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Spatial accessibility for women: A systematic literature review

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1 Introduction

The presence of varying accessibility levels contributes to societal inequality. Specific locations are easily reachable exclusively via private vehicles, thereby fostering disparities for public transport users. Many studies have been conducted to elucidate the variations in accessibility among diverse socio-demographic cohorts.

One of the segments that has received relatively limited attention in accessibility literature is women. Insights from travel behaviour studies indicate that, on average, women within heterosexual family units shoulder more responsibilities compared to their male counterparts (Kwan and Kotsev, 2015). Additionally, women are more prone to have shorter commute distances, engage in a higher number of non-work-related trips, and are more inclined to 'trip chain'—making multiple stops for various purposes (Acker, 2018). Moreover, most women are more likely to travel during off-peak hours and opt for flexible modes of transportation (Acker, 2018). However, the precise implications of these patterns on the accessibility of a destination for women, distinct from men, remain unclear.

Considering the distinct travel behaviour exhibited by women, it becomes imperative to investigate potential disparities in transport accessibility between women and men. This study aims to understand the scale of focus on women's accessibility (and the gap). In addition to discuss the findings of the studies with a focus on gender/ women and accessibility and identify the gap building on these findings.

2 Methodology

In this study, a literature search was conducted using a systematic method. The sources used were Scopus and Web of Science with the following keywords:

TITLE-ABS-KEY (transport* OR transit)

AND

TITLE-ABS-KEY (accessibility)

AND

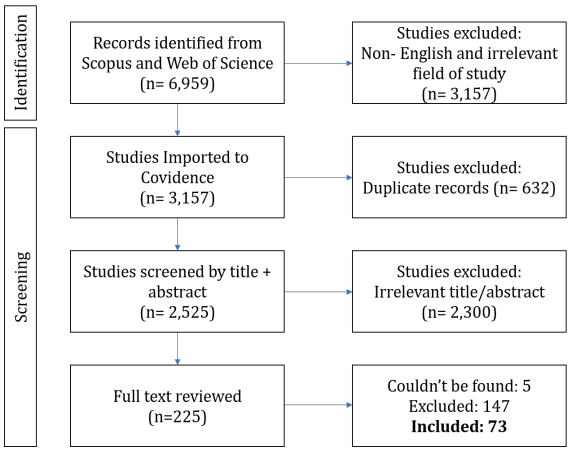
TITLE-ABS-KEY (demographics OR gender OR women OR men OR mother* OR age OR youth OR young OR elder OR children OR *income OR *employed)

Two inclusion criteria were used to identify relevant papers, which are:

- Focused on spatial accessibility (as opposed to physical access);
- Measure accessibility differences between different socio-demographic groups.

The first author led the systematic search. If there was any uncertainty about inclusion/exclusion, the authors discussed it to clarify whether the paper would be included or excluded in the review process.

Figure 1: Systemic search (based on PRISMA flow diagram template)



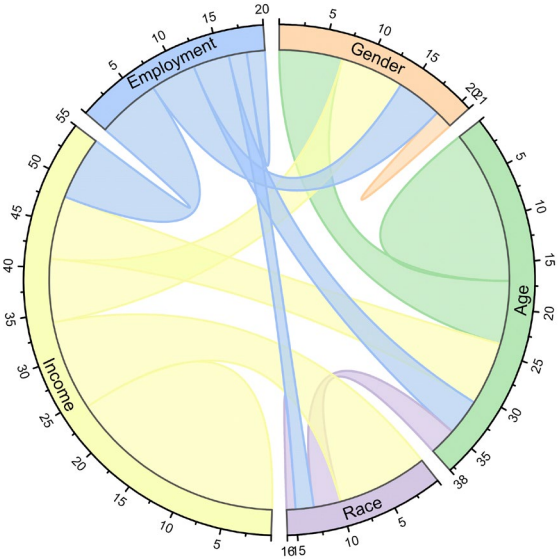
As depicted in Figure 1, the 2,525 papers were reviewed based on their title and abstract, adhering to the inclusion/exclusion criteria outlined in the previous section. From this initial review, 225 papers advanced to the full-text review stage. However, five of these papers could not be located. Ultimately, out of the remaining 220 papers, only 73 aligned with the inclusion criteria. Among the excluded papers, fifty failed to differentiate between socio-demographic groups, and 33 studies did not specifically address transportation accessibility.

The 73 papers identified in the search were classified based on several categories. These categorizations encompassed the socio-demographic(s) discussed in the paper (such as gender, age, race, income, and/or employment), accessibility measurement, mode of transport, and travel destination.

3 Main findings

Figure 2 illustrates the relation between one sociodemographic to each other. Age and income were the most likely socio-demographics to be considered independently. Some studies specifically tailor accessibility measures for older age groups, such as a transit accessibility measure designed for older individuals as proposed by Fatima et al. (2022). Others, like Wood and Horner (2019), compare accessibility across different age groups.

Figure 2: Demographics studied across 73 accessibility papers



Source: Author's synthesis of the literature

In contrast, papers involving gender, race, or employment status almost universally considered other socio-demographic factors. Notably, race and income were remarkably

interconnected, with 59% of studies examining race also including income considerations. Examples of research that explores the intersection of race and income include studies conducted by Aman et al. (2021), Shin (2020), and Hess (2005). Studies focusing on gender were associated with almost every socio-demographic, frequently examining three or even four socio-demographics in the same study. Among the five socio-demographic groups (gender, age, race, income, and employment), it is noteworthy that race and gender have never been concurrently considered in accessibility research.

A mere 15% of papers in the systematic search incorporated gender; among those, most treated gender as one of many socio-demographic characteristics. Table 1 details the 13 studies that integrated gender into their analyses. This table delves into the analysis approach employed, the mode of transport considered, and the destinations factored into the accessibility calculation.

As shown in Table 1, of the 13 accessibility studies that discuss gender, only six studies are comparative (descriptive approach). The rest only use gender as an independent determining variable in the analysis to calculate accessibility. Even though women are less likely to work full-time than men, the journey to work is the purpose of the trip that is most often the focus of research. The modes that are often associated with work travel are cars and transit. Several studies discuss walking accessibility. However, little research still discusses accessibility to educational facilities or shopping using public transportation.

4 Discussion

Women have unique travel patterns compared to men (Kwan and Kotsev, 2015, Lee, 2022). While many men only make daily trips from home to work, women are more likely to trip-chain and have many travel destinations. Regardless of whether they have children or not, women are more likely to take a greater role in the care of household needs (Chen and Yeh, 2021, Kwan and Kotsev, 2015, Neutens et al., 2014). And a woman who works will tend to visit many places before she travels to work (Al-Hussaini and Al-Ahbabi, 2020, Kwan and Kotsev, 2015).

In the end, women face difficult conditions to meet their travel needs. Complex travel needs, lower economic resources and less access to private vehicles combine to restrict their activity space compared to men (Kwan and Kotsev, 2015, Olaru et al., 2005). Several studies show that women tend to choose workplaces close to their home (Kwan and Kotsev, 2015, Fanning Madden, 2016, Tracy Turner, 1997, Lillydahl, 1986). In addition, many travel destinations for women are not well-served by public transport, taking place outside of the times and locations where public transport is concentrated. Several studies show that public transport accessibility is concentrated primarily in city centres and during peak commuting times (Fransen et al., 2015, Currie, 2004).So, in general, there is still a larger gap between public transport demand and supply among women than men (Fransen et al., 2015, Currie, 2004). This condition shows that women's travel needs need to be served better.

There are several research gaps found in the accessibility for women literature. Firstly, researchers often neglect to consider specific destinations in accessibility studies, opting for a more generalized approach. In addition, there is a scarcity of accessibility studies specifically examining women's roles as mothers or caregivers. This gap hinders our understanding of the relationship between familial roles, accessibility determinants, and the appropriate measurement methodologies. Given the important role of women in society, not only economically but also in their significant contribution to the family, regardless of their marital status, women who live with their families tend to have a more significant role in household affairs. Thus, research is urgently needed to focus on women's accessibility to this caregiving role.

Table 1: Summary of accessibility research that considers gender

No	Citation	Model type		Methodological Approach							Mode of Transport					Destinations					
		Descriptive Approach	Structural Approach	Cumulative Opportunity	Gravity	Logsum Measures	Time-space Measures	Activity Space	2-Step Floating Catchment Area	Catchment Based	Walk	Bike	Car	Public Transport	General	Work Facilities	Health Facilities	Education Facilities	Shopping Facilities / Retail	Social Facilities / Open Space	Not Specified
1	Al-Hussaini 2020	x*								x					x	x	x	x	x	x	
2	Guo 2022	x							x					x		x					
3	Kwan 2015	x		x									x	x		x					
4	Lecompte 2017	x			x										x	x					
5	Neutens 2014	x					x					x	x			x		x			
6	Olaru 2005	x						x							x	x			x	x	
7	Chen 2021		x				x						x	x		x			x		x
8	Dixit 2020		x			x					x	x	x	x		x					
9	Lau 2003		x							x				x		x					
10	Lau 2004		x							x				x		x					
11	Lee 2022		x						x				x	x			x				
12	Li 2018		x					x			x	x	x	x					x		
13	Rojas 2016		x	x							x									x	
Total		6	7	2	1	1	2	2	2	3	3	3	6	8	3	10	2	2	4	3	1

Source: Author's synthesis of the literature

5 References

Acker, W.-S. N. a. A. 2018. Understanding Urban Travel Behaviour by Gender for Efficient and Equitable Transport Policies. *Understanding Urban Travel Behaviour by Gender for Efficient and Equitable Trasnsport Policies.* Paris, France: International Transport Forum.

Al-Hussaini, Z. I. H. & Al-Ahbabi, S. H. H. Accessibility indicators from a gender perspective. 2020.

Aman, J. J. C., Zakhem, M. & Smith-Colin, J. 2021. Towards equity in micromobility: Spatial analysis of access to bikes and scooters amongst disadvantaged populations. *Sustainability (Switzerland),* 13.

Chen, Z. & Yeh, A. G. O. 2021. Socioeconomic variations and disparity in space–time accessibility in suburban China: A case study of Guangzhou. *Urban Studies,* 58**,** 750-768.

Currie, G. 2004. Gap Analysis of Public Transport Needs. *Transportation Research Record,* 1895**,** 137 -146.

Fanning Madden, J. 2016. Why Women Work Closer to Home. *Urban Studies,* 18**,** 181-194.

Fatima, K., Moridpour, S. & Saghapour, T. 2022. Development of a Public Transport Accessibility Index for Older Commuters: A Time-Based Approach. *JOURNAL OF ADVANCED TRANSPORTATION,* 2022.

Fransen, K., Neutens, T., Farber, S., De Maeyer, P., Deruyter, G. & Witlox, F. 2015. Identifying public transport gaps using time-dependent accessibility levels. *Journal of Transport Geography,* 48**,** 176-187.

Hess, D. B. 2005. Access to employment for adults in poverty in the Buffalo-Niagara region. *URBAN STUDIES,* 42**,** 1177-1200.

Kwan, M. P. & Kotsev, A. 2015. Gender differences in commute time and accessibility in Sofia, Bulgaria: A study using 3D geovisualisation. *Geographical Journal,* 181**,** 83-96.

Lee, S. 2022. Spatial and Socioeconomic Inequalities in Accessibility to Healthcare Services in South Korea. *HEALTHCARE,* 10.

Lillydahl, L. D. S. a. J. H. 1986. An Empirical Analysis of the Commute to Work Patterns of Males and Females in Two-Earner Households. *Urban Studies,* 2**,** 119 - 129.

Neutens, T., Daniels, S., Minnen, J., Glorieux, I., De Maeyer, P. & Van De Weghe, N. 2014. Spatial and temporal fluctuations in individual accessibility: a comparative analysis among subgroups of the population. *Geografisk Tidsskrift - Danish Journal of Geography,* 114**,** 119-131.

Olaru, D., Smith, N. & Ton, T. Activities, accessibility and mobility for individuals and households. 2005. 373-383.

Shin, E. J. 2020. Disparities in access to opportunities across neighborhoods types: a case study from the Los Angeles region. *Transportation,* 47**,** 475-501.

Tracy Turner, D. N. 1997. Travel to work and household responsibility: new evidence. *Transportation,* 24**,** 397 - 419.

Wood, B. S. & Horner, M. W. 2019. Aging in Activity Spaces: How Does Individual Accessibility Compare across Age Cohorts? *Professional Geographer,* 71**,** 1-14.