services, but rather enhancing the sustainability and inclusivity of them, possibly by improving their integration within formal transit services.


\(^{59}\) United Nations Habitat, Informal Transport in the Developing World (2000, p. 5)

\(^{60}\) Ibid., p.5


\(^{64}\) Yves Boquet, “Can Western mobility solutions apply to East Asia’s cities?” Proceedings of the 10th Asian Urbanization Conference, (August 2009, p.15), available at: https://hal.science/hal-00767197/file/Boquet2009.pdf

\(^{65}\) Ibid., p.16
Box 3: Integration of Informal Microbuses into Public Transport Networks in Jakarta, Indonesia

The metropolitan area of Jakarta, Indonesia, is home to 32 million people. The city is connected by the Transjakarta public transport system, which now includes an informal paratransit service called Mikrotrans. Jakarta integrated these microbuses, known as angkots, into the formal public transport network in 2017, which has formed a key part of a long-term programme aimed at reducing emissions, addressing congestion, and enhancing access to transit services.

The process of integrating these microbuses was supported by upgrades to these informal vehicles to improve safety and comfort. An integrated and cashless fare system was introduced across bus rapid transit (BRT), mass rapid transit (MRT), and Mikrotrans, allowing for easier and cheaper multimodal trips. Mikrotrans stops were also integrated with other transport modes. Subsidized fares were even offered for disadvantaged groups.

Jakarta’s integration of informal microbuses into its public transportation network demonstrates the potential benefits of integrating these services into the broader formal transit network. It has enabled Jakarta to rapidly double formal public transport coverage from 42 per cent in 2017 to 82 per cent in 2022 and increase daily ridership from 300,000 to over a million passengers in the same period. Mikrotrans now accounts for over 60 per cent of Transjakarta’s network coverage.

Jakarta started with a 10-month pilot programme in 2017, incrementally integrating part of the city’s angkot network with the Transjakarta bus network. The success of this pilot was a result of collaborative efforts with regional leaders, informal operators, transit agencies, and city government representatives, which resulted in the establishment of business plans, routes, and standards for participating informal operators.

Source: C40 Cities Climate Leadership Group (2023)
3.4 TECHNOLOGICAL INNOVATIONS

40. Innovations in fare integration, application-based route planning, and live transit schedules have significantly enhanced the convenience and efficiency of FLM solutions. Yet, while these technologies streamline the transit experience and broaden access for many, there remains a need to ensure that these advancements cater to all demographics, including older persons and other underserved groups, who might not fully benefit from digital solutions without additional targeted measures. For instance, providing high-contrast visuals or voice commands to aid those with limited vision or tech literacy for application-based services.

41. Fare integration systems are pivotal for seamless travel across multiple modes of transport. By enabling a single payment solution for a journey that may involve buses, trains, and micromobility services, these systems simplify and reduce the transactional barriers that discourage the use of public transport. Implementing this often requires retrofitting existing vehicles with compatible infrastructure, such as contactless payment readers. These infrastructure upgrades enable commuters to effortlessly switch between feeder modes and main transit services without the need to purchase separate tickets. These platforms can also integrate data from various transport modes across an entire individual’s journey, providing valuable insights into travel behaviours and enabling authorities to tailor FLM solutions more effectively to meet commuter needs.

42. Application-based services offer real-time data that empower users to make informed decisions about their travel routes and schedules, providing updates on live transit schedules, congestion levels, and potential delays. These route planning technologies can direct commuters to less congested or alternative routes away from main roads, thereby reducing exposure to noise and air pollution for communities living near major thoroughfares. Additionally, ride-sharing applications facilitate the coordination of shared journeys, allowing users to connect with others travelling in the same direction, which can further alleviate road congestion and lower individual travel costs. Applications also enable users to evaluate and choose between different transit options, be they faster, more expensive services or slower, economical ones. By enabling such customization of services, applications enable the seamless adaptation of FLM solutions to the varied personal situations of commuters.
Box 4: ESCAP’s Promotion of the Electrification of Public Transport

The integration of electric mobility into FLM strategies is a key technological innovation aimed at transforming public transport systems to meet contemporary urban demands and demographic shifts. In particular, electric buses offer advanced technologies that improve the quality, safety, and environmental impact of urban transport. These enhancements support the sustainable and inclusive objectives that FLM aims to facilitate, effectively closing the loop between feeder and main transit services.

ESCAP estimates that by 2050, 20 per cent of the region’s population will be over the age of 65. The current diesel bus fleets in Asia and the Pacific lack features that cater to the mobility needs of these users. In contrast, electric buses can be designed with features such as low-entry points, handrails, and accessible seating. Moreover, the continuous operation of urban buses, often running up to 16 hours per day, means that electrification has a profound reduction of harmful pollutants such as particulate matter (PM), and nitrogen oxides (NOx), as well as less noise pollution.

In this context, ESCAP’s Asia Pacific Initiative on Electric Mobility (APIEM) promotes regional collaboration among e-mobility stakeholders to promote electric mobility in public transport. Since its launch in August 2022, the APIEM has brought together 20 member countries with over 650 regional EV stakeholders including policymakers, development partners, research institutes, and the private sector, to adapt best practices from across the region into local contexts.

4. CHALLENGES FOR FIRST AND LAST MILE ACCESS TO PUBLIC TRANSPORT IN ASIA AND THE PACIFIC

4.1 URBAN AND TRANSPORT PLANNING

43. In the absence of integrated land use and transport plans, new developments may divide communities and vehicle traffic can overwhelm urban areas. In Asia and the Pacific, urban plans have historically favoured vehicle-oriented approaches. Roads continue to be built faster over time in Asia, from 3.7 million kilometres between 2000-2010 to 5.7 million in 2020. Total road kilometres in Asia are predicted to increase by a further 8 million kilometres by 2030.66 Road construction in the region outpaces that of rail, while the annual growth rate of infrastructure for BRT has declined from 43.8 per cent in 2000-2010 to 6.9 per cent in 2015-2020.67 The prevailing focus on private vehicles has, thus, created a “lock-in” effect that often binds cities to traditional urban development models that cannot adapt to the needs of rapidly growing populations and their needs.

44. These development patterns have been exacerbated by factors acute to the region, such as urban sprawl.\textsuperscript{68} Informal settlements located in urban peripheries manifest the difficulties of accommodating rapid increases in urban populations under strained public transport systems. The nature of these settlements, with dense and narrow streets, restricts the ability of operators to adapt and meet the access needs of these communities, while their unplanned, maze-like layout also hinders the ability of individuals to conveniently access transit points.\textsuperscript{69} This underscores the need for a harmonized approach to urban and transport plans, which ensures that authorities can flexibly develop accessible transport systems in line with population trends.

4.2 FINANCING FOR PUBLIC TRANSPORT

45. Transport infrastructure investments are economically costly, carry significant risk due to frequent construction delays and long investment payback times and specific transport modes being potentially politically contentious. In Asia and the Pacific, it is predicted that the investment required to develop, maintain, and repair inland transport infrastructure will cost approximately US$14.5 trillion between 2020 and 2030, which is about 3 trillion higher than the period 2010 to 2020.\textsuperscript{70} This comprises around 1.6 per cent of the total GDP of Asian economies\textsuperscript{71} and presents a tremendous opportunity to refocus these investment decisions towards sustainable and inclusive transport modes that enhance accessibility.

46. Roads still dominate investments at 66 per cent of this total, mainly to accommodate the projected increase in vehicle ownership.\textsuperscript{72} Crucially, the focus of transport investments is predominantly on infrastructure expansion, rather than maintenance, which only represents 14 per cent of investment.\textsuperscript{73} This exacerbates traffic congestion and hinders the convenient and safe use of public transit and feeder modes, whereby maintenance and improvements are often overlooked to the detriment of their appeal and functionality. Moreover, the uneven distribution of public transit across Asian countries affects 1.37 billion urban residents who lack efficient access to these services, predominantly in the least developed countries.\textsuperscript{74} For instance, the amount of rapid urban transit in low and lower-middle-income, upper-middle-income, and upper-income economies, is about 2, 8, and 16 kilometres per million urban population, respectively. At current trends, this is only expected to increase to 4, 14, and 18 kilometres by 2030, respectively.\textsuperscript{75} Conversely, access to buses in low and lower-middle-income economies is higher than in upper-middle-income and upper-income economies, with approximately 10 buses per 1,000 population, compared to 5 buses and 3 buses, respectively.\textsuperscript{76} This underscores the importance of buses for low-income populations and highlights the need

\textsuperscript{69} Ibid., p.130
\textsuperscript{71} Ibid., p.45
\textsuperscript{72} Ibid., p.45
\textsuperscript{73} Ibid., p.45
\textsuperscript{74} Ibid., p.26
\textsuperscript{75} Ibid., p.27
\textsuperscript{76} Ibid., p.28
to redistribute investments more equitably across countries and transit modes so that FLM access can be enhanced with its inherent benefits of sustainability and inclusivity.

47. Active mobility and micromobility have some of the lowest infrastructure costs compared to other transport modes, yet they remain low within investment priorities. This is often due to perceptions that they do not significantly alleviate major issues like congestion or facilitate long-distance travel. However, a comprehensive understanding of the benefits of FLM solutions can make investment in these modes more attractive to authorities. An example of the potential cost efficiency of active mobility networks can be seen in Seville, Spain, where the city spent 32 million euros on its 80-kilometre network of segregated cycle lanes that serve approximately 70,000 trips per day. Comparatively, the city spent 800 million euros building its 18-kilometre metro line that serves 44,000 trips per day. Similarly, in Lima, Peru, the World Bank estimated that a potential US$300 million investment for a 1,173-kilometre connected network of safe bike infrastructure would have the potential to capture more than a million trips per day, which is similar to the actual ridership of the metro and the BRT systems combined.

4.3 ROAD SAFETY

48. There are over 700,000 lives lost on roads in Asia and the Pacific every year, which represents almost 60 per cent of worldwide road fatalities. The socio-economic costs are estimated at US$96 billion annually, as over 18 million people are left permanently disabled, while the majority of dependents use loans to cover the income loss, which can exacerbate cycles of debt and poverty. FLM modes that comprise walking, cycling, and two- and three-wheelers make up 47 per cent of these fatalities in ESCAP member States, led by pedestrians at 27 per cent, motorized two- and three-wheelers at 17 per cent, and cyclists at 3 per cent (see Figure 6). Globally, micro-mobility accounts for 3 per cent of deaths, while heavy goods vehicles and those carrying more than ten people, such as buses, account for 20 per cent of fatalities. These issues are pronounced in many ESCAP countries as the WHO describes a correlation “between income level and fatality rates… with fatality rates highest in low-income countries and lowest in high-income countries in all world regions.” To overcome this disparity, there is a need to share best practices that can be adapted or replicated in the Asia-Pacific context, especially compared to regions with different socio-economic and transport characteristics, such as Europe, who have the lowest fatality rate at 7 deaths per 100,000 population.
Unsafe conditions for FLM journeys stem from several factors. Infrastructure deficiencies, such as a lack of sidewalks and protected bike lanes, force individuals to share roads with vehicles which increases their risk. A lack of vehicle standards in informal transport means many vehicles are unregulated and poorly maintained. Insufficient traffic calming measures and enforcement of traffic laws lead to chaotic road conditions. Additionally, extreme climates such as heavy rain or high temperatures affect visibility and hinder the effectiveness of one-size-fits-all approaches to FLM, such as unsheltered bike lanes, which may be effective in countries with moderate and predictable climates, unlike Asia and the Pacific. To overcome these issues, FLM infrastructure should consider contextual adaptations in construction, especially the resilience to environmental impacts, and a commitment to maintenance. Improved vehicle standards and traffic measures are also necessary.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

Figure 6. Share of Vulnerable Road User Fatalities by Sub-Region, 2021

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.

To compound this issue, road safety disproportionately affects marginalized individuals, undermining the progress that FLM enhancements aim to achieve for these populations. Children are particularly vulnerable, as road injuries are the leading cause of death for 5–29-year-olds, as per the WHO’s 2023 Global Status Report on Road Safety. Women face increased safety exposures as well; Older persons and persons with disabilities also encounter challenges navigating unsafe infrastructure and often lack accessible transport options. Physical barriers to access and egress facilities, such as gaps between platforms, steep steps to transit points, inadequate shelter, and poorly lit streets, all put older adults at risk of falls and injuries. Lastly, for poor communities, unsafe informal transport modes or affordable active mobility is a necessity rather than an option, which exposes them to higher safety risks.

Source: ESCAP analysis based on the data from the Global Status Report on Road Safety 2023, WHO.
4.4 DATA GAPS

51. Despite the robust conceptual framework of SDG 11.2.1, there remain challenges related to data collection, particularly in Asia and the Pacific. These challenges, as acknowledged by UN-Habitat, the United Nations Economic Commission for Europe (UNECE), and member States at the United Nations High-Level Political Forum (HLPF) in 2023, underscore the need to further the discussion surrounding the barriers to monitoring progress toward FLM access to public transport.

52. Notably, there is difficulty with measuring access to public transport in areas with a prevalent informal transport network. As recording an inventory of public transit stops is ordinarily achieved by compiling data from city administrations, transport service providers, or alternative sources such as Google Maps, these sources only tend to recognize formal transit points. This potentially underrepresents actual access levels due to the omission of informal transit points, which are not officially documented but contribute significantly to local mobility (see Figure 7). UN-Habitat states “A mapping of the transport routes where these paratransit networks can stop is thus recommended.”

53. In 2023, methodological advances to SDG 11.2.1 improved this issue by clarifying the measurement of “informal” public transport stops, which has enabled many cities to measure this indicator more accurately. Authorities are also now encouraged to disaggregate this data on access to public transit stops by the type of service that serves them, whether formal or informal, as this is directly relevant for making policy and investment decisions related to FLM. The metadata also recommends that the indicator findings be split into the share of the population with access to each type of formal or informal transport operator, as this is critical for the decision-making process around improving access to public transport.

---

91 Ibid., p.97
92 Ibid., p.97
93 Ibid., p.97
94 Ibid., p.97
54. Enhancing FLM access requires a balanced approach that captures the immediate benefits of easily implementable solutions within existing policies, and long-term systemic initiatives that address future population trends and needs. So called ‘low-hanging fruit’ can be identified and integrated into current policies quickly. These solutions are practical and cost-effective, providing immediate improvements to accessibility. Examples include utilizing open-source data dashboards to make informed investments and integrating cost-effective private sector micromobility services. In parallel, long-term systemic changes are essential to move away from traditional, car-dominated approaches to urban and transport planning. These include utilizing frameworks such as Sustainable Urban Mobility Plans (SUMPs) and positioning FLM within emerging broader transport priorities to unlock finance.
5.1 SHORT-TERM OPPORTUNITIES

5.1.1 INFORMING POLICY AND INVESTMENT DECISIONS WITH DATA

55. According to UN-Habitat, the data available for SDG 11.2.1 covers approximately 1600 cities globally. However, despite Asia and the Pacific representing 60 per cent of the world’s population, the data for the region only comprises 348 of these cities, equivalent to 23 per cent. South and South-West Asia leads at 155 cities, followed by North Central Asia (62), Southeast Asia (47), East and North-East Asia (47) and the Pacific (37). To improve the conclusions that can be drawn on access to public transport in Asia and the Pacific, there is a need to enhance data collection efforts and present this in a way that enables comparison across the world, so as to learn from the best practices of other regions with comparable issues or superior solutions.

56. While resource and financial constraints can hinder data collection efforts, especially in developing countries, platforms exist that enable the utilization of readily available data. For instance, the Institute for Transportation and Development Policy’s (ITDP) [Atlas of Sustainable City Transport](https://itdp.org/event/turning-data-into-policy-with-the-atlas-of-sustainable-city-transport/), launched in May 2024, is a data dashboard that measures nine key FLM indicators across all modes of transport in tens of thousands of municipalities worldwide. These indicators include population density, block density, people near protected bike lanes, people near services, people near car-free places, people safe from highways, people near frequent transport, people near rapid transport, and people near bikeways and transport (see Figure 8). Across these indicators, researchers, planners, and policymakers can better understand FLM issues in their cities by comparing the performance of neighbourhoods within their jurisdiction, or with other cities, and identify ways to improve and where to focus interventions.

57. The data in the ITDP's Atlas of Sustainable City Transport is generated from open data sources, including satellite imagery, census data, and crowd-sourced information. Regular updates incorporate new data and reflect changes in urban infrastructure. ITDP publishes the data in the Atlas openly and invites anyone to use this data for their own research. Officials from the Seattle Department of Transportation in the USA, the Metropolitan Government of Santiago in Chile, and the city of Pimpri Chinchwad in India, among others, are already using this data-driven approach to improving access to public transport.

---

96 ESCAP analysis based on the data from the SDG 11 Synthesis Report, UN-Habitat
5.1.2 INTEGRATING COST-EFFECTIVE PRIVATE SECTOR MICROMOBILITY SERVICES

58. The substantial amount of investment in the Asian micromobility sector, valued at US$3.1 billion, or 37 percent of total worldwide investments since 2018,\(^98\) presents opportunities to implement these services quickly and cost-effectively. Globally, 90 per cent of this investment is directed at e-scooters, but in Asia, 80 per cent is aimed at bicycles.\(^99\) Furthermore, investments in the supporting operations for shared micromobility, such as parking areas, charging stations, and fleet maintenance, have received increased investor attention across China, Europe, and North America, tripling from US$100 million in 2019 to US$350 million in 2022.\(^100\) This suggests that when countries provide a favorable environment for micromobility investment, it can also bring about broader urban enhancements and contribute towards national policy objectives.

59. As the value of the Asia-Pacific micromobility market is projected to increase by 13 per cent annually to 2032,\(^101\) countries should start to plan how they can benefit from this growth. This is crucial, as the region has faced the largest drop in micromobility investments, from US$2.7 billion in 2019 to US$400 million in 2022. McKinsey states that this shift in investments away from the region reflects accelerated measures, particularly in Europe, to build dedicated bicycle and scooter lanes, which have made micromobility safer and more

---


\(^{99}\) Ibid.

\(^{100}\) Ibid.

Given that much of the urban infrastructure in Asia and the Pacific is not prepared for micromobility devices, the money that authorities save on implementation costs, which are covered by private sector investments, could be considered for redirection towards the development or improvement of urban infrastructure. For example, protected and sheltered lanes can benefit all active modes, not just micromobility. Cities can thereby create more accessible and safe networks that meet the needs of all residents, both quickly and cost-effectively.

60. Furthermore, the implementation of micromobility can be done in various ways, based on local contexts and the preparedness for these devices. This includes various levels of operational restrictions or limits to the number of operators. There are already many examples from across Asia and the Pacific that vary in terms of these approaches. The relatively small modal share for these devices in Asia, which comprised 2.2 per cent of urban trips in 2021 means they can also be introduced and tested with limited externalities to the mass public, and their operation can be adapted with ease, based on their efficacy within current policies. This flexibility and ease with which micromobility can be implemented is vital as these services provide immediate benefits to communities. For example, the ITF stated that across all ASEAN member states, "app-based mobility services increase consumer welfare by providing a more convenient travel option than incumbent services." Furthermore, experiences from Malaysia, as raised by the ITF, also revealed that "despite several initiatives by the government, the quality of service provided by taxi services has been on a decline... App-based services provided a technological solution to that problem." 

5.2 LONG-TERM OPPORTUNITIES

5.2.1 POSITIONING FLM WITHIN EMERGING TRANSPORT PRIORITIES TO UNLOCK FINANCE

61. The cross-cutting nature of the transport sector presents tremendous opportunities to position FLM within broader transport priorities that are at the forefront of investment. These priorities, which include gender equity and electric mobility, among others, have seen actors from the public, private, and international domains come together to share market potential, drive societal demand, and undertake coherent policy actions. The Asian Development Bank (ADB) estimates that over US$500 billion of transport sector investment is needed annually in Asia to maintain growth, tackle poverty, and respond to climate change. Hence, FLM could unlock a larger proportion of this when it is considered in these broader transport initiatives, rather than as a standalone activity.

62. The potential of FLM to interlink with other sectors and address various issues makes it an attractive investment opportunity. In the context of Asia and the Pacific, which is constrained by uneven tax revenues, an upward trend of Official Development Assistance (ODA), and limited borrowing capacities of many developing countries, there is wide acknowledgment of the increasingly important role of the private sector for investing in the acceleration of sustainable mobility. As the transport sector is the largest recipient of public-private partnerships (PPP), with global investment totalling US$25.8 billion, FLM can be positioned as a key and interlinked element in the sustainable transport agenda, not least for its capacity to capture lucrative opportunities in the just- and low-carbon transitions.

63. For instance, FLM solutions are poised to benefit from the electric mobility transition, which has been deemed “the biggest transformation… in a century.” As the ITF states that 100 per cent of new bus sales in Asia and the Pacific should be zero-emissions vehicles (ZEVs) by 2040, 33 per cent of the total current bus fleet in Asia and the Pacific is expected to be replaced by 2030 at a cost of over US$40 billion. However, the effectiveness of this investment relies on FLM access, as the benefits from both an operator and user perspective will remain unattainable if transit points are inaccessible. The introduction of modern electric buses provides an optimal environment for FLM solutions, as they support technologies that enable fare integration with FLM feeder services and can be fitted with accessible seating or ramps, enabling access for individuals previously cut off from public transport. These synergies between electric mobility and FLM should reflect new investment in the latter, as without a focus on FLM, the benefits of electric buses will remain out of reach for those who cannot access the transit points, making the effectiveness of investment in public transport intrinsically linked to the implementation of FLM solutions.

64. Furthermore, the increasing focus by countries on gender equity presents opportunities for FLM. If women had an identical role to men in labour markets, global annual GDP could rise by $28 trillion, or 26 percent, by 2025. Yet, barriers to their participation, such as transport accessibility, availability, affordability, and safety, disproportionately impact women. Given this potential, the number of countries that mention women and gender in their Nationally Determined Contributions (NDCs) increased from 40% in 2016 to 78% in 2021. As NDCs reflect a country’s ambition and direct investment priorities, FLM should not be considered as a means to an end. Instead, it should be seen as a core component to unlock the full potential of a country.

By ensuring that policymakers are aware of the benefits of FLM solutions for women, more investment can be directed at these modes to support their inclusion.

5.2.2 UTILIZING SUSTAINABLE URBAN MOBILITY PLANS

65. Sustainable Urban Mobility Plans (SUMPs) are frameworks designed to enable local authorities to tackle transport challenges in urban areas while prioritizing sustainability, efficiency, and accessibility. The primary objective of a SUMP is to create a cohesive, integrated approach to transport and urban developments in cities. This makes them a beneficial component of any FLM initiatives as these solutions have traditionally been treated in isolation and without full consideration of the sustainable and inclusive benefits they are capable of when developed and considered within current infrastructure and urban plans.

66. SUMPs support improvements to FLM by prioritizing the transport user rather than the vehicles themselves. This aims to transition urban transport from car-centric to multimodal networks that prioritize public and active transport. As the majority of residents in Asia and the Pacific lack convenient access to this service, SUMPs present a clear roadmap for enhancing FLM access beyond the focus of traditional urban mobility planning. This would represent a transition away from traditional, car-centric approaches that have often failed FLM investments and supported a transport sector that does not prioritize sustainability or inclusivity. Crucially, SUMPs focus on ‘functional urban areas’ (FUAs), which encompass the actual flows of people into and out of an urban area, often extending beyond official municipal boundaries.115 This is particularly relevant in Asia and the Pacific, where urban sprawl means that informal settlements frequently extend beyond the confines of formal city plans, which hinders access to public transport when urban and transport plans are not integrated.

67. SUMPs are typically implemented in four phases: 1) preparation and planning; 2) strategy development; 3) measure planning; and 4) implementation and monitoring. In phase one, authorities create working groups to understand the current mobility situation. These comprise transport stakeholders traditionally underrepresented in these views, such as marginalized users and informal operators. In phase two, urban mobility scenarios are created, and a vision is developed that anticipates societal and local transformations. This is important for FLM as many informal communities are already underserved by current transport plans, and access for these communities will only worsen with forecasted rates of urbanization. In measure planning phase, specific actions and duties should be identified and delineated to stakeholders, which could improve informal transport by providing these operators with responsibilities commensurate to the broader transit network. Finally in implementation and monitoring, the efficacy of the SUMP in the ‘real world’ is tested. This contributes to the collection of data which could reinforce the importance of FLM, especially as many cities lack data on it.

115 ASEAN, Guidelines for the Development of Sustainable Urban Mobility Plans in ASEAN Metropolitan Regions, (Indonesia, 2022, p.22)
Adaptations to the concept are being explored across Asia and the Pacific. As SUMPs were originally conceptualized by the European Commission, their effectiveness in Europe has been facilitated by established regulatory support, comprehensive urban plans with public involvement, and infrastructure that is conducive to multimodal transport enhancements. Cities in Europe are usually smaller than many Asia-Pacific cities, which would expectedly make a difference in the efficacy and applicability of SUMPs. Contrastingly, Asia and the Pacific has, in many cases, less planning coordination and infrastructural deficits that mean transport systems cannot keep pace with rapid urbanization and population trends. However, these challenges do not necessarily prevent the adoption of SUMPs; rather, they underscore the importance of plans that align with local realities. For instance, the varied economic landscapes across Asia and the Pacific suggest that while some countries may have the resources to implement comprehensive SUMPs, others might adopt a phased or modular approach, prioritizing certain aspects such as FLM connectivity enhancements based on immediate needs and available resources. Thus, SUMPs should not be viewed as one-size-fits-all solutions, but as flexible frameworks that can be tailored to address specific urban mobility challenges, such as the accessibility of public transport systems.

6. CONCLUDING REMARKS

This document has highlighted the that the FLM challenge can be addressed with tailored approaches that accommodate the region's vast cultural, economic, and infrastructural diversity, stressing the importance of adaptable and customizable FLM solutions. With over 1 billion people in Asia and the Pacific lacking convenient access to public transport, this gap restricts access to employment, education, healthcare, and other essential services, impacting sustainable development.

Modest efforts and investments are already being made across the region to improve access to public transport. These initiatives, while varied in their consideration for inclusivity and sustainability, demonstrate an ambition to provide public transport systems that serve the needs of the population despite the confines of resource, infrastructure, and financial constraints experienced by many countries. While short-term, cost-effective solutions enable some immediate benefits, these efforts are expectedly most effective when complemented by long-term systemic changes. This ensures that solutions are both immediately impactful and sustainable in the long term.

The interconnectedness of FLM with broader sustainable transport objectives, such as electric mobility and road safety, highlights its role in advancing sustainable and inclusive transport systems. Ensuring that public transport is accessible to all, including marginalized groups and vulnerable users, is essential for improving the appeal, safety and wider usage of public transport. Ultimately, by focusing on both immediate and future needs, the region can develop sustainable transport systems that support economic and social development, ensuring that no one is left behind.