

The everyday struggles of accessing public transport for women in the first- and last-mile stretches in Kolkata

Sanghamitra Roy^{a,b,*}, Ajay Bailey^{a,c}, Femke van Noorloos^a

^a International Development Studies, Department of Human Geography and Spatial Planning, Faculty of Geosciences, Princetonlaan 8a, 3584 CB Utrecht, Utrecht University, the Netherlands

^b Manipal School of Architecture and Planning, Manipal Academy of Higher Education, Manipal, Karnataka 576104, India

^c Transdisciplinary Centre for Qualitative Methods (TCQM), Prasanna School of Public Health, Manipal Academy of Higher Education (MAHE), Manipal, Karnataka 576104, India

ARTICLE INFO

Keywords:

Women's mobility
Mobility barriers
Public transport
First- and last-mile connectivity
India

ABSTRACT

Walking and public transport are the primary modes of transport for women in developing countries. However, accessing these is not without barriers, particularly in the first- and last-mile stretches due to poor services, crowding, transfers, waiting, and lack of pedestrian infrastructure. This study aims to understand accessibility and the barriers women face in the first and last miles of everyday commuting. The data for this qualitative study are derived from visual surveys of selected locations in Kolkata and in-depth interviews to understand women's lived experiences, nuances of everyday travel, and diversity of encounters and perceptions. The major barriers to walking and accessing auto-rickshaws and buses are primarily heavy traffic, speeding vehicles, negligent driving, chaotic transfers, crowded conditions of buses, unsafe boarding and alighting, and absence of sidewalks. These barriers make women feel unsafe, influence modal choice, and increase travel time. Challenges in accessibility and acceptability of public transport push women to often make non-efficient and more expensive choices, which affects their work and family life. The findings stress the need for appropriate planning and design strategies and interventions to ensure equitable mobility for women.

1. Introduction

Walking, public transport, and intermediate public transport (IPT) are the primary modes of transport for women in developing countries. However, accessing these is not without barriers, particularly in the first- and last-mile stretches. Unreliable and unsafe public transport coupled with inferior access to private motorized vehicles pushes women to become more dependent on IPTs such as cycle-rickshaws and auto-rickshaws, which are usually costlier than public transport, to access work and other everyday activities (Allen, 2018; Mahadevia, 2015; Uteng and Turner, 2019). For example, 93% of women garment workers in Dhaka walk or use cycle-rickshaws to commute to work. In India, 84% of the trips undertaken by women are by public transport, IPTs, and non-motorized transport (NMT), and 60% of women depend on buses as their primary mode, followed by IPTs and NMTs (Borker, 2022; Shah et al., 2017; Tiwari and Singh, 2018). Unreliable public transport adversely affects women's mobility, particularly during non-peak hours (Shah and

Raman, 2019). For short distances, women tend to walk regardless of income, and they use NMTs more than men (Pojani and Stead, 2017; Shah et al., 2017; van Soest et al., 2020). Moreover, unreliable public transport increases waiting time due to missed transfers, thus decreasing the time available for them to manage care responsibilities at home (Borker, 2022; Dominguez Gonzalez et al., 2020). In India, the average waiting time for buses is 12 min, which is double that of auto-rickshaws, irrespective of the time of the day (Roy and Basu, 2021). Across contexts, women prefer integrated service to avoid waiting during transfers (Allen, 2018; Chowdhury and Van Wee, 2020). A study in South Korea finds that most commuters are reluctant to transfer more than once and are disinclined to walk longer distances during transfers (Ha et al., 2020). Besides, the lack of pedestrian infrastructure hindering access to transit stops, and sexual harassment in crowded buses limit women's mobility, exclude them from public spaces, and prohibit exercising their right to the city (Adlakha and Parra, 2020; Bivina and Parida, 2020; Herrmann-Luncke et al., 2020; Hussin et al., 2021; Iqbal et al., 2020;

* Corresponding author at: International Development Studies, Department of Human Geography and Spatial Planning, Faculty of Geosciences, Princetonlaan 8a, 3584 CB Utrecht, Utrecht University, the Netherlands.

E-mail addresses: s.roy@uu.nl (S. Roy), a.bailey@uu.nl (A. Bailey), h.j.vannoorloos@uu.nl (F. van Noorloos).

<https://doi.org/10.1016/j.jtrangeo.2024.103892>

Received 5 July 2023; Received in revised form 2 May 2024; Accepted 2 May 2024

Available online 6 May 2024

0966-6923/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Lak et al., 2020; Mejía-Dorantes and Villagrán, 2020).

2. Refocussing on first and last mile stretches

Typically, the first and last miles are described as the beginning and end of a transit trip (Kumar and Khani, 2021). They are vital stretches of a trip and are crucial for accessing public transport, and economic and social opportunities (Adlakha and Parra, 2020; Borker, 2022). Yet, they largely remain neglected in the Global South, where transport systems often lack multimodal facilities, intermodal transfers, and a safe, convenient, and comfortable walking environment (Chant, 2013; SPACE10, 2018). A study around the metro stations in Delhi, India, notes that most first- and last-mile trips were made by NMTs and walking due to the lack of IPT options (Shah et al., 2017). Another study on 11 selected cities in India finds that even though more than 80% of women lived within a 15-min walk from a public transport stop, only 47% chose to walk or cycle due to the lack of adequate first- and last-mile connectivity. Most women felt that first and last miles are key areas of improvement in the transport system (Shah and Raman, 2019). The perspectives and experiences of women are important in understanding the barriers they face while accessing public transport in the first and last mile stretches. As Carruthers et al. (2005) put forth, users' perspectives on the availability, accessibility, affordability, and acceptability of public transport are crucial for understanding mobility. Briefly put, "availability" refers to route possibilities, timings, and frequency; "accessibility" refers to the ease with which one can use public transport; "affordability" refers to the ability to undertake transport movements without significantly inhibiting other important activities and "acceptability" refers to if the transport is acceptable either because of the transport quality or the benchmark of the commuter.

However, there is a dearth of studies that discuss women's lived experiences of mobility in the first- and last-mile stretches in India and other developing countries focusing on the availability, accessibility, affordability, and acceptability of public transport. Access to equitable mobility is essential to realize women's right to the city. There is a distinct need to understand the gendered dimensions of mobility and their influences in various spatial contexts. Present mobility studies in India as we see in Fig. 1, mostly take a quantitative approach that focuses on difficulties related to bus and paratransit services and their attributes (Dandapat and Maitra, 2020; Pandit and Sharma, 2022;

Mahadevia, 2015; Roy and Basu, 2021), lack of integrated services and travel cost (Bose and Pandit, 2020; Shah et al., 2017; Uteng and Turner, 2019), and street traffic and lack of pedestrian infrastructure (Adlakha and Parra, 2020; Bivina and Parida, 2020; Haque et al., 2019; Mukherjee et al., 2020). Also, they focus more on availability and affordability. Quantitative studies in Pakistan and Latin America also focus on the barriers related to the availability of public transport, namely the lack of adequate and reliable services, intermodal facilities, and short operating times (Ahmad et al., 2019; Dominguez Gonzalez et al., 2020). Some studies in Israel, Latin America, Morocco, and Pakistan do delve into gendered mobility, for example discussing how crowded and unsafe conditions increase travel time and cost, and how inconvenience and discomfort influence accessibility, affordability, and acceptability, but not specifically for mobility in the first- and last-mile stretches (Herrmann-Lunecke et al., 2020; Iqbal et al., 2020; Kerzhner et al., 2018; Mark and Heinrichs, 2019; Masood, 2017; Saadaoui, 2019; Tiznado-Aitken et al., 2020).

This study aims to address this very knowledge gap and understand how the first- and last-mile stretches are accessed by women in Kolkata, the barriers they face while doing so, how these barriers influence accessibility, affordability, and acceptability, and how women respond to these barriers. Fig. 1 shows the conceptual framework and how this study is situated with respect to the current knowledge base. Gendered dimensions are seldom integrated into urban planning (Beebeejaun, 2017; Peake, 2020). The findings of this study will aid in creating a holistic understanding and devising interventions inclusively and equitably. The following section briefly describes the study area. The next section explicates the methods used, followed by the results section. After that, we discuss the results and note the concluding remarks.

3. Study area

Kolkata is a dense and compact city with nearly 4.5 million people (Census of India, 2011). It has an elaborate public and intermodal public transport system. Hand-pulled and cycle-rickshaws are the slowest of all modes. They ply only for short distances within a locality. Auto-rickshaws ply on fixed routes on a shared basis for short distances between two nodal points. Buses have an elaborate network and are available at most locations, though frequency varies and decreases at night. Types of buses include government buses, private buses, and

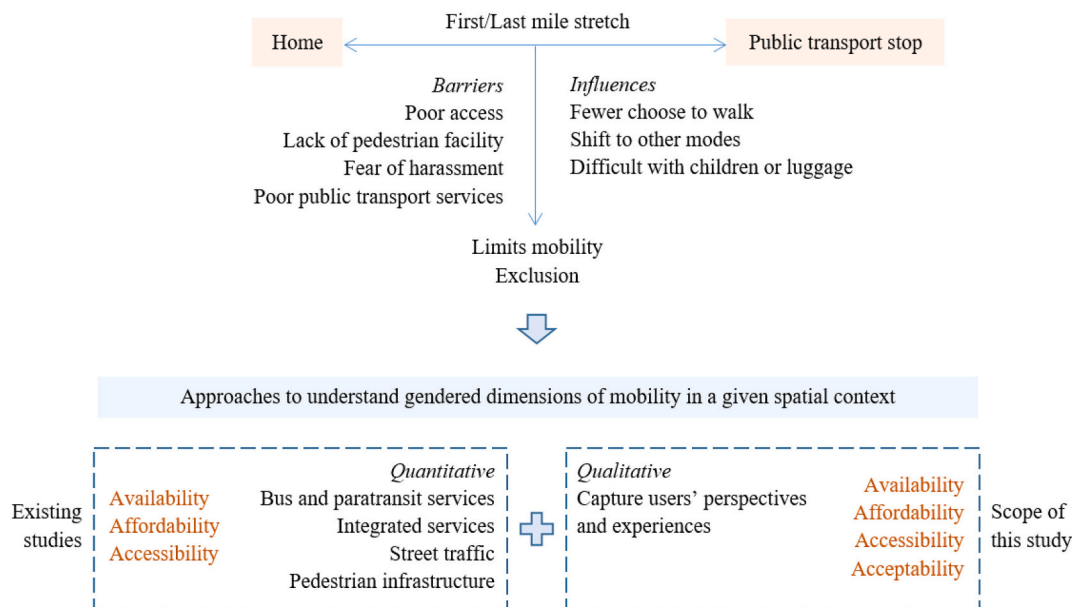


Fig. 1. Conceptual framework situating this study. (Source: Authors)

private minibuses. The metro is the fastest option and runs at regular and frequent intervals (Basu, 2019). The metro is Kolkata's second busiest public transport mode after buses (Ghosh and Schot, 2019).

Buses, however, are unreliable, crowded, drive rashly, and lack maintenance (Bose and Pandit, 2020). Auto-rickshaws are the predominant mode of transport in the first- and last-mile stretches, as 91% of the city is within one kilometre of an auto-rickshaw route. Women use auto-rickshaws for work and non-work trips throughout the day, comprising about 40% of auto-rickshaw users in Kolkata. Auto-rickshaws are preferred because of their coverage, reliability, and affordability (Arora et al., 2016; Basu, 2019; Chowdhury, 2021). Women tend to use hand-pulled rickshaws, cycle-rickshaws, and auto-rickshaws primarily due to easy accessibility, convenience, and comfort (Chatterjee and Sarkar, 2016; Ghosh and Schot, 2019). For the middle class, comfort and convenience are the emerging parameters of travel as opposed to affordability earlier (Ghosh and Schot, 2019). Walking, too, is a challenge in Kolkata due to poor pedestrian infrastructure in most parts of the city, particularly for women, as they tend to walk more frequently than men for short distances (Mahadevia, 2015). With 24,252 persons per square kilometre, a meagre 6% road space, a lack of comprehensive transport planning, and heavy traffic, there are serious concerns about road safety for pedestrians (Basu, 2019; Haque et al., 2019).

Most mobility studies in Kolkata are quantitative and focus on the efficiency of public transport and walkability (Basu, 2019; Bose and Pandit, 2020; Dandapat and Maitra, 2020; Mukherjee et al., 2020), and seldom on lived experiences which are key to understanding the context of mobility. Hanson (2010), in her work on the interplay between gender and mobility, notes that quantitative studies mainly focus on mobility and not on gender; they also rarely consider people's lived experiences and the meanings they give to various aspects of mobility. Hanson thus identifies a need for in-depth contextualized studies. It is, therefore, imperative to capture the nuances of everyday travel, and the diversity of lived experiences and perceptions, to meaningfully understand the barriers women face in the first- and last-mile stretches.

4. Methods

In line with the knowledge gap and the research objective, this study used qualitative research methods – in-depth interviews and visual surveys. The in-depth interviews were conducted to understand the lived experiences and perspectives of the participants. The visual surveys were conducted at major metro stations and neighbouring localities to contextualize these lived experiences. As transport inequalities play out in a spatial context, visual surveys are important to understand the spatial contexts before proceeding with interview questions and their probes. These two methods, when used in combination, help obtain meaningful data. The data were collected by the first author under the supervision of the second and third authors in two phases in 2017–2018 and 2021–2022.

4.1. In-depth interviews

Twenty-six in-depth interviews in Phase I and thirty-eight in-depth interviews in Phase II were conducted. The participants in Phase II were different from the participants in Phase I to capture wider viewpoints and ensure information richness (Busetto et al., 2020). During the interviews, the participants narrated their personal experiences and perspectives, which enabled an in-depth understanding of how the first- and last-mile stretches were accessed, the barriers faced, and how these barriers influenced the accessibility, affordability, and acceptability of public transport and IPTs. The interviews were conducted until data saturation was reached. Following Hennink et al. (2017), data saturation was influenced by the purpose of the study and data quality that focused on thick descriptions. Data saturation was reached at 26 interviews in Phase I and 38 interviews in Phase II. Semi-structured interview guides based on the research objectives were used. Safety being one of the

major barriers to mobility, during Phase I, we focused on women's mobility and perception of safety, and during Phase II, we looked at a wider range of physical and social barriers pertaining to women's mobility. The questions were meant to understand women's lived experiences and the meanings derived from them. In phase I, the topics covered various attributes of the use of public spaces, predominantly through walking, the behavior of people and activities in public spaces, and how they shaped women's perceptions of safety and negotiations. In phase II, the topics covered participants' mobility needs and patterns, modal choice, availability of public transport at different times of the day, and issues pertaining to accessibility, affordability, and acceptability of public transport and IPTs. The use of public spaces and issues pertaining to mobility and safety were common across the phases. Phase I interviews were conducted in person at their residences or workplaces, and phase II interviews were conducted online using MS Teams, Zoom, or Google Meet due to the then ongoing COVID-19 pandemic in India. All interviews were conducted in the participants' native language for about 60–90 min. Participation in the study was voluntary.

4.2. Participant profile and recruitment

Participants were selected based on their gender, age, residential location, and use of public transport. The study was limited to women 18 years and above. The participants were between 18 and 61 years of age. They were selected from various residential locations across Kolkata along and further from the metro line, as we see in Fig. 2. They included students, teachers, engineers, doctors, nurses, saleswomen, advocates, homemakers, and others who used public transport regularly, traversed various parts of the city, and were able to share a wide range of lived experiences. The participants were mostly from lower middle- and middle-income households who relied on public transport as they did not have or could not afford private motorized vehicles for everyday commutes. Women from high-income households use mostly ride-hailing services and private motorized vehicles (Chatterjee and Sarkar, 2016; Ghosh and Schot, 2019). Purposive sampling was used for this study, and the participants were selected based on the purpose of the study (Saunders and Townsend, 2018). Initially, a few participants were recruited through direct acquaintances, and thereafter, the remaining participants were recruited through snowball technique.

4.3. Visual surveys

Visual surveys capture information about the environment to gain insights into the spatial context and its elements (Barbour, 2014; Sanoff, 1991). Five visual surveys were conducted around Tollygunge, Kalighat, Jatin Das Park, Esplanade, and Shyambazar metro stations, as shown in Fig. 2, as these major metro stations are within the first and last miles of the participants' home, work, and other regular destinations, and are often referred to by the participants during interviews. In line with the research objective, the visual surveys focused on capturing broadly the spatial context at the metro stations, major details of the infrastructure, and the mobility behavior of women therein through observation and field notes. Following Busetto et al. (2020), the observer was not a part of the context and behavior being observed and did not influence the setting by her presence. Infrastructure-related data included sidewalk conditions, metro entry-exit details from the street to the platform level, location of nearby bus and IPT stands and stops, traffic flow directions, and a broad understanding of the movement of women therein. Data related to the mobility behavior of women included how they access public transport and IPTs, and barriers faced while walking, waiting, getting up and down the steps, and boarding and alighting.

4.4. Data management and analysis

Data collected through interviews were translated and identifying features were taken out. After preparing the verbatim transcripts, data



Fig. 2. Map of Kolkata showing the residential location of the participants. (Source: Authors)

analysis was done involving two cycles of coding following Saldaña (2015). In the first cycle, we looked at the text data closely to understand the identifying patterns – similarities, dissimilarities, causations, etc. We coded the data based on the patterns using Atlas.ti. We remained close to the text data while identifying the patterns as descriptive analysis attempts to remain close to the original data. In the second cycle, we categorized and grouped the codes into families based on the research questions (Moser and Korstjens, 2018). The data from the interviews and visual surveys were then triangulated to ensure data validity (Carter et al., 2014). They were found to be convergent and supported the findings of the study.

5. Results

The figure below presents the range of challenges involved in accessing public transport for women, especially related to the first- and last-mile stretches. The subsections that follow narrate a range of lived experiences and challenges pertaining to the availability, accessibility, acceptability, and affordability of public transport faced by women accessing public transport in Kolkata.

This is the story of Mita, 38 years old, married, residing in *Santoshpur* in south Kolkata, and traveling to Russell Street in central Kolkata to work for a leading private sector company. This narration is about the barriers Mita faces every day as she 1) walks from her home to the nearest transport stop, 2) takes an IPT (sometimes even a bus) from the nearest transport stop to the public transport stop, and 3) accesses the metro or the bus. This narration also captures the barriers she faces as she returns from work to home by 4) taking an IPT from the public transport stop to the transport stop near her home and 5) walking from there to her home. It is around a 12-km distance that takes about 50 min in the morning to reach the office and 90 min in the evening to return home. She narrates how the barriers and her experiences influence her choices while traveling; these will be discussed in the following subsections. While other participants' experiences largely resonate with the

barriers faced by Mita, they also bring forth further nuances and additional barriers, as we see in Fig. 3. The results capture the diversity of participants' experiences on barriers in the first- and last-mile stretches.

Santoshpur, where Mita resides, is a dense residential neighbourhood housing low- and mid-rise buildings. Like most other residential neighbourhoods, in Santoshpur, the primary modes of transport are buses and auto-rickshaws on the main streets, and rickshaws and walking on the inside lanes. Metro is also available, but the nearest metro station for Santoshpur is about 2–3 km away, as shown in Fig. 4. Mita primarily uses auto-rickshaws in the first- and last-mile stretches; these connect her to the main bus stand or the metro station for undertaking the middle and longest segment of her trip. She avoids using ride-hailing services because of their high cost.

5.1. Walking from the home to the nearest transport stop

“If the car comes, you have to make space”.

Mita prefers to walk from home to the nearest transport stop on the main street to avail of auto-rickshaws while going to the office. However, household work often prevents her from leaving home well in advance, resulting in her taking a cycle-rickshaw to the main street almost every day for fear of arriving late to the office.

My house is not on the main road, it is a bit inside, I cannot afford to walk to the main road as I keep thinking I cannot waste 10 min by walking, I will probably miss two buses, so I take the rickshaw. The rickshaw stand is right in front of my house. (Mita, 38 years).

Participants, almost of all ages, living near a transport stop (within a 10-min walk or up to 800 m) prefer to walk, unless they are late or in a hurry. One participant, 59 years old, who lives in Dum Dum and does not have a rickshaw or auto-rickshaw stand close to her home, is compelled to walk to the IPT stand. Despite having a driving license, she could not afford a car until a few years back. Only recently, she has started commuting in her car to avoid the hassles of walking to the IPT stop and

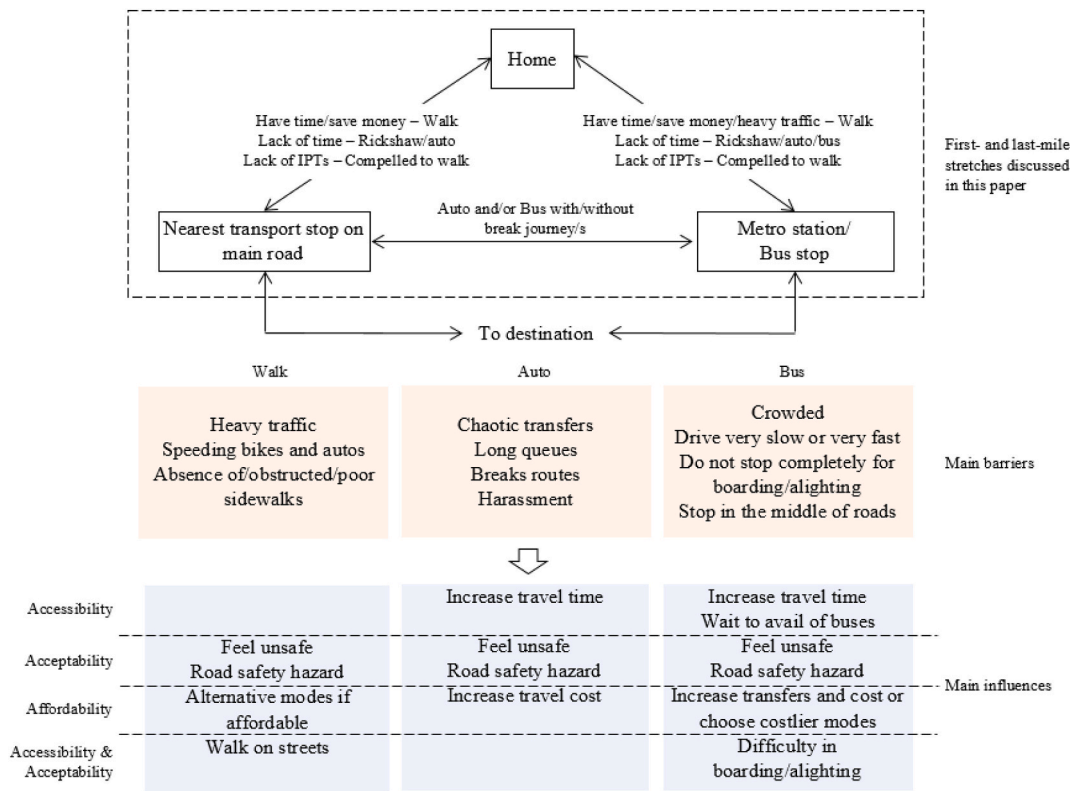


Fig. 3. Main barriers and their influences in the first- and last-mile stretches for women in Kolkata. (Source: Authors)

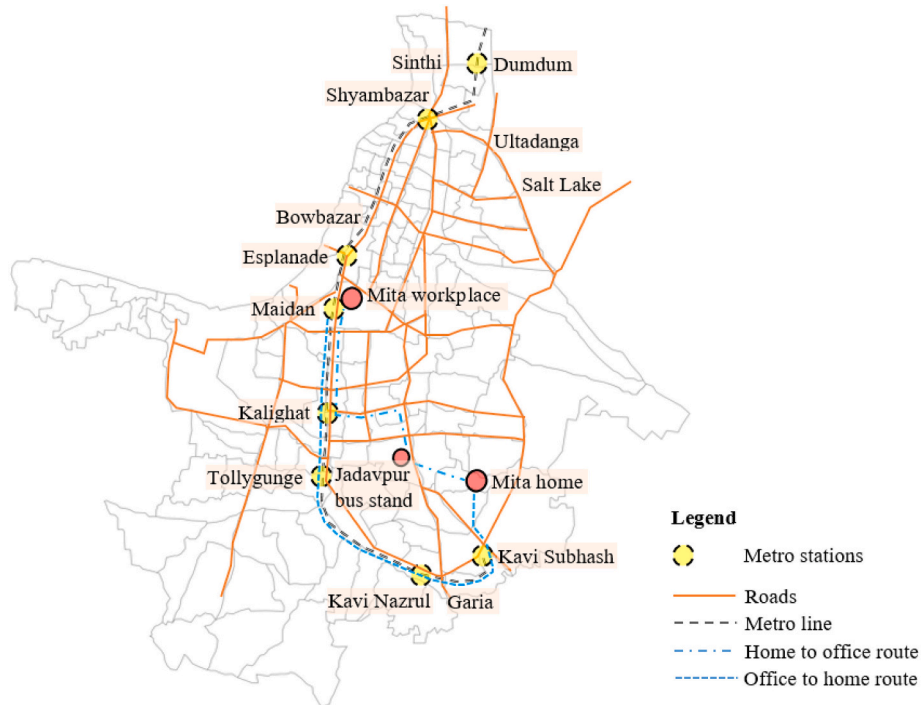


Fig. 4. Map of Kolkata showing the metro line, a few major roads, and Mita's routes. (Source: Authors)

everyday transfers. Cycle- and auto-rickshaws are usually available in most residential areas except in some posh areas. One participant, 51 years old, who resides in one such location, notes that the 20-min walk

to the Maidan metro station is unavoidable for her. Walking is also her desired choice though, as she travels during non-peak hours. Some participants feel that walking short distances avoids wasting money. A

homemaker residing in *Bowbazar* in proximity to Chandni and Central metro stations prefers to walk not only because of the proximity to metro stations but also because of the heavy traffic in the congested commercial streets of *Bowbazar*, which makes her feel unsafe riding cycle-rickshaws.

I am a bit scared to use the man-pulled rickshaw, they are very high, you have to lift your leg high to get on the rickshaw, I feel scared to get on and off the rickshaw. And when the buses and trucks pass by, I feel very scared. If I am in a hurry, I take a bus to the metro station. (Homemaker, 48 years).

Walking on the streets of Kolkata, however, is anything but easy. As Mita states, crowded sidewalks compel her to get down on the streets and walk. Other participants, too, find crowded sidewalks with innumerable activities therein a barrier. Most sidewalks in Kolkata are obstructed by shops that extend onto the sidewalks, hawkers, small religious structures, parked vehicles, and so on. These make walking on the sidewalks extremely difficult and at times impossible. Instead of continuously getting up and down the sidewalk, participants prefer walking on the streets, even if it means sharing the space with vehicles of all sorts, as we see in Fig. 5. In commercial areas on streets without adequate sidewalks, auto-rickshaws and motorbikes continuously weave through the traffic and drive recklessly, posing significant barriers to walking that women negotiate on a daily basis. In residential areas, women are particularly wary of motorbikes. Consequently, they tend to avoid the lanes that do not have sidewalks and where speeding motorbikes brush by at times, adding to the difficulty of walking safely.

5.2. Taking an IPT from the nearest transport stop to the public transport stop

“If you break a journey, it will cost you”.

As Mita continues her journey to work, she avails of an auto-rickshaw from the nearest transport stop to the main bus stand.

I take an auto-rickshaw to the Jadavpur bus stand. There, government buses are available, you can sit comfortably and travel. I get down at Maidan, and from there, it is a walking distance. (Mita, 38 years).

Though there are direct private buses to her office from the transport stop near her home, they are extremely crowded during office hours. Hence, she prefers government buses even though she must break her journey and the fares are higher. Higher fares make government buses a little less crowded, and they are mostly availed by office workers. But not everyone can afford to break their journeys too many times. A young

participant, 25 years old, who, unlike Mita, comes from a low-income household of six and travels about 12 km to work in an area where bus routes and frequency are poor, needs to change auto-rickshaws twice to reach the metro station, spending about 10% of her household income only on her work trips. At times, when travel time and comfort are more important, she avails of auto-rickshaws as these are faster, and she can sit. Other times, she uses a bus to reduce travel costs even when the journey takes two hours. Another young participant, 25 years old and from a low-income household in south Kolkata, explains that as most of her friends reside in north Kolkata, she either cannot meet them or meet them midway to reduce travel costs and time.

Auto-rickshaws are integral to Mita’s and other participants’ daily travel in Kolkata and they are the most commonly used IPT despite the barriers. Participants narrate how auto-rickshaws often drop off and pick up people in chaotic, rushed, and dangerous ways, posing serious barriers to safe accessibility. Often, at busy locations with no auto-rickshaw stands or separate lines for different auto-rickshaw routes, it is an uphill task for the participants to get on a running auto. Sexual harassment is also common in auto-rickshaws.

In auto, the behavior issue of co-passengers is always there, I think all women face this, nothing we can do. I sometimes get angry and sit next to the driver. (Mita, 38 years)

Most other participants resonate with Mita’s experiences. Younger participants get out of the auto-rickshaws midway and take a bus. Some participants also share the discomfort of sitting next to the driver.

I don’t prefer sitting in the front seat much, I am scared of the driver. The way he moves his hands, I always somehow coil myself whenever I sit in the front. (Student, 30 years)

Older participants, too, note their discomfort sitting close to men while acknowledging that it is unavoidable in public transport and needs to be accepted if there is no wrong behavior involved.

5.3. Accessing public transport

“How will I get on that bus?”

Mita avails of the government bus while going to the office, but bus services in Kolkata are unreliable. On days when the government bus is unavailable, Mita is compelled to either hang from a crowded minibus, as we see in Fig. 6, or take another auto-rickshaw to the metro station and then a metro from there. Other participants, too, opt for alternate modes and routes to avoid crowded buses. A 27-year-old participant who travels around 18 km each way every day to work narrates,



Fig. 5. Obstructed sidewalks compelling walking on the streets. (Source: Authors)



Fig. 6. Hanging out of crowded buses. (Source: Authors)

I cannot hang from buses like that, there is a huge chance of falling. I have to leave those buses even if I am getting late. Or, from VIP Road I take an auto-rickshaw to *Ultadanga*, and from *Ultadanga* another auto-rickshaw to Shyambazar metro station. Very hectic. (Service, 27 years)

Most participants forego alighting 2–3 buses on average every day, even if it means reaching their office late and being penalized with a leave deduction. To Mita, ride-hailing services are not an alternative to crowded buses as she feels they are almost ten times the cost of traveling in a bus. She further explains how difficult crowded conditions in buses are for women. On the way back from the office, Mita takes the metro as buses become even more crowded. The metro, too, is crowded, but most participants still prefer it over buses: first, each metro coach has a section only for women, whereas in buses only a few seats are reserved for them. Second, the metro is reliable, and women are certain about their travel time. Third, as Mita and other participants note, men always stand at the bus gates. Women must push through and make their way, which makes boarding and alighting difficult and makes them feel unsafe.

To add to the difficulties of daily commute for women, the buses do not come to a complete stop; they are in a rush, and often stop in the middle of the street, as we see in Fig. 7. Auto-rickshaws and two-wheelers keep coming from the left, making boarding and alighting extremely hazardous, particularly for women and older adults. Mita notes,

The conductors are in such a rush, they do not stop properly. Hurry while getting on, and hurry while getting off. It doesn't matter to them if people fall. And when getting down suddenly a motorbike will pass by, such things are there.

(Mita, 38 years)

5.4. Taking an IPT from the public transport stop to the nearest transport stop

"I want to reach home as fast as possible".

The excessive crowd in buses while returning home from work prompts Mita to use the metro for the return journey, even though it requires more breaks. She gets down at the Kavi Subhash metro station, but from there, getting an auto-rickshaw during peak hours is challenging. Therefore, she gets on whichever auto-rickshaw is going towards her home so that she can take another auto-rickshaw or bus from there, whichever comes sooner, and reach home.

After getting down at Kavi Subhash, there is not much bus connectivity, there are many auto-rickshaws, but there is a long line, have to



Fig. 7. Boarding/alighting in the middle of the street. (Source: Authors)

wait a long time for an auto. So, as soon as an auto-rickshaw comes we sit, may or may not be a direct auto. If not direct, I get down at a nearby place, and from there, I change to go home. (Mita, 38 years)

However, this journey costs her time, and on most days, she is unable to reach home on time to relieve her daughter's caregiver. This made her decide to rent a residence closer to her mother's place, so that her daughter can stay with her mother until she returns home, despite such decisions having financial implications. Another participant who has a young child and resonates with Mita's urgency of returning home as soon as possible explains,

That time money does not matter, I want to reach home as fast as possible, the whole day I am out, my young daughter is at home, if I reach home early I will be able to play with her, teach her, so that time, I don't think about anything else, that's why I change auto-rickshaw twice and reach home. (Advocate, 39 years)

Returning home in the late evenings is a struggle, some participants note. In many locations, particularly on the outskirts of Kolkata, auto-rickshaw frequency decreases in the evening and night. As one participant who travels a long distance to work every day narrates,

The area I work in is very institutional, and after a certain time getting an auto-rickshaw is very difficult. Many times, I have to wait for 15–20 min, and still do not get an auto, so I cannot access the metro. Once, I had to spend almost 400 rupees for a cab to return home, which was too much. (Service, 27 years)

Although the metro is reliable and is preferred by women, access to the metro is challenging. It requires negotiating numerous steps, as we see in Fig. 8. While not a concern to Mita, to others, especially to older participants, the steps are a major hindrance to accessing the metro. Kolkata's metro stations do not have barrier-free access from the street to the platform level. In the metro stations built recently, lifts are provided, but accessing them is difficult because the lifts either are not readily visible or do not work. On a positive note, 25% of the seats reserved for women in each coach impart a sense of safety and comfort for women. As Mita notes and most participants agree, women prefer to board the metro through the doors located on either side of the reserved



Fig. 8. Steps at metro stations. (Source: Authors)

seats to avoid the discomfort of weaving through unreserved areas that are mainly occupied by men. The reserved area permits women to stand without feeling unsafe, particularly during peak hours when the metro is crowded. In addition, the reserved seats are located in the center of each coach and thereby highly visible to the co-commuters, so any attempt to harass women would not go unnoticed. The belief of being seen by fellow commuters, too, imparts a sense of safety and comfort for women.

5.5. Walking from the nearest stop to the home

“I get down a bit early to buy things from the market”.

After reaching the transport stop near home, unlike while going to the office, Mita prefers to walk back as she shops at the local market on her way. Sometimes, she gets down before her scheduled stop to do so.

I do most of my household work on my way back from the office, I get down a bit early to buy things from the market there, my husband comes home very late, and it is difficult for him to buy things, so I am used to this. (Mita, 38 years)

Older participants prefer to take a rickshaw after shopping as door-to-door service is convenient when traveling with heavy bags. In rickshaws, there is space to store things. Some also request auto-rickshaws to either drop them off at their doorstep or allow them to book another seat for their bags. Given a choice, most women prefer to walk on the shortest route to save time unless it is night, empty, not well-lit, there are no hawkers or people, or it is too congested. At night, for safety, they prefer either a company or an alternate route that is better lit or has more people, even if circuitous.

6. Discussion

Accessing public transport for women in Kolkata is an everyday struggle. Kolkata has a wide network of public transport and IPTs in most parts of the city. Yet, the numerous barriers to accessibility in the first- and last-mile stretches make their travel arduous and challenge women's acceptability of public transport. The significance of this study is its focus on understanding the barriers faced by women in Kolkata in the first- and last-mile stretches through their lived experiences. It shares the much-needed narratives of the women commuters and the range of issues they face while accessing public transport, which are not sufficiently captured by quantitative studies. This study finds that women's everyday travel in Kolkata is largely an issue of accessibility and acceptability: the context of travel compels them to avail modes and make travel decisions more out of compulsion than by choice.

Mobility in the first- and last-mile stretches almost always includes a walking component. This study finds that walking to and from the nearest transport stop is a challenge in Kolkata primarily because of the absence of - or poor condition of - sidewalks. The unclean and poor condition of the sidewalks and the obstructions therein are major barriers, which is concurrent to current literature, which also states how such barriers influence women's mode and route choice and result in their avoidance of streets (Herrmann-Lunecke et al., 2021; Ruiz-Padillo et al., 2022). In Kolkata, however, participants note that as sidewalk conditions are poor in most parts of the city, alternate route choice seldom helps. Furthermore, in contrast to the literature (Adlakha and Parra, 2020; Hussin et al., 2021), in Kolkata, a shift to private motorized vehicles in the first- and last-mile stretches is rarely an option as the participants do not own or have access to private motorized vehicles, and in most residential areas, IPTs are available. Women are, therefore, compelled to either weave their way through obstructions on sidewalks or walk on the streets amidst heavy, mixed, and speeding traffic. Both choices lack acceptability. Women tend to maintain a “shy distance” from others more than men, thus reducing their walking speed (Mukherjee et al., 2020; Sun and Lau, 2021). Walking is a predominant mode for women, and these barriers influence their accessibility and right to the city. The streets, despite being the urban spaces that connect

and house activities, continue to exclude women and limit their mobility. As noted in other contexts, routine household work is also considered the women's responsibility which adds to the difficulty in accessibility. Often, they must consider using the IPTs even for walkable distances to save time, travel with children, or carry household things. However, if residing in locations where IPTs are not available, or hand-pulled rickshaws are deemed risky, women must endure difficulties associated with walking while accessing public transport.

Availing IPTs or buses to reach the public transport stop for women is about negotiating between two or more difficult situations and choosing the least challenging one. This process of making a choice depends on various factors such as residential location, household responsibility, and travel costs. Furthermore, women weigh between the option of breaking a journey and paying more to reduce travel time vs. taking a direct bus to reduce travel cost and the hassle of getting up and down during each transfer. Women make such decisions several times a day, every day, depending on their travel needs and the context of travel. Women constantly have to face and negotiate such inequalities and associated struggles that influence their accessibility and acceptability. The lack of transfer and intermodal facilities increases road safety hazards, impedes social activities, increases travel costs, and adds to the struggles of women's everyday mobility. This study, in concurrence with the current literature, finds that commuters are reluctant to transfer more than once and are disinclined to walk longer distances during transfers (Ha et al., 2020). Women from low-income households, especially if commuting long distances, are forced to avail of buses to reduce travel costs. Accessibility is limited for those who cannot navigate the challenges of boarding and alighting a bus, seek alternate modes, or wait for travel conditions to become acceptable enough to complete the journey. The crowded and unreliable buses and dangerous conditions on the streets compel women in Kolkata to prefer autorickshaws over buses in the first- and last-mile stretches. In the absence of desirable bus services and walking conditions, they emerge as an alternative in most locations.

This study also highlights gendered inequalities as women with greater household responsibilities, especially concerning children and older dependent family members, make decisions as impactful as changing their residential locations to avoid dependency on agency caregivers. In contrast to the existing literature stating that household responsibility makes women avoid traveling longer distances (Turduliaeva and Edling, 2017), this study notes that in Kolkata, women travel even more than 15 km to access work partly because of the availability of the metro, and partly because of its wide public transport and autorickshaw networks. The gendered dimensions of mobility in Kolkata, as this contextual study observes, are by no means about realizing the right to the city but, on the contrary, about disengagement from the city. The everyday commutes of women are so meticulously routinized that there are seldom any efforts by women to reclaim their space and to undo the barriers that hinder their accessibility, acceptability, and affordability of public transport.

7. Conclusions

The findings of this study, though specific to the city of Kolkata, may apply to other Indian cities with similar spatial contexts and transport infrastructure. What emerges from this study is the dire need for better transport and pedestrian infrastructure, including transfer facilities, level of service in buses, and traffic management. The heterogeneity of women's everyday travel experiences, whether residing in or further from the metro corridor, from low-income families or otherwise, brings to the fore the nuances that need the attention of planners and policy-makers. These lived experiences can help urban planners and policy-makers rethink policies and interventions to ensure that the barriers in the first- and last-mile stretches are tackled and women can access transport equitably. Policies and interventions are required to ensure women have unhindered access to public transport and are able to

exercise their right to the city. Reflecting on Mita's journey and the various experiences we documented in the study, we note the importance of engaging in qualitative research to capture users' perspectives and experiences. There is also a need for policies on gender-segregated data to articulate and integrate the gender dimension into the gender-sensitive planning process. This would enable the design of targeted interventions to tackle the barriers related to accessibility, acceptability, and affordability of public transport for women. Urban local bodies such as Kolkata Municipal Corporation can update local building bylaws based on contextual evidence-based qualitative data to include gender-sensitive design guidelines. Zooming out, integrated land use and transport planning can be a powerful tool to develop an intermodal and integrated public transport system that makes cities more intersectionally inclusive.

CRedit authorship contribution statement

Sanghamitra Roy: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ajay Bailey:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Femke van Noorloos:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgments

The authors acknowledge the NWO-WOTRO project Inclusive Cities through Equitable Access to Urban Mobility Infrastructures for India and Bangladesh (W 07.30318.003). The project is funded by the Dutch Research Council and Utrecht University.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jtrangeo.2024.103892>.

References

- Adlakha, D., Parra, D.C., 2020. Mind the gap: gender differences in walkability, transportation and physical activity in urban India. *J. Transp. Health* 18, 100875. <https://doi.org/10.1016/j.jth.2020.100875>.
- Ahmad, Z., Batool, Z., Starkey, P., 2019. Understanding mobility characteristics and needs of older persons in urban Pakistan with respect to use of public transport and self-driving. *J. Transp. Geogr.* 74, 181–190. <https://doi.org/10.1016/j.jtrangeo.2018.11.015>.
- Allen, H., 2018. Approaches for gender responsive urban mobility. Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities Module 7^o. Recuperado de <http://cort.as/-JuZP>. Retrieved from https://womenmobilize.org/wp-content/uploads/2020/02/A_Sourcebook_Social-Issues-in-TransportGIZ_SUTP_SB7a_Gender_Responsive_Urban_Mobility_Nov18-min.pdf.
- Arora, A., Anand, A., Banerjee-Ghosh, S., Baraya, D., Chakrabarty, J., Chatterjee, M., Taraporevala, P., 2016. Integrating Intermediate Public Transport within Transport Regulation in a Megacity: A Kolkata Case Study. Res report, Cent policy Research. Retrieved from https://cprindia.org/wp-content/uploads/2021/12/IntegratingIPT_Within_Transport_Regulation_In_A_Megacity_Kolkata.pdf.
- Barbour, R.S., 2014. *Introducing Qualitative Research: A student's Guide*, 2nd ed. Sage.

- Basu, A., 2019. Viability assessment of emerging smart urban Para-transit solutions: case of cab aggregators in Kolkata city, India. *J. Urban Manag.* 8 (3), 364–376. <https://doi.org/10.1016/j.jum.2019.01.002>.
- Beebejaun, Y., 2017. Gender, urban space, and the right to everyday life. *J. Urban Aff.* 39 (3), 323–334. <https://doi.org/10.1080/07352166.2016.1255526>.
- Bivina, G.R., Parida, M., 2020. Prioritizing pedestrian needs using a multi-criteria decision approach for a sustainable built environment in the Indian context. *Environ. Dev. Sustain.* 22, 4929–4950. <https://doi.org/10.1007/s10668-019-00381-w>.
- Borker, G., 2022. Constraints to Women's Use of Public Transport in Developing Countries, Part I: High Costs, Limited Access, and Lack of Comfort. World Bank Group. <https://documents.worldbank.org/curated/en/09950408012242045/pdf/IDU05986e9020f68504b680bc3709f90291733e9.pdf>.
- Bose, T., Pandit, D., 2020. Heterogeneity in perception of service quality attributes of bus transit across various user categories—a case of Kolkata. *Transp. Res. Proc.* 48, 2784–2799. <https://doi.org/10.1016/j.trpro.2020.08.239>.
- Busetto, L., Wick, W., Gumbinger, C., 2020. How to use and assess qualitative research methods. *Neurol. Res. Pract.* 2, 1–10. <https://doi.org/10.1186/s42466-020-00059-z>.
- Carruthers, R., Dick, M., Saurkar, A., 2005. Affordability of public transport in developing countries. World Bank, Washington DC, U.S.A, pp. 1–27. *Transport Papers*, TP-3. <http://hdl.handle.net/10986/17408>.
- Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., Neville, A.J., 2014. The use of triangulation in qualitative research. *Oncol. Nurs. Forum* 41 (5), 545–547. <https://doi.org/10.1188/14.ONF.545-547>.
- Census of India, 2011. Office of the Registrar General & Census Commissioner, India. India.
- Chant, S., 2013. Cities through a “gender lens”: a golden “urban age” for women in the global south? *Environ. Urban.* 25 (1), 9–29. <https://doi.org/10.1177/0956247813477809>.
- Chatterjee, A., Sarkar, P.K., 2016. Modelling The Activity Based Travel Pattern of Workers of an Indian Metropolitan City: Case Study of Kolkata. 9th Urban Mobility India Conference and Expo.
- Chowdhury, R., 2021. The social life of transport infrastructures: masculinities and everyday mobilities in Kolkata. *Urban Stud.* 58 (1), 73–89. <https://doi.org/10.1177/0042098019875420>.
- Chowdhury, S., Van Wee, B., 2020. Examining women's perception of safety during waiting times at public transport terminals. *Transp. Policy* 94, 102–108. <https://doi.org/10.1016/j.tranpol.2020.05.009>.
- Dandapat, S., Maitra, B., 2020. Preference heterogeneity in trip makers' perception and policy issues: a study with reference to bus services in Kolkata. *Case Stud. Transp. Policy* 8 (4), 1504–1517. <https://doi.org/10.1016/j.cstp.2020.11.001>.
- Dominguez Gonzalez, K., Machado, A.L., Bianchi Alves, B., Raffo, V., Guerrero, S., Portabales, I., 2020. Why Does She Move? A Study of Women's Mobility in Latin American Cities. Retrieved from <https://elibrary.worldbank.org/doi/abs/10.1596/33466>.
- Ghosh, B., Schot, J., 2019. Towards a novel regime change framework: studying mobility transitions in public transport regimes in an Indian megacity. *Energy Res. Soc. Sci.* 51, 82–95. <https://doi.org/10.1016/j.erss.2018.12.001>.
- Ha, J., Lee, S., Ko, J., 2020. Unraveling the impact of travel time, cost, and transit burdens on commute mode choice for different income and age groups. *Transp. Res. A Policy Pract.* 141, 147–166. <https://doi.org/10.1016/j.tra.2020.07.020>.
- Hanson, S., 2010. Gender and mobility: new approaches for informing sustainability. *Gen. Place Cult.* 17 (1), 5–23. <https://doi.org/10.1080/09663690903498225>.
- Haque, I., Mehta, S., Kumar, A., 2019. Towards Sustainable and Inclusive Cities: The Case of Kolkata. ORF Special Report.
- Hennink, M.M., Kaiser, B.N., Marconi, V.C., 2017. Code saturation versus meaning saturation: how many interviews are enough? *Qual. Health Res.* 27 (4), 591–608. <https://doi.org/10.1177/1049732316665344>.
- Herrmann-Lunecke, M.G., Mora, R., Sagaris, L., 2020. Persistence of walking in Chile: lessons for urban sustainability. *Transp. Res. Rev.* 40 (2), 135–159. <https://doi.org/10.1080/01441647.2020.1712494>.
- Herrmann-Lunecke, M.G., Mora, R., Vejares, P., 2021. Perception of the built environment and walking in pericentral neighbourhoods in Santiago, Chile. *Travel Behav. Soc.* 23, 192–206. <https://doi.org/10.1016/j.tbs.2021.01.002>.
- Hussin, H., Osama, A., El-Dorghamy, A., Abdellatif, M.M., 2021. Towards an integrated mobility system: the first and last mile solutions in developing countries; the case study of new Cairo. *Transp. Res. Interdiscip. Perspect.* 12, 100469. <https://doi.org/10.1016/j.trip.2021.100469>.
- Iqbal, S., Woodcock, A., Osmond, J., 2020. The effects of gender transport poverty in Karachi. *J. Transp. Geogr.* 84, 102677. <https://doi.org/10.1016/j.jtrangeo.2020.102677>.
- Kerzhner, T., Kaplan, S., Silverman, E., 2018. Physical walls, invisible barriers: Palestinian women's mobility in Jerusalem. *Reg. Sci. Policy Pract.* 10 (4), 299–314. <https://doi.org/10.1111/rsp3.12162>.
- Kumar, P., Khani, A., 2021. An algorithm for integrating peer-to-peer ridesharing and schedule-based transit system for first mile/last mile access. *Transp. Res. Part C: Emerg. Technol.* 122, 102891. <https://doi.org/10.1016/j.trc.2020.102891>.
- Lak, A., Aghamolaei, R., Myint, P.K., 2020. How do older women perceive their safety in Iranian urban outdoor environments? *Ageing Int.* 45 (4), 411–433.
- Mahadevia, D., 2015. Promoting Low Carbon Transport in India: Gender Sensitive Transport Planning for Cities in India. 1 [Sup], st ed. Magnus Custom Publications, Ahmedabad, Gujarat. Retrieved from https://smartnet.niua.org/sites/default/files/resources/UNEP_Gender_Report_For_Upload_Med_Rez.pdf.
- Mark, L., Heinrichs, D., 2019. More than time and money—influences on mobility of low-income women in the Villa 20 in Buenos Aires, Argentina. *J. Transp. Health* 15, 100652. <https://doi.org/10.1016/j.jth.2019.100652>.

- Masood, A., 2017. Negotiating mobility in gendered spaces: case of Pakistani women doctors. *Gen. Place Cult.* 25 (2), 188–206. <https://doi.org/10.1080/0966369X.2017.1418736>.
- Mejía-Dorantes, L., Villagrán, P.S., 2020. A review on the influence of barriers on gender equality to access the city: a synthesis approach of Mexico City and its Metropolitan Area. *Cities* 96, 102439. <https://doi.org/10.1016/j.cities.2019.102439>.
- Moser, A., Korstjens, I., 2018. Series: practical guidance to qualitative research. Part 3: sampling, data collection and analysis. *Eur. J. Gen. Pract.* 24 (1), 9–18. <https://doi.org/10.1080/13814788.2017.1375091>.
- Mukherjee, D., Das, S., Saha, P., Roy, S.K., 2020, May. Analysis of pedestrian movements on sidewalks: A case study in Kolkata, India. In: *International Conference TRANSBALTICA: Transportation Science and Technology*. Springer International Publishing, Cham, pp. 99–111. Retrieved from https://link.springer.com/chapter/10.1007/978-3-030-38666-5_11.
- Pandit, D., Sharma, D., 2022. Expected service dimensions and service levels for paratransit considering future mobility needs in emerging countries. *Transp. Res. A Policy Pract.* 162, 1–13. <https://doi.org/10.1016/j.tra.2022.05.021>.
- Peake, L.J., 2020. Gender and the city. *Int. Encyclopaed. Human Geogr.* 5, 281–292. <https://doi.org/10.1016/B978-0-08-102295-5.10186-6>.
- Pojani, D., Stead, D., 2017. The urban transport crisis in emerging economies. In: *An Introduction*. Springer International Publishing, pp. 1–10. Retrieved from https://link.springer.com/chapter/10.1007/978-3-319-43851-1_1.
- Roy, S., Basu, D., 2021. An approach towards estimating critical value of waiting time at transit stops. *J. Traffic Transp. Eng. (English Edition)* 8 (2), 257–266. <https://doi.org/10.1016/j.jtte.2018.08.002>.
- Ruiz-Padillo, A., Oestreich, L., Torres, T.B., Rhoden, P.S., Larrañaga, A.M., Cybis, H.B., 2022. Weighted assessment of barriers to walking in small cities: a Brazilian case. *Transp. Res. Part D: Transp. Environ.* 109, 103392 <https://doi.org/10.1016/j.trd.2022.103392>.
- Saadaoui, R., 2019. *Barriers to women's Mobility. Case of Rabat, Morocco*.
- Saldana, J., 2015. *The Coding Manual for Qualitative Researchers*. SAGE Publications.
- Sanoff, H., 1991. *Visual Research Methods in Design*. Van Nostrand Reinhold.
- Saunders, M.N., Townsend, K., 2018. Choosing participants. In: Cassell, C., Cunliffe, A., Grandy, G. (Eds.), *Sage Handbook of Qualitative Business and Management Research Methods*. Sage, London, pp. 480–494.
- Shah, S., Raman, A., 2019. What Do Women and Girls Want from Urban Mobility Systems. OLA Mobility Institute. Retrieved from https://olawebcdn.com/ola-institute/ola_women_and_mobility.pdf.
- Shah, S., Viswanath, K., Vyas, S., Gadepalli, S., 2017. Women and Transport in Indian Cities. ITDP India, New Delhi, India, pp. 10–11. Retrieved from <https://safetipin.com/wp-content/uploads/2020/01/women-and-transport-in-indian-cities-safetipin-2017.pdf>.
- SPACE10, 2018. Beyond Borders: Gender and Urban Mobility in India. Retrieved from <https://space10.com/beyond-borders-mobility-in-india/>.
- Sun, G., Lau, C.Y., 2021. Go-along with older people to public transport in high-density cities: understanding the concerns and walking barriers through their lens. *J. Transp. Health* 21, 101072. <https://doi.org/10.1016/j.jth.2021.101072>.
- Tiwari, G., Singh, N., 2018. Travel to Work in India: Current Patterns and Future Concerns. Transport Research & Injury Prevention Program, Indian Institute of Technology, Delhi. Retrieved from https://www.researchgate.net/publication/331548050_Travel_To_Work_In_India_Current_Patterns_and_Future_Concerns.
- Tiznado-Aitken, I., Lucas, K., Muñoz, J.C., Hurtubia, R., 2020. Understanding accessibility through public transport users' experiences: a mixed methods approach. *J. Transp. Geogr.* 88, 102857 <https://doi.org/10.1016/j.jtrangeo.2020.102857>.
- Turdaliev, C., Edling, C., 2017. Women's mobility and 'transport-related social exclusion' in Bishkek. *Mobilities* 13 (4), 535–550. <https://doi.org/10.1080/17450101.2017.1388348>.
- Uteng, T.P., Turner, J., 2019. Addressing the linkages between gender and transport in low-and middle-income countries. *Sustainability* 11 (17), 4555. <https://doi.org/10.3390/su11174555>.
- van Soest, D., Tight, M.R., Rogers, C.D., 2020. Exploring the distances people walk to access public transport. *Transp. Rev.* 40 (2), 160–182. <https://doi.org/10.1080/01441647.2019.1575491>.