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Barriers and facilitators to urban mobility for older adults in LMICs: A scoping review

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ABSTRACT

The number of people aged 65 and older is projected to double by 2050, with the highest increases expected in Low and Middle-income countries (LMICs). This study aims to examine the main barriers and facilitators affecting older adults' mobility in urban areas of LMICs. A scoping review of peer-reviewed scientific literature and grey literature was conducted between January and March 2024. We screened five major databases (PubMed, Web of Science, Scopus, ProQuest, and Google Scholar) for studies reporting barriers and facilitators affecting older adults' access to mobility in LMICs. Using deductive content analysis and the Theoretical Domains Framework (TDF), barriers and facilitators were categorized into behavioral determinant domains spanning four overarching categories: individual, socioeconomic, place-based, and institutional. Forty-four articles from Asia, Africa, and Latin America met the inclusion criteria and were retained for data extraction. Safety concerns, exacerbated by inadequate infrastructure and unsafe road user behavior, represent significant barriers, while gender norms specifically restrict older women's mobility. Conversely, key facilitators include familial support and intergenerational solidarity, subsidized transport, and specific government interventions. Older adults' mobility in urban areas of LMICs is affected by safety concerns, especially for women, and a lack of appropriate infrastructure and reliable public transportation options. These barriers result in limited outdoor mobilities, potentially leading to social isolation and exclusion. These challenges can be overcome through specific interventions that promote more affordable, reliable, and safer public transportation and improved walking options.

1. Introduction

Low- and middle-income countries (LMICs) are expected to experience rapid urban growth in the coming decades. According to the United Nations, the urban population in these countries is projected to increase from 41 % in 2018 to 59 % by 2050 (UN, 2023). Alongside this urbanization, an increasing proportion of these populations are older adults aged 65 and above (UN, 2019; WHO, 2022). By 2050, 80 % of the world's population over 60 will live in urban areas of LMICs (Mathews, 2024). This rapid demographic shift in cities across less developed regions of the world elevates concerns about older adults' access to essential services, social participation, and economic opportunities (van Hoof and Marston, 2021). Recognizing the need to address aging populations in urban contexts, the World Health Organization (WHO) introduced the Age-Friendly Cities (AFC) initiative in 2007 as a global priority (WHO, 2007). This initiative is particularly significant in LMICs, where the convergence of rapid urbanization and an aging population presents distinct and pressing challenges.

As people age, their outdoor mobility often decreases; they tend to travel less and take shorter trips due to barriers associated with the lack of safe, affordable, or reliable modes of transportation (He et al., 2020). These challenges are amplified in contexts where existing infrastructures are limited or lacking, institutional interventions often overlook the needs of older adults, and socioeconomic inequalities are higher, such as those present in LMICs. However, existing research on unmet transportation needs has primarily concentrated on older adults in high-income contexts (Nordbakke and Schwanen, 2014). For instance, a review of active travel behavior among older adults by Voorheis et al. (2023) focuses on large cities in North America and Europe. Similarly, studies by Maresova et al. (2023) found that research in this field is dominated by contributions from the United States, followed by England, the Netherlands, and other European countries.

Given the vast spectrum of cultural differences and socioeconomic disparities (Webber et al., 2010), research on high-income and Western

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contexts may not be relevant for older adults in LMICs. Hanson (2010) emphasizes that mobility extends beyond the individual, being deeply embedded in interactions with household, family, community, and society. In LMICs, context likely plays a crucial role in shaping older adults' mobility. Similarly, Nordbakke and Schwanen (2014) underscore the complex relationship between the mobility of older people and well-being, highlighting the importance of research in non-Western contexts to determine whether this relationship is universal or influenced by cultural, temporal, and spatial factors.

Recent studies show that aging experiences across lower-income countries are influenced by specific socio-economic aspects such as employment status, living arrangements, and social networks, as well as the need to involve stakeholders in planning and implementing urban mobility solutions that consider the specific needs of older adults. These studies argue for the need to avoid 'one-size-fits-all' approaches (Gorman et al., 2019; Patil et al., 2022; Villena-Sanchez and Boschmann, 2022); and to explore the interplay between transportation settings, neighborhood environments, and social networks and their impact on older adults' mobility (Hansmann et al., 2024).

Against this backdrop, this scoping review focuses on examining the barriers and facilitators that affect older adults' mobility specifically in urban areas of low- and middle-income countries (LMICs). Urban settings in LMICs present unique challenges and opportunities for mobility, given their high population density, poor infrastructure, including transport, and specific social and gendered norms. In this review, barriers to urban mobility are defined as any obstacle that limits older adults' ability to move within urban spaces, while facilitators are any element that enhances their capacity to access everyday needs. This review aims to examine the range of available evidence on mobility in urban LMIC contexts, synthesize the main findings, identify gaps in the existing literature, and recommend paths for future policy and research that prioritize the unique needs of older adults in urban environments.

2. Methods

In this scoping review, we primarily drew on procedures proposed by Arksey and O'Malley (2005), and, for the PRISMA guidelines, we followed suggestions by Tricco et al. (2018); details are presented in Fig. 1. These procedures guide the review process through six stages: defining the research question, identifying relevant literature, selecting studies, charting the data, summarizing and reporting results, and incorporating expert consultation. Prior to this review, we developed the protocol following the JBI methodology for scoping reviews, as outlined by Aromataris and Munn (2020) (see Supplementary Material).

The scoping review's methodological robustness lies in three key analytical steps. First, we collected original papers and grey literature exploring the barriers and facilitators of older adults' mobility in urban areas of LMICs. Secondly, we conducted a content analysis of the data collected, systematically organizing the information within a data charting framework that captures both mobility barriers and facilitators. Thirdly, we identified and categorized these barriers and facilitators into specific domains according to predefined criteria.

2.1. Search strategy

The primary aim of this review is to identify and categorize the barriers and facilitators influencing the mobility of older adults in LMICs. The search was conceptualized using terms for Population, Concept, and Context (PCC): 1) Population are "older adults", 2) Concepts are "barriers and facilitators of urban mobility", and 3) Context is specifically urban areas in "low- and middle-income countries". We included a range of synonyms for these terms to ensure that the search results were comprehensive. The combination of search keywords and terms is provided in Appendix A.

For this review, we established the key definitions of the aforementioned PCC terms as below:

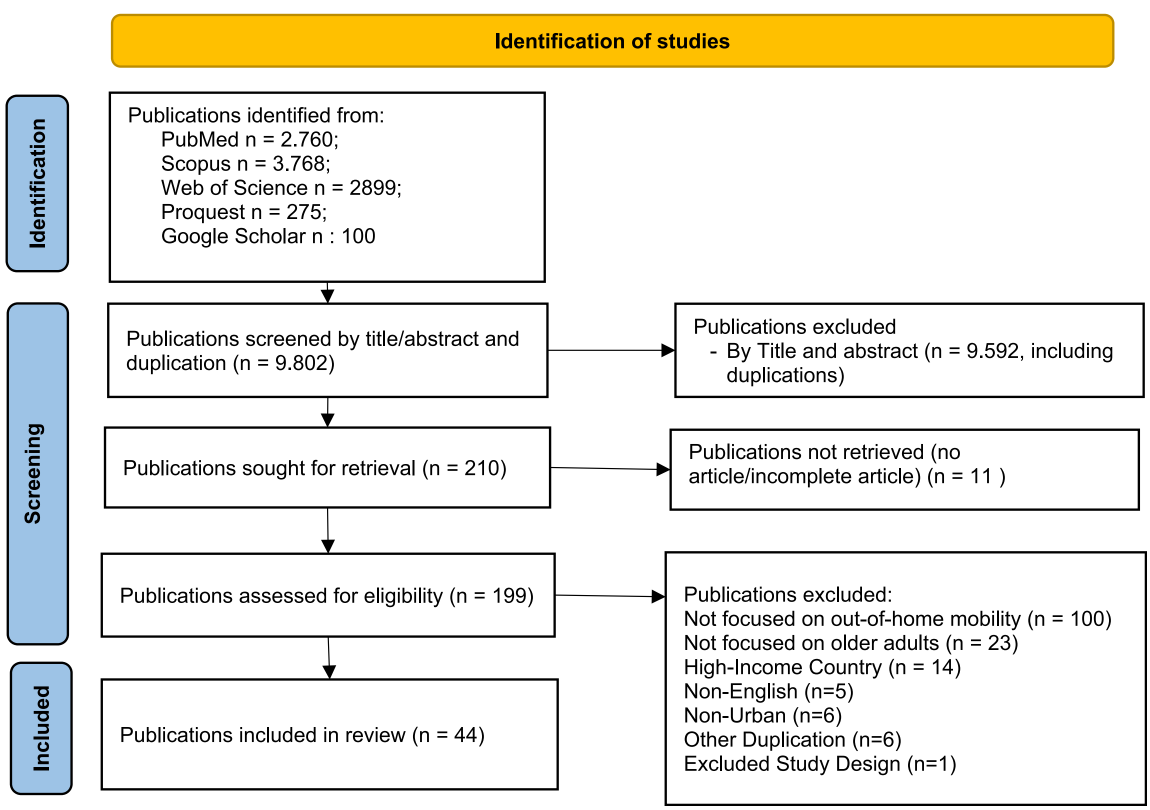

Fig. 1. PRISMA flow diagram.

(1) Older adults: While the current UN definition categorizes older adults as those aged 65 or over (UN, 2023), many studies, particularly from developing countries, still adhere to the previous threshold of ≥60 years (UN, 2017). Consequently, this review adopts the inclusive criterion of considering participants from age 60.
(2) Barriers: A barrier is defined as any obstacle that prevents or limits older adults from accessing their everyday needs through mobility.
(3) Facilitators: A facilitator is any factor or intervention that enables older adults' mobility or makes it easier to access their needs.
(4) Mobility refers to an individual's capacity to move within various environments, from their residence to the neighborhood and even to regions beyond, with or without assistive devices or transportation.
(5) LMIC (urban areas): Participants in the research are those living in low- and middle-income countries. For this, we followed the World Bank's classification of LMICs (World Bank, 2024). Urban area definitions vary by country—for instance, Sweden considers areas with 200 inhabitants urban, while in India, the threshold is much higher (UN, 2019). In this paper, we define an urban area as any place classified as urban, including urban agglomerations, with no connection to rural areas.

2.2. Identifying relevant studies

We systematically searched published literature covering both peer-reviewed publications and grey literature. The literature search was conducted between January and March 2024. We searched the following bibliographical databases: PubMed, Web of Science, Scopus, ProQuest, and Google Scholar.

For this review, specific inclusion and exclusion criteria were formulated to guide the selection of relevant studies.

2.2.1. Inclusion criteria

- Research that primarily focuses on older adults (≥ 60 years) AND barriers OR facilitators of mobility AND low- and middle-income countries
- Qualitative, quantitative, and mixed-methods research
- Studies with full texts available in English
- Studies conducted in urban areas of low- and middle-income countries
- Studies that discuss "mobility" with explicit reference to out-of-home mobility or transportation use

2.2.2. Exclusion criteria

- All languages other than English
- Studies that discuss in-home mobility only
- Studies with the full texts unavailable for review
- Review studies were excluded, but their reference lists were screened for relevant primary sources.
- Duplicates

We identified a total of 9802 items of peer-reviewed and grey literature (see Fig. 1). Initial screening was carried out for titles and abstracts based on the predefined eligibility criteria; we excluded 9592 entries, including duplicates. This process resulted in the retention of 210 articles, which were then uploaded to Rayyan (https://rayyan.ai), a web-based tool that assists researchers in systematic and scoping reviews in the screening and selection process. We used Rayyan solely as a data management and collaborative review tool, assisting in the initial screening process among the authors. The full-text screening was conducted manually by the authors based on predefined inclusion and exclusion criteria, and the overall review process remained manual and theory-driven. The authors independently conducted the final selection of 44 articles, ensuring adherence to the eligibility criteria. Fig. 1 presents the PRISMA flowchart detailing this process. After screening, the authors conducted all subsequent analyses of the included studies independently, ensuring that the final analysis accurately reflected their interpretation and synthesis of the literature.

2.3. Data charting and synthesis

After confirming that the records met the inclusion criteria, we proceeded to chart data according to the characteristics of the included studies. This chart encompassed the authors' names, publication years, titles, geographic locations, study purposes, study designs, population descriptions, and perceived barriers and facilitators identified in the studies. We extracted themes and subthemes from the qualitative literature to identify barriers and facilitators. In contrast, the positive or negative associations in the findings of quantitative studies were used to determine barriers and facilitators.

The barriers and facilitators identified are structured into four domains—individual, socioeconomic, place-based, and institutional. These domains are informed by theories and concepts proposed by Grieco (2003) and Lucas (2012). Grieco defines three main dimensions for analyzing transport-related social exclusion: (i) place-based measures focusing on opportunities and services within an individual's immediate area, (ii) social-category-based measures that address social stratification within a community, and (iii) person-based measures considering the journey needs of individual public transport users. To broaden the analysis with an institutional perspective, this study further adopts the framework from Lucas (2012), which emphasizes the role of policy changes and governance interventions. Notably, governance in this context extends beyond mere government actions; it includes various institutions involved in transportation, such as regulatory agencies, public transit authorities, and private transport operators. This approach expands the analytical focus to the institutional level, thereby encompassing influences that transcend strict governmental boundaries.

Furthermore, building on the framework developed by Voorheis et al. (2023), which categorizes measurement constructs significantly impacting older adults' active travel, we adapt this approach using the Theoretical Domains Framework (TDF) (Cane et al., 2012; Voorheis et al., 2023) to classify barriers and facilitators into behavioral determinant domains. Domains include: "Environmental Context and Resources", "Social Influences and Social-Professional Role", "Beliefs about Capabilities", "Beliefs about Consequences", "Skills", "Emotions", "Intentions", "Reinforcement", "Behavioral Regulation", "Goals", "Memory, Attention and Decisions Processing", "Optimism", and "Knowledge". In this review, we define the constructs of barriers and facilitators by mapping them to a single primary domain based on its most prominent characteristics. For example, Infrastructure Conditions (e.g., uneven surfaces, lack of pedestrian devices), which can act as a barrier, are categorized under "environmental context and resources". With this approach, we aim to illuminate the specific behavioral determinants that significantly influence older adults' mobility across different levels, providing a clear perspective on how behavioral domains shape mobility in various contexts.

3. Results

3.1. Characteristics of the included articles

The articles included in this review examine low and middle-income countries across Asia ($n = 31$), Africa ($n = 5$) and Latin America ($n = 8$). The studies identify various modes of transport for older adults, including walking, cycling, private vehicles, taxis and public transport. Studies employed quantitative methods (36/44), qualitative methods (5/44) and mixed methods (3/44). While quantitative methods dominate, qualitative studies offer valuable insights into the nuanced experiences of older adults, particularly in underserved contexts. Thematic grouping was conducted after reading and coding the selected sources. Among the studies included, participant age criteria ranged from 59 to 92 years, reflecting a focus on older adults. Age criteria typically start at ≥60 years, though some studies focus on narrower or older cohorts. Key topics include access to services (e.g., healthcare, parks), transport behavior, social influences, and active aging. The study aims varied but frequently centered on understanding older adults' experiences in relation to mobility-related factors, including barriers and facilitators in accessing healthcare or other essential services. Studies in LMICs often emphasize infrastructure and policy gaps. For further details, a comprehensive table summarizing the characteristics of each study is provided in Appendix B.

3.2. Barriers and facilitators to urban mobility

We present the barriers and facilitators faced by older adults across four domains—Individual, Socioeconomic, Place-Based, and Institutional (see Fig. 2, page 12). In combination with the Theoretical Domains Framework (TDF), this framework highlights the prevalence of barriers and facilitators in the literature and categorizes them into specific behavioral determinants that influence older adults' mobility across various levels.

3.2.1. Individual

The analysis shows that, at the individual level, older adults encounter significant challenges related to diminishing their *beliefs about capabilities* and *consequences*. For instance, we found that the main issues noted in the sources reviewed are physical limitations that affect their decision to drive. Some older adults become reluctant to drive or stop driving due to health-related issues such as vision and hearing impairments (Hauser et al., 2022; Kamal et al., 2022; Zhou et al., 2022). Conversely, older adults who reported faster reaction times were able to continue driving, as highlighted in a study by Chen et al. (2023). This shows that aging alone does not hinder driving skills; instead, maintaining good health as individuals grow older serves as a critical facilitator of mobility.

In LMICs, however, mobility for older adults is further shaped by economic pressures. Many older adults are unable to retire due to the absence of pensions or receive pensions that are insufficient to meet their basic needs. As a result, they often continue to work to support themselves and their families. Soltani et al. (2018) note that this economic necessity pushes many older adults in middle- and low-income groups to remain employed, thereby increasing their mobility demands. However, competition with younger individuals for access to transport further complicates their mobility. Tao and Cheng's (2019) study in Beijing highlights how older adults often find themselves disadvantaged in accessing public transport due to reduced mobility and limited transportation availability relative to demand. As a result, older adults are more likely to undertake shorter daily commutes (Bernal et al., 2019).

Individual factors under the belief of capability also encompass factors such as the absence of a driving license, inability to read sign boards (due to lower education levels or illiteracy among older generations), and self-confidence issues (Abootalebi et al., 2021; Navarrete-Reyes et al., 2017; Ramachandran and D'Souza, 2016). For instance, Ramachandran and D'Souza (2016) report that older adults with driving licenses often cease to drive long distances due to both the physical strain and the potential visibility issues in the dark.

Furthermore, research by Kamal et al. (2022) and Zhang and Yao (2022) shows a connection between higher education levels, increased driving rates, and more frequent social activities outside the home. Individuals with higher education were more likely to drive, particularly if they held a driver's license (Kamal et al., 2022), and equally, older adults with at least postsecondary education were more likely to engage in social activities beyond their home (Zhang and Yao, 2022).

As part of beliefs about capabilities, personal safety concerns significantly shape older adults' urban mobility in LMICs, influenced by

	TDF Domain	Determinant	B (n)	F (n)
Institutional	Environmental Context and Resources	Availability of Public Transportation Service (e.g., lack of public transport service)	4	
	Social-Professional Role	Public transport management (e.g., crowded and inappropriate public transport, older adult priority, low frequency of PT, free-fare for older adults, a special provision of transport service)	4	4
Spatial/ Place-Based	Environmental Context and Resources	Infrastructure Condition (e.g., steep streets, uneven surfaces, absence of pedestrian-friendly infrastructure, lack of pedestrian devices, and unsafe streets)	8	11
		Crossing Challenges (e.g., crossing time, people disobeying traffic regulations, sidewalk conditions, crowded sidewalks)	5	
		Proximity (e.g., accessibility to healthcare, transport hubs, and parks impacts mobility, with shorter distances being more favorable.	9	5
		Spatial Distribution (e.g., reduced accessibility in peripheral areas, travel delays)	4	
		Safe Environment (e.g., bus stations and metro stops with security issues, such as empty areas).	5	1
Socio-economic	Social Influences	Transportation costs (e.g., high cost, limited access to a family vehicle, preference for walking as cheaper)	3	1
		Socioeconomic factors (e.g., resource constraints, socioeconomic status, employment)	5	7
		Social discomfort in public spaces (e.g., perceived unsafe features of the urban environment)	2	1
	Social Role and Identity	Gender-based cultural mobility constraints (e.g., domestic responsibilities, patriarchal societies)	2	2
Individual	Beliefs About Capabilities	Driver's license possession	1	1
		Education levels	1	1
		Physical condition (e.g., health issues, vision, and hearing problems)	3	2
		Unmet travel needs (e.g., dissatisfaction with public transport)	1	
		Personal independence (e.g., dependency on family)	1	1
		Personal safety concerns (e.g., fear of older people moving outdoors, the difficulty of crossing)	2	
	Beliefs About Consequences	Self-regulated driving	2	
		COVID-19 Control Measures	1	
	Emotion	Fear of travel (mostly women)	1	1
	Environmental Context and Resources	Time-sensitive travel preferences (e.g., avoiding night travel, prioritizing daylight travel, or selecting faster modes of transport)	2	1

Fig. 2. Barriers (B) and Facilitators (F) affecting older adults' mobility.

environmental context and resources and *emotion*. Older adults are significantly impacted by growing physical challenges that induce, for instance, the fear of falling (Ramachandran and D'Souza, 2016). Individual safety concerns are further complicated by environmental factors such as poor pavements, non-compliance with traffic rules, and overcrowded roads, disproportionately affecting those with physical and visual impairments.

Furthermore, in their study in Iran, Lak et al. (2020) highlight that older women experienced heightened safety concerns when using public transport. Likewise, older women in Dhaka, Bangladesh, felt uncomfortable boarding buses where conductors or helpers often stand near the narrow entry, which raises concerns about potential harassment (Jahangir et al., 2022). Limited access to public transportation across LMICs forces older women to frequently cover long distances on foot, increasing their vulnerability to harassment and stalking (Ahmad et al., 2019). In addition to these gendered challenges, the prevalence of unmet transportation needs is particularly acute among disabled older adults. Navarrete-Reyes et al. (2017) highlight the difficulties disabled older adults face in adapting to the characteristics of available public transportation.

Also, under *environmental context and resources*, time-sensitive travel preferences play a significant role in shaping older adults' mobility choices. For instance, older adults with more spare time often choose to access public transport during off-peak hours to avoid crowds (Ning et al., 2021). In addition, lifestyle choices, living conditions, and free time can also facilitate mobility by enhancing well-being. Wang et al. (2022) and Ahmad et al. (2019) found that walking not only fulfills mobility needs but also improves mood and physical health and facilitates social interaction. Ahmad et al. (2019) further noted that walking lends autonomy by allowing individuals to set their own pace and better control their surroundings compared to other forms of transportation.

Additionally, during the COVID-19 pandemic, regulations enforcing social distancing in public spaces significantly complicated older adults' mobility, especially in LMICs. The crowdedness of public transport heightened this already at-risk population's vulnerability to the virus, particularly for those with underlying health conditions. Heightened fears of infection led to increased social isolation. Shaer and Haghshenas (2021) noted the fear of crowded spaces like buses and metro stations, prompting many older adults to seek alternative options, such as cycling and walking.

3.2.2. Socioeconomic

Under the *social influences* of the behavioral domain, socioeconomic factors such as transportation costs and socioeconomic status significantly impact older adults' mobility choices, particularly their decision to use private vehicles or taxi/ride-sharing services. Limited financial resources require older adults to allocate additional funds for hired transportation or accompaniment to healthcare facilities, which can be prohibitively expensive for many (Chen et al., 2023; Holmes et al., 2018; Kelly et al., 2019; Ramachandran and D'Souza, 2016; Zhou et al., 2022).

Across LMICs, many older adults are not entitled to retirement pensions (or receive meager pensions) and thus often continue to work or depend on younger family members for financial support. Transportation costs coupled with limited income significantly restrict older adults' access to essential services and social life. The study by Olawole and Aloba (2014) in Osogbo, Nigeria, highlights that many older adults rely heavily on public transit due to limited access to personal transportation. Similarly, the study by Aroonsrimorakot et al. (2019) in Thailand and India shows that high transportation costs severely limit community participation among older adults.

Socioeconomic disparities and uneven income distribution are often pronounced in LMICs, where individuals from higher socioeconomic backgrounds experience greater mobility advantages. Older adults from wealthier households frequently own private vehicles, such as cars (Bernal et al., 2019; Kamal et al., 2022; Odufuwa, 2010) or electric bicycles (Li et al., 2018; Zhang and Yao, 2022), which enables more independence and the possibility to participate in many out-of-home activities. Older adults from affluent backgrounds often receive their driver's licenses at a younger age and can afford vehicle expenses, thus enhancing their driving opportunities. A study focusing on the case of Iran shows that employment status further influences mobility; employed older adults are more likely to use cars, while retirees tend to rely on public transit due to their generally lower incomes (Soltani et al., 2018).

Another *social influence* determinant is discriminatory and rule-breaking behavior, along with ageist attitudes from other road users and public transport operators; these behaviors act as barriers to the safety and mobility of older individuals. For example, older adults perceive traffic rule violations by other road users as a barrier, feeling unsafe while walking or driving a private vehicle (Cardona et al., 2022; Ramachandran and D'Souza, 2016). Furthermore, in the context of public transportation, Holmes et al. (2018) found in their study in Sri Lanka that ambivalent or neglectful attitudes towards older adults, such as not offering bus seats or conductors failing to assist them with boarding and alighting, pose significant obstacles. Increasing instances of abuse and discrimination on public transport further impede access to urban mobility by older adults (ibid).

In addition to *social influences* under the TDF domain, *social role and identity* also play a significant role. Studies demonstrate that traditional social and gendered norms significantly affect urban mobility and act as barriers, particularly for women (Ahmad et al., 2019; Jahangir et al., 2022; Kamal et al., 2022; Lak et al., 2020). Kamal et al. (2022) show that in Tehran, Iran, deep-rooted patriarchal norms and financial dependence on spouses make older women less likely to drive compared to men. Similarly, Ahmad et al. (2019) highlight how social norms in Pakistan restrict women's driving experience and access to vehicles, negatively affecting women's autonomy and mobility.

In contrast, older women who live independently and are free from traditional domestic roles experience enhanced mobility, as shown in Gangopadhyay's (2020) study in India. While living alone without household responsibilities benefits some older adults at the individual level, residing with family offers advantages such as social support and assistance with daily activities. Three studies (Kamal et al., 2022; Li et al., 2018; Zhang and Yao, 2022) show that strong intergenerational ties, filial piety and responsibility, and familial norms can support older adults' mobility; for example, through younger family members accompanying them on daily trips.

3.2.3. Spatial/place-based

Place-based barriers (infrastructures, services, and location) affect individuals' immediate surroundings and can significantly shape accessibility within the domain of *environmental context and resources*. The studies reviewed show how the condition of existing infrastructure and the physical layout of urban spaces limit access to essential services (for example, health care) for older adults (Kelly et al., 2019; Ramachandran and D'Souza, 2016). Walkability concerns, which are critical among these barriers, profoundly impact the mobility and daily lives of older adults in LMICs.

Given the high cost of private transportation and the unavailability or unreliability of public transportation, older adults often choose walking as their mode of mobility (Li et al., 2018). However, this comes with multiple challenges. For instance, defects in sidewalks (Ferreira et al., 2018) and inadequate pavements (Ramachandran and D'Souza, 2016) commonly deter older adults from engaging in outdoor activities due to fear of falls or injury. Furthermore, (Wang et al., 2022) illustrate how complex indoor-outdoor transitions and the lack of seating along neighborhood streets further restrict their ability to venture outdoors. In Nigeria, this is exacerbated by the presence of street vendors on the sidewalk and the absence of dedicated pedestrian paths, which lead older adults to venture perilous routes alongside vehicular traffic (Ipingbemi, 2010).

Additional barriers that exacerbate these walkability concerns include limited crossing opportunities on busy roads (Cardona et al., 2022; Ren et al., 2023) coupled with physical difficulties in crossing the street (Duim et al., 2017; Ferreira et al., 2018; Ramachandran and D'Souza, 2016), crowded roads (Ramachandran and D'Souza, 2016), distances walked are often long (Guo et al., 2019; Li et al., 2018; Ma et al., 2022), extended travel times (Li et al., 2018; Xie et al., 2018), and high pedestrian density (Ren et al., 2023). These place-based factors contribute to a challenging urban landscape that can discourage mobility and increase safety concerns among older adults.

Beyond pedestrian difficulties, transportation challenges significantly affect older drivers and public transport users. For older drivers, the primary issue is traffic congestion, as reported by Kamal et al. (2022). Transportation users encounter similar challenges as those restricting walkability, with studies reporting that long distances and poor accessibility to transit stops negatively impact their journeys (Ahmad et al., 2019; Holmes et al., 2018; Shi et al., 2022; Tao and Cheng, 2019; Zhang and Yao, 2022). Moreover, adverse weather conditions such as rainfall intensify these challenges, particularly affecting public transport users with reduced mobility. Studies from Brazil, like Azevedo et al. (2021), document the influence of climate on transportation efficacy. Additionally, inadequate sheltering facilities at bus stops provide minimal protection from harsh weather conditions, further degrading the traveling experience (Ipingbemi, 2010; Lan et al., 2022; Olawole and Aloba, 2014).

Conversely, well-designed, accessible infrastructure and a safe built environment act as facilitators, significantly enhancing the mobility of older adults. Eight studies in this review underscore the importance of walkability within the built environment for facilitating older adults' mobility. For instance, research in Brazil has shown that enhancements in walkability are crucial for preserving mobility, independence, and quality of life in later life (Fogal et al., 2019). Similarly, a study from Colombia found that feeling safe in the neighborhood can significantly increase the likelihood of older adults maintaining functional autonomy (Cardona et al., 2022). Studies in China also show that enhanced safety and walkability encourage older adults to engage in more out-of-home activities, especially walking (Li et al., 2018; Xie et al., 2018; Zhang and Yao, 2022). Features such as designated paths and shorter walking distances between amenities have proven beneficial in aiding older adults' movement and ensuring their safety (Ma et al., 2022; Zhou et al., 2022). Providing urban parks within walking distance (Zhao et al., 2023) and integrating pedestrian infrastructure into public areas and recreational spaces are also important; research from Turkey highlights the effectiveness of such integrations (Bozdağ et al., 2017). Additionally, introducing amenities like elevators in public spaces can effectively boost the number of walking trips taken by older adults with poor health, enhancing both mobility and safety (Li et al., 2018). Spatial accessibility of essential everyday services is shown to reduce travel times (Xie et al., 2022) and increase flexibility and convenience (Li et al., 2018; Zhang and Yao, 2022). Two studies in China (Ning et al., 2021; Shi et al., 2022) demonstrate that having nearby amenities such as convenience stores, restaurants, public transport, hospitals, supermarkets, squares, parks, and scenic spots significantly enhances older adults' ease of travel and well-being.

3.2.4. Institutional

Institutional constraints related to public transport services present significant challenges for older adults, falling under both *environmental context and resources* and *social-professional role* domains. The regulations transport management institutions enforce can inadvertently create barriers that affect older adults' mobility. Many of these difficulties stem from inadequate facilities within the transport fleet (Olawole and Aloba, 2014; Ramachandran and D'Souza, 2016) and a lack of priority services for older people (Cardona et al., 2022; Holmes et al., 2018; Jahangir et al., 2022; Li et al., 2018; Sis et al., 2022). The lack of priority services is a critical barrier, particularly due to the insufficient priority seating for older adults, the absence of regulations governing the use of those seats, and a lack of specialized transportation options for frail older individuals.

Moreover, studies indicate regulatory constraints related to public transport management, including infrequent service (Abootalebi et al., 2021; Fasina et al., 2020; Holmes et al., 2018; Sis et al., 2022), uncoordinated transport systems (Fasina et al., 2020; Jahangir et al., 2022; Sis et al., 2022), and unreliable schedules (Abootalebi et al., 2021; Lan et al., 2022; Li et al., 2018; Olawole and Aloba, 2014; Sis et al., 2022).

Strategic institutional interventions act as critical facilitators for older adults' mobility, optimizing public transportation and essential services. For instance, age-friendly transport policies in Malaysia encourage older adults to travel independently and engage in social activities, which are essential for their well-being (Loke et al., 2021). Similarly, in China, well-designed public transport facilities such as bus shelters and bike stations significantly improve older adults' ease of travel by enhancing spatial accessibility, positively impacting their well-being (Ning et al., 2021; Shi et al., 2022).

Operational practices within public transportation systems are also significant facilitators of mobility. Studies in India emphasize the importance of connection frequency and reliability (Ramachandran and D'Souza, 2016), while research in Nigeria and China highlights the critical roles of safety regulation and quality of service (Fasina et al., 2020; Lan et al., 2022). In Pakistan, the positive attitudes of operators, driven by institutional employee engagement, significantly enhance mobility (Ahmad et al., 2019). Additionally, studies from Turkey and China show that providing free or subsidized public transportation boosts older adults' mobility, enabling them to access essential services and participate more actively in community life (Senbil and Yetiskul Senbil, 2021; Zhang and Yao, 2022).

Collaboration between various stakeholders, such as NGOs and the government, in creating specialized services that ensure access to healthcare is also shown to be crucial. In Cape Town, South Africa, free government-subsidized Dial-a-Ride services, seniors' club transport, and NGO-provided clinic transport help older adults safely reach essential services, supporting their health and mobility (Kelly et al., 2019).

4. Discussion and implications

4.1. Primary findings

This scoping review has drawn on the literature to identify barriers and facilitators affecting older adults' urban mobility in LMICs based on income classifications, as defined by the World Bank (World Bank, 2024). At the individual level, ***beliefs about capabilities, consequences, and emotions*** emerge as key determinants. For instance, physical limitations, such as vision and hearing impairments, and low self-confidence in driving, are key barriers, while higher education levels facilitate increased driving and social participation (Hauser et al., 2022; Kamal et al., 2022; Zhang and Yao, 2022). Economic pressures further exacerbate these challenges, as many older adults lack adequate pensions and must continue working, relying heavily on unreliable public transportation due to limited financial resources (Ahmad et al., 2019; Soltani et al., 2018).

Our review also highlights gender-based mobility barriers, which sit within the *social influences* domain of the Theoretical Domains Framework (TDF). Studies show that patriarchal norms and financial dependence significantly restrict older women's mobility. In Iran, these constraints limit independence, as women often rely on male family members or lack financial resources (Kamal et al., 2022; Lak et al., 2020). Similarly, Ahmad et al. (2019) highlight how social norms in Pakistan restrict women's driving experiences and access to vehicles, negatively affecting women's independence and mobility. Driving cessation remains a universal concern for older adults in both LMICs and HICs, though the underlying causes and implications differ. In LMICs, cultural and economic barriers often drive this cessation, particularly for women, whereas in HICs, it is primarily associated with health or age-related limitations. Studies, such as the review from Nordbakke and Schwanen (2014), highlight the psychological consequences of driving cessation in HICs, including depressive symptoms, which significantly impact older adults' well-being.

Socioeconomic constraints significantly compound mobility challenges, as high transport costs limit access to essential services, particularly in LICs (Low-Income countries) and LMCs (Lower-Middle-Income countries) such as Sri Lanka, Bangladesh, and Nigeria, where lower-income older adults rely heavily on unreliable public transport (Holmes et al., 2018; Jahangir et al., 2022; Olawole and Aloba, 2014). Similarly, high fares and unreliable services in UMICs (Upper-Middle-Income countries) such as South Africa and Thailand disproportionately burden lower-income groups (Aroonsrimorakot et al., 2019; Kelly et al., 2019).

Insufficient infrastructure emerges as a critical barrier across all three country income classifications, profoundly shaped by *environmental context, resources, and social-professional roles*. This barrier reflects the interplay between spatial and institutional factors, further complicating mobility for older adults. In LMICs, infrastructural challenges are more acute compared to HICs, where issues typically involve inadequacies rather than a complete absence of infrastructure. For example, Voorheis et al. (2023) identify barriers in HICs, such as limited pedestrian facilities, safety concerns, and destination accessibility. In contrast, LICs and LMCs, including countries such as Bangladesh, Pakistan, Nigeria, India, and Sri Lanka, face recurring challenges, such as the absence of basic facilities like sidewalks, safe pedestrian crossings, and reliable public transport systems. These barriers profoundly hinder older adults' mobility (Holmes et al., 2018; Jahangir et al., 2022; Olawole and Aloba, 2014; Ramachandran and D'Souza, 2016).

4.2. Implications

We identify two key theoretical implications of our review on the mobility of older adults in LMICs and how they contribute to advancing inclusive mobility. First, existing theoretical frameworks for transport-related social exclusion, such as Grieco's (2003) dimensions—place-based, social-category-based, and person-based—require additional layers of analysis to account for mobility exclusion in LMICs. The systemic nature of exclusion found in LMICs is best understood as a dynamic interaction between deep-rooted physical, institutional, and societal barriers, which necessitates a more integrated approach. To address this, we suggest that the place-based dimension should also include environmental factors like infrastructure quality, the built environment, and public facilities. Additionally, integrating Lucas's (2012) institutional perspective highlights the role of governance, policy design, and funding inequities, which significantly shape mobility barriers. These institutional dimensions act as either enablers or barriers to mobility and offer a comprehensive theoretical lens for addressing inequities and promoting inclusive mobility and equitable access to transport for all.

Second, we found that employing a Theoretical Domain Framework (TDF) to address behavioral determinants of mobility is essential. While Grieco's and Lucas's frameworks focus on systemic barriers, they attend less to internal behavioral and psychological factors influencing older adults' mobility. Our analysis highlights individual determinants, such as physical capabilities, social influences, and beliefs about consequences (e.g., safety perceptions, fear of falling, or harassment), which intersect with structural barriers. For instance, patriarchal social norms, family dynamics, and safety concerns, often compounded by a lack of financial resources, further restrict mobility. These findings underscore the interconnectedness of structural and individual factors, showing that achieving inclusive mobility requires addressing both external barriers and the social-psychological factors shaping mobility decisions.

We also present four key evidence-based recommendations for policymakers to create a more inclusive and safe urban mobility experience for older adults in LMICs. First, in LMICs, a large proportion of the older population relies on walking as they have less access to public transport or might not be able to afford other modes of transportation. Therefore, we recommend cities invest in walking infrastructure. Secondly, our review highlights the urgent need to make public transport systems safe for older adults, especially women. We recommend improving the physical infrastructure in and around urban mobility infrastructures (lighting, improved signage, ramps, and handrails) and the social environments (positive operator attitudes, zero-tolerance for age and gender-based discrimination, community education on safety during commutes, improved surveillance). Thirdly, for older adults who drive or wish to continue driving, we recommend implementing older driver training programs through driving schools to support their autonomy and independence, as suggested by Hauser et al. (2022). Fourthly, at the place-based and institutional level, our review emphasizes the need for an integrated approach in which local transport authorities and city councils invest in improving older adults' access to essential amenities such as markets, medical facilities, and workspaces.

4.3. Limitations and future directions

There are a few limitations to this study that warrant acknowledgment. The inclusion of only English-language papers and grey literature may have led to the omission of relevant studies published in other languages. To address this limitation, future research should expand searches to include non-English studies and a broader range of grey literature. Additionally, variations in terminology across mobility and urban planning fields may have contributed to gaps in our literature search, as reflected in the limited number of qualitative studies identified. To bridge these gaps, future research should incorporate qualitative and mixed-methods approaches to understand better how various objective and perceived determinants shape older adults' mobility across multiple levels and contexts. Since perceived experience is inherently subjective, qualitative research is essential to capture diverse contextual insights and variations in older adults' mobility experiences.

While this review focuses on urban contexts in LMICs, further research is needed to examine how mobility barriers and facilitators differ in rural and suburban areas, where infrastructure development and mobility needs may differ, particularly for aging populations. Additionally, the absence of advanced mobility solutions reflects the technological and infrastructural gaps in LMICs, where the primary focus remains on addressing foundational issues such as inadequate public transport and pedestrian infrastructure. Advanced technologies, such as autonomous vehicles (AVs) or digital innovations, are currently beyond consideration due to the pressing need for basic mobility systems. However, this gap presents an opportunity for future research to explore how emerging technologies, including AVs, could address mobility challenges in LMICs, contingent on significant investment in infrastructure and technological adaptation.

CRediT authorship contribution statement

Octaviani Ariyanti: Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Dora Sampaio Ajay Bailey:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization.

Declaration of competing interest

No potential conflict of interest was reported by the author(s).

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jtrangeo.2025.104289.

Data availability

This is a literature review.

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