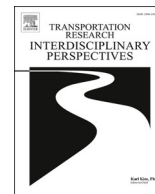


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Inequalities in accessing public transportation and social exclusion among older adults and people with disabilities in Bangladesh: A scoping review

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ABSTRACT

In the rapidly evolving landscape of urbanisation and transportation infrastructure in Bangladesh, it is critical to address the disparities in public transportation access that disproportionately affect vulnerable people such as older adults and people with disabilities. This scoping review aims to synthesise the available evidence and highlight research gaps on unequal access to public transportation and how these inequalities lead to the social exclusion of older adults and people with disabilities in Bangladesh. We followed the Preferred Reporting Items for Systematic Review and Meta-Analyses, Scoping Review Extension (PRISMA-ScR) guidelines and employed thematic analysis to interpret the findings. Four databases Scopus, Embase, PubMed and Web of Science, and online sources such as Google Scholar and TRID were searched from January 2002 to July 2022. The findings show that the existing modes of transportation are inadequate and non-inclusive and pose both physical (including built environments such as roads, ramps, and footpaths) and social barriers (such as low income, low employment opportunities, and negative social attitude) which reduced the accessibility to workplaces, healthcare, and social networks for these two vulnerable groups. An inclusive and sustainable urban transport infrastructure, older adult-specific and disabled-friendly transportation policies, and behaviour changes are significant steps to improve safety and social inclusion. The transport authorities have ignored the transport necessities of these vulnerable groups and (in)advertently pushed them towards marginalised sections. This study theoretically contributes to the age-friendly city framework for older adults and people with disabilities by adopting an inclusive urban mobility approach for all.

1. Introduction

In the rapidly urbanising global South, a number of megacities are unable to provide adequate urban basic services, particularly equitable access to urban mobility infrastructure, to the increasing number of urban residents (Datta, 2017; UN DESA, 2018). Mobility in terms of transport and accessibility is a crucial feature of urbanisation and the related infrastructures such as roadways, transportation systems, public spaces, and buildings invariably shape the urban form of cities (UN Habitat, 2016). However, due to rapid demographic change, haphazard

growth, and unplanned development the cities of the global South are not socially inclusive and equally accessible (UN Habitat, 2010). Therefore, many marginalised and vulnerable inhabitants such as low-income households, older adults (OAs), women, and people with disabilities (PWDs) do not have affordable, safe, and accessible public transit, which limits their ability to access work, healthcare and social life (Hine and Mitchell, 2003; Social Exclusion Unit, 2003). Sustainable Development Goals such as 11.2 and 9.1 urge cities to be more inclusive towards marginalised and vulnerable populations while providing sustainable, clean/green, and affordable transport infrastructures and

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services (UNDP, 2018). The realisation of these goals still remains distant. To cope with rapid urbanisation, countries in the global South have implemented many transport-related infrastructure projects (e.g., highways and rapid transit systems) to improve access and mobility for urban residents (Beard et al., 2016). These new transport facilities and infrastructures (e.g., metros, highways) often, in turn, benefit wealthier economic groups (Anand and Tiwari, 2006; Banerjee and Piketty, 2001; Smitha and Pal, 2018) and there are apparent knowledge and practice disparities in inclusive transportation planning in the global South (Hickman et al., 2017; Lucas, 2012; Pojani and Stead, 2015).

Previous research has focused on traffic congestion and traffic management system for improving performance indices of road traffic congestion (Nadrian et al., 2019), travel time (Javid and Javid, 2018), travel behaviour (Moniruzzaman et al., 2015), and recently the impact of transportation on the environment (Wang et al., 2023), and health and healthcare (Reche et al., 2022). Among various urban transport planning aimed at addressing chronic traffic congestion and environmental health, transit-oriented development (TOD) is considered one of the best models to adopt for its integrated nature of land and transport use planning (Almatar, 2022, 2023). This will also help to achieve sustainable urban transport including cycling and walking (Papagiannakis and Yiannakou, 2022). Several studies have focused on technology-based planning such as artificial neural networks (Zaki et al., 2020), transportation using GPS (Gonzalez et al., 2020), and floating car data analysis (Houbraken et al., 2018) to improve traffic congestion and urban mobility. Rarely any of the above-mentioned studies focussed on transport inequity in terms of accessibility, affordability, acceptability, and appropriation for vulnerable groups of people such as OAs and PwDs.

In this context, this paper advocates a rethinking of planning and policies for transportation infrastructures towards inclusive and sustainable urban mobility. The following sections will review the available limited literature on access to public transportation for OAs and PwDs in Bangladesh. Section 2 highlights the age-friendly cities conceptual framework which explains the infrastructural and social barriers leading to uneven access to public transportation, and the need to address this issue with an inclusive urban mobility approach. Based on the literature review, Section 3 describes the procedures, selection process, and standards for including and excluding the studies, section 4 presents the barriers to accessing public transport, plans and policies implementation towards urban mobility infrastructure, and how challenges to access public transport push these vulnerable groups towards social exclusion. Section 5 discusses the underlying factors associated with transport inequalities and social exclusion. Section 6 outlines the research gaps, future research, and limitations; and section 7 offers policy recommendations.

1.1. Accessibility to transport for OAs and PwDs

Access to public transportation is essential to perform everyday activities such as travelling to work, visiting health facilities, shopping, socialising, and participating in recreational activities (Lattman et al., 2016). However, vulnerable people such as OAs and PwDs lack equal access to appropriate public transportation, particularly in developing countries (Bezyak et al., 2019). The access to public transportation and mobility of OAs and PwDs in economically developed cultures have been extensively studied (Broome et al., 2010; Clarke and Gallagher, 2013; Gallagher et al., 2010; Vine et al., 2012) but very few studies have been done in the Global South (Ahmed et al., 2008; Low and Banerjee-Guha, 2003). However, in the context of Bangladesh studies are rare, if not nil. There are studies, in the context of Dhaka, which in general throw light on the inequitable distribution of public transport infrastructures (Debnath et al., 2019) and restrictions on extensively used non-motorised modes such as rickshaws (Hasan and Davila, 2018). These restrictions put an uneven burden on the mobility of OAs and PwDs because most of them use rickshaws to access workplaces, healthcare

facilities, and social interaction (Bhuiya et al., 2022; Jahangir et al., 2022). A study by Rahman (2019) found that about 59 % of middle-income OAs in Dhaka use rickshaws for their everyday mobility, whereas about 73 % of low-income OAs prefer walking to access essential services in the neighbourhood. Another survey report by Bhuiya (2019) found that the modal share of PwDs for regular trips in Dhaka consist of rickshaw (45 %), CNG³ (22 %), bus (11 %), car (6 %), walking (11.5 %), and wheelchair (4.5 %).

In this context, the present scoping review study seeks to synthesise the existing evidence and highlight the knowledge gaps on unequal accessibility of public transportation which causes social exclusion of the two vulnerable groups i.e., OAs and PwDs. This review paper will help to rethink urban planning, particularly in terms of transportation infrastructure and mobility issues in developing countries to make the cities more inclusive for OAs and people with different forms of disabilities. The study will also contribute to identifying research gaps in the physical and social challenges of accessing public transportation and subsequent mobility of the Global South's most disadvantaged demographics. This review study will push the boundaries of urban and transportation planning by incorporating the physical and social barriers of OAs and PwDs and making the cities more inclusive for all. In this scoping review, the following explanations have been used:

1. Accessibility denotes the ability to access essential services including public transport and participate in community and societal levels (Baum, 2011).
2. Older adults refer to all those persons who are 60 years and above in Bangladesh. According to the National Census of Bangladesh (2011), the percentage of OAs in the population is expected to rise from 7.47 % to 21.9 % by 2050.
3. Disability refers to "all the things that impose restrictions on disabled people; ranging from individual prejudice to institutional discrimination, from inaccessible public buildings to unusable transport systems, from segregated education to excluding work arrangements, and so on" (Oliver, 1996). In this paper, we refer to PwDs as defined by Bangladesh's Persons with Disabilities Act of 2013. According to this Act, there are around 16 million people with 13 different forms of disability in Bangladesh.
4. Social exclusion refers to both physical (including built environments such as roads, ramps, and footpaths) and social (such as low income, low employment opportunities, and negative social attitude) barriers to access public transport for basic services and consequent marginalisation by limiting access to opportunities (Rashid and Yigitcanlar, 2015).

2. Conceptual framework

The World Health Organization (2007) developed an 'Age-friendly Cities framework' comprising eight interconnected realms that include the physical environment of cities, social involvement, and community services. The age-friendly city is identified as "a place where older people are actively involved, valued, and supported with infrastructure and services that effectively accommodate their needs" (p. 4). An age-friendly city encourages social engagement and active aging through eight interrelated domains: employment, civic engagement, transportation, outdoor areas and buildings, social participation, respect and social inclusion, housing, community support and health services, and communication and information (Fitzgerald and Caro, 2014; van Hoof et al., 2021; WHO, 2007). Within the framework, the WHO advocates that accessible and affordable transportation is crucial to independent and healthy ageing. To provide age-friendly and inclusive public transport, the following ten domains must be addressed: (a)

³ CNG refers to auto rickshaws running with compressed natural gas (CNG) in Dhaka. Usually, it is identified as CNG in the city.

affordability, (b) safety and comfort, (c) reliability and frequency, (d) information, (e) adequate and appropriate destinations for travel, (f) appropriate vehicles for older people, (g) special services that support the travel needs, (h) seating preferences, (i) responsible and sensitive transport personnel, and (j) stops and stations for public transport (Fig. 1). Besides, the most popular mode of transportation, particularly in heavily populated urban areas is walking (Stevenson et al., 2016). For instance, ‘Complete Streets’ policies in the United States have been implemented towards improving the walkability of OAs in the neighbourhood; such initiatives also encourage the urban and transport designers to consider roads from the perspective of pedestrians of all ages and abilities (Jordan and Ivey, 2021). However, the majority of the age-friendly city initiatives for better health and social participation have been implemented in economically advanced societies whereas these initiatives are still to be included in the transportation policies of developing countries (Wang et al., 2017). In short, the social and structural obstacles to public transportation and equitable access to urban mobility infrastructure in the Global South societies such as Bangladesh need to be addressed with an inclusive mobility approach to achieve the Sustainable Development Goals (SDGs) of the United Nations.

3. Material and methods

This scoping review is reported as per the Preferred Reporting Items for Systematic Review and Meta-Analyses, Scoping Review extension (PRISMA-ScR) guidelines (Tricco et al., 2018). We followed the five-stage methodological protocol of formulating the research question; finding relevant studies; determining a study; mapping the data; and compiling, summarising, and reporting results as described by Arksey and O’Malley (2005).

3.1. Identifying the research question

Given the review aim, this study intends to address the following two research questions (i) what evidence exists on inequitable access to public transportation and societal exclusion of the OAs and disabled people in Bangladesh? and (ii) what are the knowledge gaps in the existing evidence? The research questions were developed after a preliminary review of the existing literature. The scoping review focused on access to public transport and social exclusion to address particular research gaps in the available evidence.

3.2. Search strategy, inclusion and exclusion criteria

A comprehensive review of the literature was carried out by using relevant keywords for both the peer-reviewed and grey literature databases. We included four peer-reviewed databases (from January 2002 to July 2022): PubMed, Scopus, Embase and Web of Science and two online sources i.e. Google Scholar and Transport Research International Documentation (TRID) for grey literature. For this scoping review, we adopted the population, concept, and context (PCC) design (Peters, 2016). Table 1 explains the search strategy for PCC studies. The keywords that were used for identifying population-relevant studies are “older adult” OR “Aged” OR “Elderly” OR “Elder” OR “Senior Citizen” OR “People with Disability” OR “Disabled” OR “Handicapped” OR “differently abled”. For concept-relevant articles words such as “public transport” OR “Accessibility” OR “Social exclusion” OR “Mobility” OR “Social participation” were used. For context-relevant studies “Bangladesh” OR “Dhaka” words were employed for all the database and online sources.

We employed the following criteria to include the study at two stages (screening based on title and abstract and full-text review): only those studies that were published in the English language; and studies

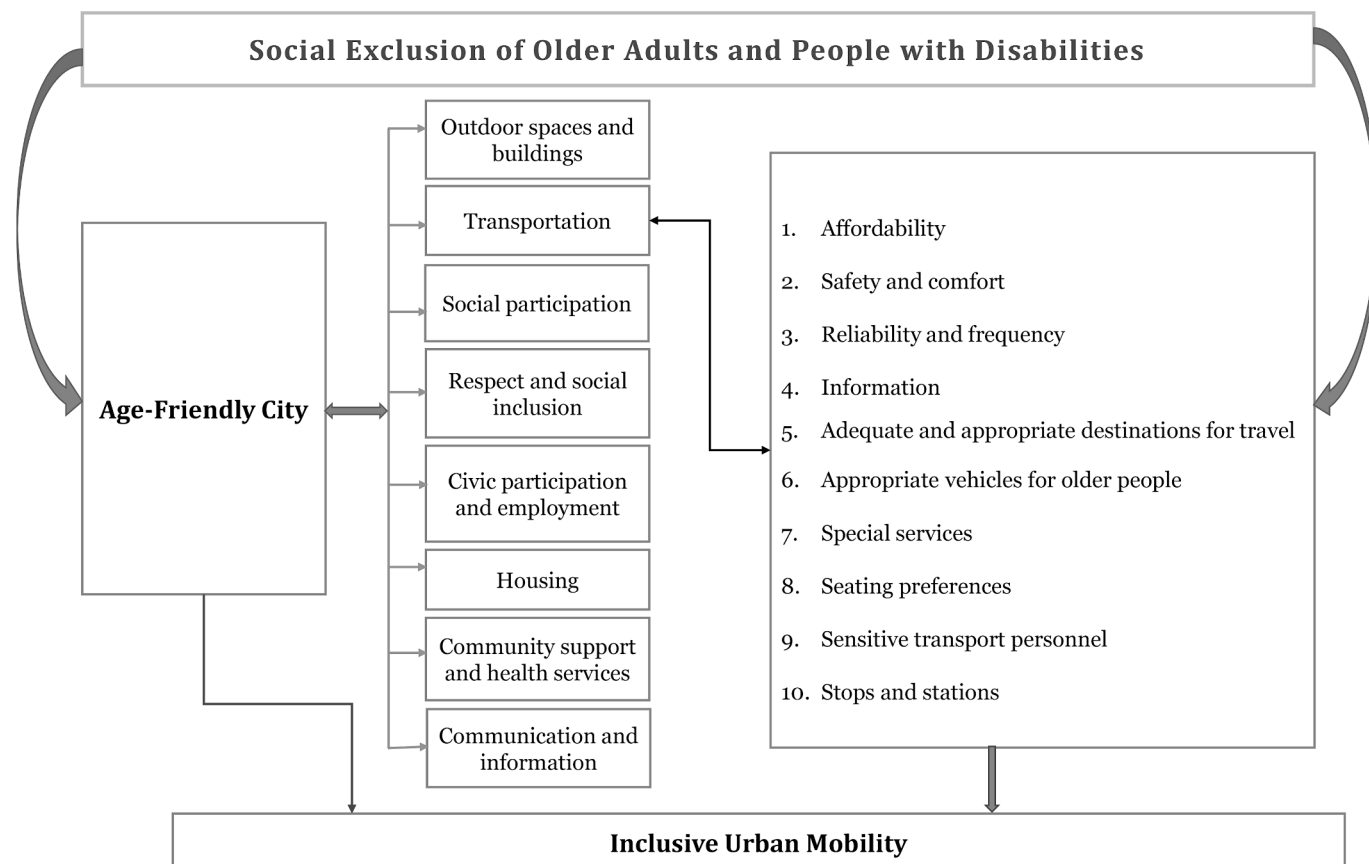


Fig. 1. Conceptual Framework of Age-friendly city for social exclusion of older adults and individuals with disabilities.

Table 1
Search strategy.

Data base	Strategy	No of Hits
PubMed	("older adult"[All Fields] OR ("aged"[MeSH Terms] OR "aged"[All Fields]) OR ("aged"[MeSH Terms] OR "aged"[All Fields] OR "elderly"[All Fields] OR "elderlies"[All Fields] OR "elderly s"[All Fields] OR "elderlys"[All Fields] OR ("elder s"[All Fields] OR "elders"[All Fields] OR "sambucus"[MeSH Terms] OR "sambucus"[All Fields] OR "elder"[All Fields]) OR "Senior Citizen"[All Fields] OR "People with Disability"[All Fields] OR ("disabilities"[All Fields] OR "disability"[All Fields] OR "disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "disabled"[All Fields] OR "disablement"[All Fields] OR "disablements"[All Fields] OR "disabling"[All Fields] OR "disability"[All Fields]) OR ("disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "handicapped"[All Fields] OR "handicap"[All Fields] OR "handicapping"[All Fields] OR "handicaps"[All Fields]) OR "differently abled"[All Fields]) AND ("public transport"[All Fields] OR ("access"[All Fields] OR "accessed"[All Fields] OR "accesses"[All Fields] OR "accessibilities"[All Fields] OR "accessibility"[All Fields] OR "accessible"[All Fields] OR "accessing"[All Fields] OR "Social exclusion"[All Fields] OR ("mobilities"[All Fields] OR "range of motion, articular"[MeSH Terms] OR ("range"[All Fields] AND "motion"[All Fields] AND "articular"[All Fields]) OR "articular range of motion"[All Fields] OR "mobility"[All Fields]) OR "Social participation"[All Fields] AND ("bangladesh"[MeSH Terms] OR "bangladesh"[All Fields] OR "bangladesh s"[All Fields] OR "Dhaka"[All Fields]) OR "older adult"/exp OR "older adult" OR 'aged'/exp OR aged OR 'elderly'/exp OR elderly OR elder OR 'senior citizen'/exp OR 'senior citizen' OR 'people with disability'/exp OR 'people with disability' OR 'disabled'/exp OR disabled OR 'handicapped'/exp OR handicapped OR 'differently abled' 'public transport' OR accessibility OR 'social exclusion' OR mobility OR 'social participation' bangladesh OR dhaka #1 AND #2 AND #3	640
Embase	older adult'/exp OR 'older adult' OR 'aged'/exp OR aged OR 'elderly'/exp OR elderly OR elder OR 'senior citizen'/exp OR 'senior citizen' OR 'people with disability'/exp OR 'people with disability' OR 'disabled'/exp OR disabled OR 'handicapped'/exp OR handicapped OR 'differently abled' 'public transport' OR accessibility OR 'social exclusion' OR mobility OR 'social participation' bangladesh OR dhaka #1 AND #2 AND #3	124
Scopus	(TITLE-ABS-KEY ("older adult" OR aged OR elderly OR elder OR "Senior Citizen" OR "People with Disability" OR disabled OR handicapped OR "differently abled")) AND (TITLE-ABS-KEY (bangladesh OR dhaka)) AND (TITLE-ABS-KEY ("public transport" OR accessibility OR "Social exclusion" OR mobility OR "Social participation"))	246
Web of Science	https://www.webofscience.com/wos/woscc/summary/9aab91e-f577-44b6-8fe7-3f08d344dde6-5057fdaa/relavance/1	207
Google Scholar	Inequalities of accessing public transport and social exclusion among older adults and people with disabilities in Dhaka, Bangladesh	80
TRID (49)	Public transport access in Bangladesh disabilities in Bangladesh Social exclusion in Bangladesh Transport Accessibility in Bangladesh	15 8 3 23
	Total	1,346

focussing population groups of OAs (defined as 60 years and above) and PwDs of working age group because these two groups are the most vulnerable in terms of accessing public transportation particularly in developing communities (Bezyak et al., 2019). Hence, we incorporated studies on the issues of the accessibility of public transportation; studies that dealt with social isolation or exclusion of OAs and PwDs; and studies based in Bangladesh. The scoping review studies were identified, screened, and selected between August 2022 and September 2022. Fig. 2 shows the PRISMA flowchart of searched literature that has been included in this scoping review.

3.3. Screening and study selection

For this scoping review, varied but relevant studies were included from literature reviews, quantitative and qualitative investigations, research project reports, and online articles that focus on the issues of accessibility of public transportation by OAs and PwDs, and their social exclusion. Screening was done based on the title, abstract, and full text by the first author. Those studies that met all of the criteria were identified as "included" while those that did not were labelled "excluded". Studies that lacked clarity were labelled as "Maybe," and Any disagreement over the articles' selection was settled through discussion with other co-authors.

3.4. Data extraction: charting the data

The lead author extracted data on a pre-designed, pilot-tested data extraction chart, which was validated by the second author. The data extraction template was pilot-tested on the first two selected articles and then it was modified to include the different forms of physical barriers. Any disagreements at this stage were settled by discussion with the corresponding author until we reached a consensus. The data extraction sheet included details of study characteristics including author(s) name, year of publication, study design, study focus, study population group, and key themes. The following Table 2 summarised the characteristics of these identified studies.

3.5. Analysis: collating, summarising and reporting results

Thematic analysis was conducted to examine excerpts of text by creating codes (labels) that most accurately represented each text passage. After codes were developed, they were modified iteratively as the team engaged in data analysis. The team not only discussed the clarity of the operational definitions of the codes but also how the codes are named and how they are related to each other. The iterative review of codes helped to identify patterns among them and led to the development of code groups/categories based on the similarity and common attributes (see Table 3). This categorisation process i.e. grouping of codes into more general themes or concepts, contributed to the development of themes for the coherent and structured literature review. These code groups served as the main explanatory framework for the barriers to using public transit and the societal exclusion of older adults and individuals with disabilities in Bangladesh. Three key deductive themes were developed from the selected scoping review studies using the thematic analytic framework for presenting the 'narrative account' of existing literature (Arksey and O'Malley, 2005). Key themes were developed during the full article review process and charted in the characteristics table (Anderson, 2007). The narrative account of scoping review articles, which are charted in the characteristics table, are being presented in two ways. First, analysing the nature, extent, and distribution of the studies selected for the scoping review. Secondly, the studies were categorised thematically to develop broader key themes.

4. Results

A total of 1346 studies were identified from the database (n = 1217) and online websites (129) literature search. 327 duplicate studies were excluded before screening and data management. After screening titles and abstracts by the predefined inclusion and exclusion criteria, 944 studies were excluded, leaving 75 studies for full-text review. Following a full-text assessment, 23 studies were selected for scoping review. In addition, 4 more studies were added to the list from the references of these identified studies, resulting in a total of 27 studies for scoping review. Of these 27 studies, 10 were questionnaire survey-based quantitative studies, 7 were qualitative, 6 were descriptive, and 4 were mixed methods. While analysing thematically, 8 studies reported on existing barriers (both physical/infrastructural and social) to access public

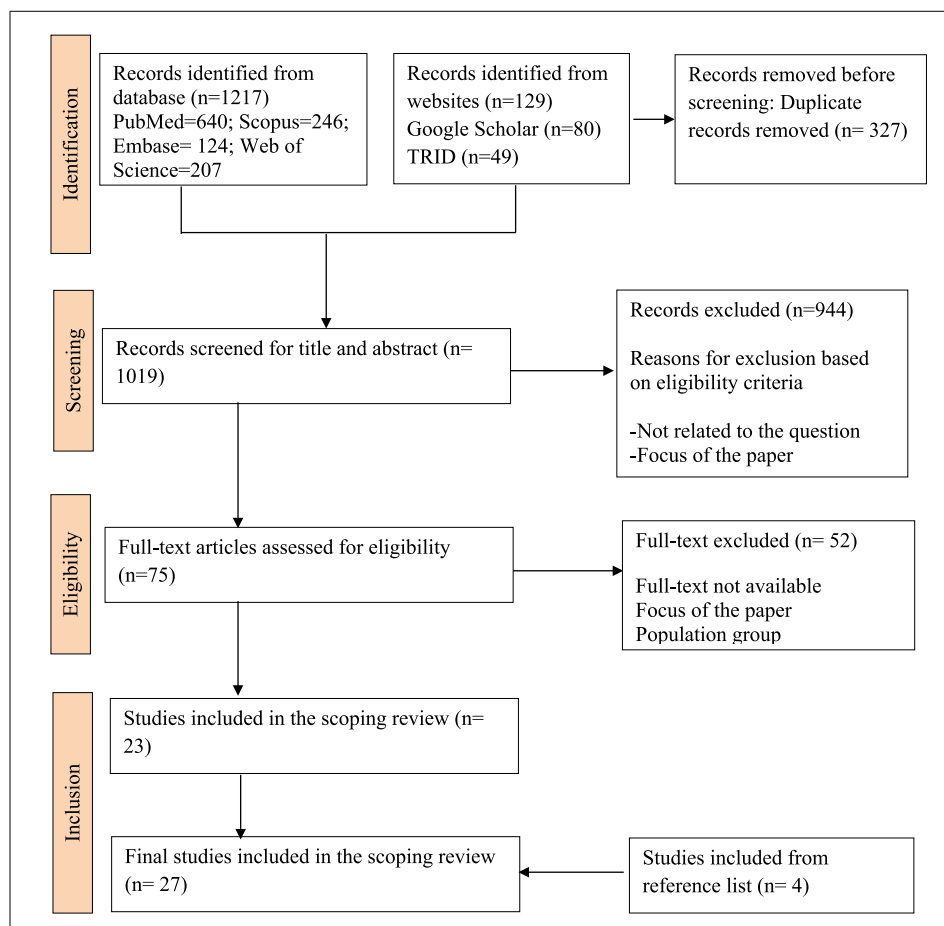


Fig. 2. PRISMA diagram of the search process and study selection.

transport; 6 reported on plans and policies implemented over the period to improve the public transport system; and 13 reported on social exclusion due to inadequate public transport system.

The review identified several issues pertaining to the disproportionate usage of public transportation and the social exclusion of the vulnerable group of people, particularly, OAs and PwDs in Bangladesh. In this study, we have categorised these issues into three themes: accessibility and barriers to transport systems; plans and policies implementation towards urban mobility infrastructure; and social exclusion of OAs and PwDs.

4.1. Barriers to access public transport

Both the physical (including built environment such as roads, ramps and footpaths; transportation, and interaction between the transport systems and users due to their overlapping nature) and social barriers (such low income, low employment opportunities, and negative social attitude) have been reported by 8 studies in this review (Abir and Hoque, 2011; Chowdhury, 2014; Hamiduzzaman et al., 2016; Karki et al., 2021; Nakshi et al., 2021; Patil et al., 2022; Sajib, 2022; Stuckey et al., 2020). The challenges increase during the rainy season since the roads and footpaths get flooded making the accessibility precarious for OAs and PwDs (Fattah, 2018; Hamiduzzaman et al., 2016; Hoque and Alam, 2002). In addition, traffic congestion and overcrowding act as major challenges to using various modes of public transportation (Bhuiya et al., 2019; Jahangir et al., 2022). Despite being one of the least motorised cities in Asia, Dhaka's traffic congestion is one of the highest especially due to an ever-increasing number of private motor vehicles (DTCA and JICA, 2016; ESCAP, 2018).

This exponential growth of vehicles and subsequent huge traffic congestion has slowed down the traffic speed to the extent that walking is often faster than using any vehicle (Bhuiya et al., 2022; Rahman, 2019). According to ESCAP (2018) the average daily traffic speed was about 21.2 km/h in 2004 but was reduced to 15.1 km/h in 2009 and by 2018 it had fallen further to 6.4 km/h. Bangladesh Road Transport Authority (2020) documented that out of all registered vehicles in 2019 only 15.25 % were the motorised public transport (auto-rickshaw, bus, covered van, microbus, minibus and pick-up) whereas 65.75 % were private vehicles (Motorcycle, jeep and private passenger car). The remaining 19 % comprised 'other' vehicles (trucks, cargo vans, delivery vans, ambulances, taxis). Hence, the question is what about the vulnerable people such as OAs and PwDs who cannot afford and access private vehicles due to low income and physical barriers? In addition, more than 80 % of the trips are within 5 km (DTCA and JICA, 2016), suggesting non-motorised modes should be the focus as they are better fitted for the OAs and PwDs to access neighbourhood resources such as health facilities, markets, food stores and social networks (Hasan and Davila, 2018; Imran and Low, 2003).

4.1.1. Non-integrated public transport

The reviewed articles and documents reported that the transport system in Bangladesh is mainly road-based which has no organised mass transit system and is not well connected with a solid grid network (Banks et al., 2022; DTCA and JICA, 2016; ESCAP, 2018). For instance, there are about 200 km of primary roads, 260 km of secondary and collector roads, and 2500 km of narrow roads that comprise about 7 % of the total built-up area in Dhaka (Abir and Hoque, 2011). But these roads are not interconnected and people are devoid of access to all the urban spaces in

Table 2
Characteristics of included papers (n = 27).

Authors & Year	Study Design	Study focus	Population group	Key Themes
Abir and Hoque (2011)	Mixed methods	Infrastructural, social and psychological barriers to access public transport	People with disabilities	Disability, accessibility and movement
Alam et al. (2013)	Cross-sectional quantitative study	accessibility of vision-impaired (VI) patients to other eyecare centres	220 People with visual impairment	Accessibility to health care facilities
Amin (2017)	Qualitative methods	Disease and disability as a normal part of aging	People over age 60 and living in the urban and rural areas.	Modal choice and social participation
Banks et al. (2022)	Qualitative methods	Direct and indirect costs for transport accessibility	People with disabilities in working age group	Higher costs decrease participation and exclusion
Bhuiya (2019)	Quantitative questionnaire survey	Mobility pattern of movement-challenged persons	People with disabilities	Travel behaviour and lack of accessibility
Bhuiya et al. (2022)	Mixed methods	Transport systems influence decision-making regarding regular and occasional movement	Movement Challenged Persons using wheelchairs, crutches, and walking sticks for their movement	Transport-induced socialexclusion
Chowdhury (2014)	Quantitative questionnaire survey	Mobility and accessibility needs.	Vulnerable group such as older adults, women and people with disabilities	Public transportation, infrastructure and pedestrian accessibility to urban services
DTCA and JICA (2016)	Quantitative methods	Revised Strategic Transport Plan for Dhaka	Both older adults and people with disabilities along with all other citizen	Existing transportation system
ESCAP (2018)	Quantitative methods	Sustainable urban transport	Both older adults and people with disabilities along with all other citizen	Inclusive cities
Fattah (2018)	Descriptive	National Urban Policy	Vulnerable group such as older adults, women and people with disabilities	Health access and social inclusion
Hamiduzzaman et al. (2021)	Thematic discourse analysis (Qualitative methods)	Health care access	Older women	Inadequate transportation facilities and policies
Hamiduzzaman et al. (2016)	Quantitative methods	Sustainable Urban Transport	Poor older adults, women and people with disabilities along with all other citizen	Strategic Transport Plan
Hoque and Alam (2002)	Descriptive	Sustainable urban public transport system	Both older adults and people with disabilities along with all other citizen	Public transport accessibility and traffic congestion
Hoque et al. (2012)	Descriptive	Accessibility, level of service, comfort, safety and operational efficiency	Both older adults and people with disabilities along with all other citizen	Social exclusion
Hossain (2004)	Descriptive	Inadequate transportation system and barriers for mobility	People with disabilities	Social exclusion
Hossen and Westhues (2010)	Qualitative methods	Challenges to access to health care	Women aged 60 or more years	Social exclusion
Hussain (2021)	Quantitative methods	Current situation of social exclusion	people with disabilities	social exclusion
Jahangir et al. (2022)	Thematic analysis (Qualitative methods)	Barriers to access public transport	Older adults	Social exclusion
Karki et al. (2021)	Mixed methods	Barriers to access assistive technology and mobility	People with disabilities	accessibility to urban services
Nakshi et al. (2021)	Quantitative methods	Accessibility to the major destinations	Low socio-economic groups of people	Inadequate transportation facilities and policies
Patil et al. (2022)	Descriptive	Factors influencing the urban mobility infrastructure	Older adults	Interventions and policies
Perez-Barbosa and Zhang (2017)	Quantitative methods	Physical accessibility and well-being of passenger	Low socio-economic groups of people	Transport-induced social exclusion
Rahman (2019)	Mixed methods	Physical and social barriers to access public transport	Older adults, women and people with disabilities	Safety in public transport
Rahman and Zhang (2018)	Quantitative methods	Accessibility levels to green public spaces	Women, older adults, low-income people and the disabled,	Social exclusion
Sajib (2022)	Qualitative methods	Infrastructural barriers to access public transport	People with disabilities	situation of existing transport system
Šiška and Habib (2013)	Descriptive	Attitudes towards disability and inclusion	People with disabilities	Policies and social exclusion
Stuckey et al. (2020)	Qualitative interviews with thematic analysis	Barriers and facilitators to work participation	People with disabilities	Inadequate transportation facilities and policies

their everyday lives. The transit (buses) and paratransit (mini buses) public transportation move through primary and secondary roads only leaving narrow roads which connect the neighbourhoods. This lack of an integrated public transport system has discouraged OAs and PwDs from accessing public transportation (Hamiduzzaman et al., 2016; Hossain, 2004; Perez-Barbosa and Zhang, 2017). In addition, non-regularised vehicles like cycle rickshaws, CNG and *Leguna* (human haulers) have increased manifold for last-mile connectivity and further increased traffic congestion; thus, making accessibility more precarious (Bhuiya et al., 2022; Hamiduzzaman et al., 2016; Jahangir et al., 2022).

4.1.2. Inauspicious attitude and behaviour of transport staff

Apart from a low level of services and availability of transport facilities, the low accessibility of public transport for OAs and PwDs is also

the result of indifferent attitudes and insensibility of the transport staff (Banks et al., 2022; Bhuiya et al., 2022; Šiška and Habib, 2013). Unlike Western societies, studies on the perception and attitudes of transport personnel towards vulnerable groups are very rare in Bangladesh (Abir and Hoque, 2011; Alam et al., 2013; Bhuiya, 2019; Jahangir et al., 2022). The study conducted by Rahman (2019) revealed that only 4 % of the transport staff including bus drivers, helpers, and conductors are being trained to be sensitive toward the needs of vulnerable groups. On the other hand, around 80 percent of PwDs reported discourteous behaviour from bus drivers and helpers. Jahangir et al. (2022) mentioned that older adults sometimes encounter inauspicious behaviour from co-passengers as well.

Table 3
List of code groups and codes developed from included studies.

Code group	Codes	Example quotations from included studies
Barriers in public transport	<ul style="list-style-type: none"> – Traffic congestion – Availability of Public Transport – Availability of buses – Break journey 	The most difficult part of accessing a bus is getting into it due to overcrowding and many people hanging on to the entry of the bus. Older adults had to push and shove to get on the bus (Jahangir et al., 2022).
Behaviour	<ul style="list-style-type: none"> – Behaviours towards older adults – Behaviours towards PwDs – Behaviour of trans personnel – Behaviour of co-passengers 	Major problems are fiercely competitive operating conditions often leads to overloading and to a refusal to stop for disabled persons due to a perception that they will prolong boarding time (Abir and Hoque, 2011). Unhelpful and dismissive behaviour of drivers, long waiting time at bus stops, and lack of reserved seating on buses are common problems faced by people with disabilities (Bhuiya, 2019).
Policy implementation	<ul style="list-style-type: none"> – National Urban Policy – Strategic Transport Plan (STP) – Revised Strategic Transport Plan (RSTP) – DTCA – BRT routes – MRT line 	The National Integrated Multimodal Transport Policy mentions that traffic safety campaigns should be implemented on regular basis to improve awareness of drivers and road users about speeding of vehicles, and in the media to improve awareness of the potential dangers of road traffic and high speeds (DTCA and JICA, 2016)
Social Exclusion	<ul style="list-style-type: none"> Helplessness Denial ridership Loneliness Poverty Social exclusion 	It is very common for rickshaw pullers and auto-rickshaw drivers to show unwillingness to carry a person with a wheelchair or walking frame (Bhuiya et al., 2022). The relevant aspects of transport-based social exclusion that could affect the wellbeing of the citizens, corresponding to the physical accessibility, and for the fear-based (self-related) dimensions of social exclusion (Perez-Barbosa and Zhang, 2017).

4.2. Plans and policies implementation towards urban mobility infrastructure

To keep up with the growing urban population and developmental projects the government has adopted a 'Strategic Transport Plan' (STP) and subsequently the 'Revised Strategic Transport Plan' (RSTP) for Dhaka, with the support of JICA (DTCA and JICA, 2016; Fattah, 2018; Hussain, 2021; Sajib, 2022). This revised plan suggested a much higher investment in Dhaka's urban transport system including, 2 BRT routes, 6 elevated highways, and 5 metro rail lines. In addition, the plan also suggested three ring roads, radial roads, 21 transport hubs, an improvement of Dhaka's circular waterway, better traffic management and safety, and improvements in the bus sector like as route expansion and bus terminal relocation (ESCAP, 2018; Hoque and Alam, 2002; Hoque et al., 2012). In spite of these plans and policies, the transport condition has not changed as anticipated. According to STP the MRT line 6, a stretch of 20.1 km, was expected to be completed by 2020 extending from Uttara in the north and Motijheel in the south. But the current progress does not match the projected schemes (Banks et al., 2022; Bhuiya et al., 2022; Hussain, 2021).

These interventions have focused more on infrastructure, but looking from the OAs and PwDs perspectives, these major constructions do not directly address the accessibility challenges for their mobility since most

of their trips are social trips, and that's too limited within certain boundaries (Alam et al., 2013; Chowdhury, 2014; Hossain, 2004; Karki et al., 2021; Nakshi et al., 2021; Sajib, 2022; Stuckey et al., 2020). Moreover, these new changes are also emphasising the government's ambitious projects that lack first and last-mile connectivity for people living in different neighbourhoods (Bhuiya et al., 2022; Jahangir et al., 2022; Perez-Barbosa and Zhang, 2017; Rahman and Zhang, 2018). The majority of the available literature documented that OAs and PwDs mostly use rickshaws, auto rickshaws, and other local transport that connect the neighbourhoods with their working places, health care centres, and social activities (Alam et al., 2013; Amin, 2017; Chowdhury, 2014; Hamiduzzaman et al., 2021; Hossen and Westhues, 2010; Nakshi et al., 2021). So, there are still gaps with respect to inclusive transport planning to address the mobility challenges of marginalised groups including OAs and PwDs in Dhaka.

4.2.1. Footpath and parking area development

Our results highlight that the fundamental idea behind implementing STP and RSTP plans was to introduce improvements in urban layout, minimising trip and traffic, and improve local accessibility (DTCA and JICA, 2016; Fattah, 2018; Hussain, 2021). Regarding the transport system, the plans suggested for ensuring accessible, safe, and sustainable connectivity between communities; and operationalization of Mass Rapid Transit systems (5 MRT and 3 BRT Routes). The plans also recommended the development of 3 Ring Roads (Inner, Middle, and Outer Ring Roads) to reduce unnecessary traffic congestion in the city (ESCAP, 2018). It is estimated that walking covers 20 percent of all trips in Dhaka (DTCA and JICA, 2016; Fattah, 2018; Nakshi et al., 2021). But the pedestrians, particularly the OAs and PwDs face a lot of challenges due to inadequate infrastructure (Bhuiya et al., 2022; Hamiduzzaman et al., 2021; Hoque et al., 2012; Jahangir et al., 2022; Karki et al., 2021).

4.3. Accessing public transport: Ridership and social exclusion

ESCAP (2018) has reported that about 88 percent of all passenger trips were on public transportation such as buses, rickshaws, and CNGs in 2014; while only 12 percent of passenger trips were on private vehicles including cars, jeeps, and motorcycles in the same period. About 7 studies have found that the bus is the most preferred mode of public transportation, comprising about 65 percent of the total trips, used by the city populace due to high transportation costs in other modes (Abir and Hoque, 2011; Alam et al., 2013; Bhuiya et al., 2022; Hamiduzzaman et al., 2021; Jahangir et al., 2022; Rahman, 2019; Sajib, 2022). The review results reveal that the selection and preference of ridership depend on a number of factors including age (Bhuiya et al., 2022; Sajib, 2022), gender (Hamiduzzaman et al., 2021), information and behaviour (Perez-Barbosa and Zhang, 2017) economic status (Nakshi et al., 2021; Patil et al., 2022), waiting time or frequency of services (Abir and Hoque, 2011), travel time (Jahangir et al., 2022), safety (Hoque et al., 2012; Rahman, 2019), and availability (Stuckey et al., 2020). Hussain (2021) argues that age and physical fitness are other influential factors in selecting different modes of transport. Being physically fit, young working people enjoy better public transport accessibility than the OAs and PwDs and are able to reach essential opportunities such as work-place, health care, basic food and clothing, commuting for education, public services, social and recreational activities (Abir and Hoque, 2011; Bhuiya, 2019; Fattah, 2018; Hossain, 2004; Jahangir et al., 2022). On the other hand, OAs and PwDs face challenges in getting in and off public transport due to congestion and overcrowding (Jahangir et al., 2022). Most of the included studies investigated the various aspects of transportation inequality that are related to geography, infrastructure, and physical characteristics (Bhuiya et al., 2022; Banks et al., 2022; Chowdhury, 2014; Karki et al., 2021; Nakshi et al., 2021; Patil et al., 2022; Rahman and Zhang, 2018; Sajib, 2022; Stuckey et al., 2020). The impact of these transport inequities is reflected in the accessibility and mobility of OAs and PwDs in their everyday lives. This resulted in the

transport-related exclusion of these vulnerable groups from accessing essential activities including social interactions (Banks et al., 2022; Bhuiya et al., 2022; Chowdhury, 2014). In addition, inappropriate and inadequate modes of transport are unable to accommodate OAs and PwDs to make them mobile enough to maintain social relations with friends and family members (Hossain, 2004; Hussain, 2021; Jahangir et al., 2022).

4.3.1. Social exclusion and reduced access to healthcare

A number of reviewed studies mentioned that the OAs and PwDs are at higher risk of social exclusion due to a lack of their ability to access desired destinations with preferred modes of transportation (Banks et al., 2022; Bhuiya et al., 2022; Hossain, 2004; Hossen and Westhues, 2010; Hussain, 2021; Perez-Barbosa and Zhang, 2017). The results indicated that OAs and PwDs live with limited access to health, employment, and social relations due to poor socio-economic status and inadequate transport facilities (Jahangir et al., 2022; Rahman and Zhang, 2018; Sajib, 2022). In addition, Abir and Hoque (2011) studied the mobility problem of disabled people in Dhaka and found that poverty, discrimination, and isolation are extensively prevalent among PwDs. The qualitative measures of their study revealed that PwDs also confront three types of barriers viz. social (low income, low employment opportunities), psychological (negative social attitude), and structural (poor footpaths and lack of ramps) barriers in accessing the social services that intensify their isolation and loneliness and adversely affect their health and wellbeing. The uncondusive design of transport facilities including parking places, discontinuous sidewalks or footpaths, road crossings, underpass and overpasses, bus stops, and railway stations also hinder the mobility of PwDs and consequently lead to their social exclusion (Abir and Hoque, 2011; Amin, 2017; Bhuiya et al., 2022; Hamiduzzaman et al., 2021; Jahangir et al., 2022; Rahman, 2019; Sajib, 2022; Stuckey et al., 2020).

This scoping review synthesised existing literature and identified key themes, shedding light on the multifaceted challenges faced by older adults and people with disabilities in accessing public transportation in Bangladesh. Furthermore, a research gap was noted pertaining to the lack of inclusivity within the current transportation system especially concerning these vulnerable populations. The review study found new studies, for instance, Jahangir et al. (2022) which empirically explored the infrastructural and societal challenges to using public transportation which led to their social exclusion. The study also found that not only the physical challenges such as the built environment, footpaths, roads, and ramps but also the social impediments such as the behaviour of transport personnel and co-passengers affect accessing public transportation and social exclusion among older adults and people with disabilities in Bangladesh.

5. Discussion

This scoping review has shown that neither the transport nor government agencies focused on the challenges to access public transportation faced by the OAs and PwDs. In addition, the current level of urbanisation coupled with the increasing migrant population coming from low socio-economic backgrounds have resulted in substantial travel demands that instigated many challenges including traffic congestion and high pressure on footpaths and pavements (Ishtiaque and Ullah, 2013).

5.1. Increased motorisation

In developing countries, it is a common feature of urban transport development plans to focus on endorsing motorised transport at the cost of non-motorised transport and it is prevalent in several Asian cities including Bangladesh (Imran and Low, 2003; Low and Banerjee-Guha, 2003), Africa (Klopp and Cavoli, 2019) and many other parts of the Global South (Richardson and Jensen, 2008 as cited by Hasan and

Davila, 2018). Similarly, motorised transport interventions have been given greater significance in many cities in Pakistan and China even at the cost of environmental sustainability and social equity (Ahmed et al., 2008). Likewise, the public transport systems in Delhi and Mumbai similarly neglected the pedestrians, cycle users, and street vendors and endorsed motorised vehicles (Low and Banerjee-Guha, 2003; Pucher et al., 2005). The increasing motorised vehicles and their infrastructural development underestimated the non-motorised infrastructures that gradually marginalised the OAs and PwDs since a majority of them are dependent on non-motorised vehicles particularly rickshaws for their mobility.

5.2. Inadequate footpaths and problems of pedestrians

Footpaths or sidewalks are a significant dimension of urban accessibility and mobility, particularly for PwDs and OAs especially to access local facilities (such as shops) and public transport (Abir and Hoque, 2011; Haning et al., 2012; Karki et al., 2021). But the travel behaviour and activity pattern of pedestrians depend on the 'walkability' of the footpaths (Fabian et al., 2010). In this context, footpaths in Bangladesh have the lowest score of walkability index among the Asian countries because of their poor situation and management; lanes are very narrow and have no space to expand because of encroachment (Leather et al., 2011). On the other hand, developed countries such as the USA, the UK, and Hong Kong have specific guidelines of minimum required dimensions for footpaths, ramps, stairs, escalators, and lifts. The comparative study of the urban transportation system for PwDs in these three countries has displayed that the footpaths would have a minimum clear width of 915 mm in the USA, 1500 mm in the UK, and 1050 mm in Hong Kong (Sze and Christensen, 2017).

In addition, OAs and PwDs encounter more challenges on sidewalks because of different forms of barriers such as steep steps, inadequate ramps, and tilted surfaces that make the footpaths inaccessible to them (Tajgardoon and Karimi, 2015). In Dhaka, in the case of Bangladesh, the total length of footpath is only 430 km constituting less than 20 percent of the total roads in the city. Moreover, many of the sidewalks are not suitable for walking not for common people even due to obstacles including poor condition of sidewalks, storage of construction materials, illegal hawkers, and parking of private vehicles (BIGD, 2016). Another study revealed that nearly 40 percent of the sidewalks are being occupied illegally (ADB, 2011) and 88 percent of footpaths are not suitable for disabled and OAs (Rahman, 2019). Besides, there are many neighbourhoods such as Old Dhaka which has very narrow sidewalks that cannot be utilised by vulnerable group. Moreover, in some of the busiest areas such as New Market, Gausia, Gulistan, Dhanmondi, Chadni Chawk, Mohakhali, and Mirpur the issue of encroachment is also prevalent; thus, creating rampant obstacles for pedestrians in their everyday accessibility and mobility (BIGD, 2016). In such a situation the pedestrians are compelled to take unsafe roads to walk causing about 70 percent of fatal accidents in Dhaka. World Health Organisation (2009) reported that more than 90 percent of fatal accidents happen in developing countries and a majority of the victims are pedestrians, cyclists, and motorcyclists. Similarly, in other South and South-East Asian countries pedestrians constitute a higher segment of fatalities due to lack of proper sidewalks (Fabian et al., 2010). While looking into city-level comparisons of pedestrian fatalities due to inadequate footpaths and improper management, Dhaka reported 70 percent of fatalities whereas Delhi, Kolkata, and Bengaluru have reported more than 40 percent of fatalities (MoUD, India, 2008). Therefore, the lack of suitable footpaths has caused greater challenges for the OAs and PwDs in Dhaka as they are more vulnerable while they walk over the roads (Jahangir et al., 2022).

5.3. Non-inclusivity of transport system

While looking into the past we can see that the OAs and PwDs have been historically excluded in Bangladesh. The study by Rahman (2019)

revealed that about 76 % of vulnerable transport users perceived the Dhaka transportation system as non-inclusive; whereas only 20 percent in the UK, 35.5 percent in the USA, and 8.1 percent in Hong Kong OAs and PwDs perceived that their transport system to be non-inclusive (Erickson et al., 2017). The reviewed study demonstrated that the main reasons for non-inclusivity are an unfriendly design of public buses (narrow doors, high floors with steep steps, and inadequate leg spaces); occupied footpaths and sidewalks by the street vendor, garbage bins or construction materials and shop keepers; no separate lanes for vulnerable groups; volatile ticket price; non-inclusive design of pedestrian pathways (curb ramps for wheelchair users, levelled pathways); non-cooperation among government agencies for inclusiveness; indifferent and insensitive behaviour of the transport personnel towards the vulnerable groups who expect for safe, accessible and reliable modes of transport (Hamiduzzaman et al., 2016; Patil et al., 2022; Stuckey et al., 2022). Similar findings have been echoed by WHO (2007) which revealed that OAs and disabled people look for inclusive public transportation with reasonable fare; frequent, safe, and comfortable; and nearest routes and junctions to reach destinations (Szeto et al., 2017; Wong et al., 2018). In addition, Venter et al (2002) explored the accessibility and mobility challenges faced by disabled people and other vulnerable groups in five countries in the Global South: India, South Africa, Mexico, Malawi, and Mozambique and revealed that transport personnel are not friendly towards the vulnerable groups. On the other hand, studies in Australia indicated that about 96 percent of vulnerable people including disabled and OAs have access to public transportation and only 40 percent of them reported the transport to be non-inclusive as they face physical, spatial, social, and psychological difficulty to access these public transport (Haning et al., 2012; Schmocker et al., 2008).

6. Literature gaps and future research possibilities

While the literature on the barriers to accessing public transport including health care facilities is increasing (Bhuiya, 2019; Chowdhury, 2014), to date, few studies have intended to understand the transport-related social exclusion of vulnerable groups of people such as OAs, women and PwDs. Given the rapid increase of motorised transport and urban mobility infrastructures in development plans, future research on complex social and cultural challenges to access public transport for OAs and PwDs, is essential to address this literature gap. Moreover, with the inadequate, poorly managed, and exclusive transport system in Bangladesh, it is essential to look beyond the efficiency and economic benefits of transport planning which ignores access inequalities.

This study also reveals that future research should focus on transport accessibility from multiple dimensions because it is central to accessing health and well-being of OAs and PwDs since it enables them to engage with relatives and friends or enhance community participation. On the other hand, PwDs face double penalties for physical barriers and social discrimination with respect to transportation and mobility. This study suggested that future research should also focus on adequate and improved accessibility, particularly in South Asia as well as other developing countries, which plays a vital role in reducing poverty among PwDs by promoting their mobility for employment and better education. The pieces of evidence in the scoping review reveal that older people and persons with disabilities are not inherently susceptible to disadvantages rather structural barriers such as unequal access, reduced mobility, and social discrimination place them more at vulnerabilities. More specifically, studies such as Hamiduzzaman et al. (2016) and Jahangir et al. (2022) revealed that traffic congestion, difficulty in getting on and getting off, poor footpaths, lack of first and last mile connectivity, behaviour of fellow passengers and transportation staff, as well as the excessive expense of transportation (CNG, rickshaw, uber) are the major challenges of unequal use of public transportation and subsequent societal exclusion among older adults and people with disabilities in Bangladesh. Hence, this study indicates that future research should include the 4As framework of Carruthers et al. (2005):

accessibility, availability, affordability, and acceptability in the transport planning strategies towards age-friendly and inclusive urban mobility.

However, the anticipated challenge for this scoping review was the lack of available literature that focused on empirical evidence of social barriers to accessing public transport for basic services. The age-friendly and inclusive urban mobility approaches largely focus on social issues such as accessibility, availability affordability of public transportation. Another limitation of the present review is that we focus on 'Bangladesh' and 'Dhaka' for context in the PCC framework. Since the majority of the study on accessing public transport, OAs, and PwDs in Bangladesh are primarily based in Dhaka, we have considered these two terms in the search strategy.

7. Conclusion and recommendation

Accessibility of public transportation is a key element of accessing essential urban facilities and services, including employment, social network, quality of life, health, and well-being. The barriers to accessing the basic services by the OAs and PwDs seldom get attention because of limited perspective on their wider needs beyond basic health. The existing urban and transport planning strategies usually focus on the infrastructure and commuting patterns, and do not include in their purview the specific travel needs of these groups. The emerging issues, due to unequal transport accessibility, such as social exclusion, mental health, low social participation, and loneliness are rarely discussed in Bangladesh where the authorities have mainly focused on a cost-benefit approach and aimed to improve the speed of the traffic system. In the infrastructural development process, the issues of 'vulnerable groups' could not draw the attention of the planners and policymakers who fail time and again to realise their basic transport necessities and (in)advertently push them towards marginalised position.

In this context of improving accessibility to urban mobility infrastructures for OAs and PwDs, it is imperative to conduct more evidence-based research on the challenges they face while accessing the transport in the city. For this further research is required first to bring forth the existing physical and social hurdles for accessing the urban transport infrastructure; secondly to frame people-oriented policies, based on insights, to enhance accessibility for workplaces, health care facilities, and social engagements of the OAs and PwDs. The research on urban and transport planning should focus more on safety, affordability, and acceptability of transport for vulnerable people particularly the OAs and PwDs for their better accessibility to urban infrastructures, mobility, and wellbeing.

Since a majority of the OAs depend on rickshaws, autorickshaws, and CNG for their everyday mobility in the neighbourhoods, it is significant to promote non-motorised modes in the city for safe and sustainable mobility. As more than 80 % of the trips of the OAs and PwDs are within 5 km, promoting walking would improve the accessibility of neighbourhood resources and quality of life. In this regard, transport authorities should focus on improving pavements and footpaths for the safe walkability of vulnerable groups. Besides, it is important to improve the interior design of the public modes for easy access (to get in and get off) and comfortable journeys for the PwDs and OAs. Moreover, increasing first and last-mile accessibility, fixing the public transport fares, and training the transport personnel to become more sensitive towards the issues of vulnerable groups are some of the necessary steps to be taken for a sustainable and inclusive transport system in Bangladesh. In addition, Bangladesh transport authorities might introduce WHO's Age-Friendly Cities initiatives such as "age-friendly vehicles" that are safe and comfortable; sensible transport drivers; and information to make the urban mobility more inclusive for OAs and PwDs. However, implementing and bringing in practices of the proposed eight domains of age-friendly cities framework will be challenging in Bangladesh. For instance, in the existing built environment and traffic congestion in Dhaka, cycling and walking may not be feasible for OAs

and PwDs due to the lack of space and encroachment of sidewalks. At this juncture, future research needs to focus more on social dimensions of transport inequity to make cities more inclusive and sustainable.

CRediT authorship contribution statement

Selim Jahangir: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Ajay Bailey:** Conceptualization, Funding acquisition, Investigation, Supervision, Visualization, Writing – review & editing. **Md Musleh Uddin Hasan:** Conceptualization, Data curation, Funding acquisition, Supervision, Writing – review & editing. **Shanawez Hossain:** Supervision, Writing – review & editing, Conceptualization, Funding acquisition, Investigation.

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.

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