

GIVING VOICE TO WOMEN IN PUBLIC TRANSPORT: UNDERSTANDING “(IN)MOBILITY OF CARE” AND FEMALE TRAVEL PATTERNS

Keiko Porath and Patricia Galilea, Department of Transport Engineering and Logistics - Pontificia Universidad Católica de Chile, pgalilar@uc.cl

ABSTRACT

Mobility of Care refers to trips generated by activities of care for home/family. These activities are mostly associated with women and affect their mobility patterns. This paper aims to understand the mobility patterns of caregivers by analysing Santiago's mobility survey.

Our findings highlight significant inequalities between genders, with more women making chained trips for care reasons. We also find that the presence of children in the household creates a gender gap that is not present in households without children. Finally, we find that 31,2% of trips are done for care-related reasons, with a significant difference between women and men.

Keywords: Mobility of Care, gender, mobility patterns

1. INTRODUCTION

The 2030 Sustainable Development Goals (SDGs) call for safe, affordable, and sustainable transport systems, emphasizing the importance of addressing gender disparities (United Nations, 2015). While urban planning is shifting towards sustainability, gender-specific considerations are often overlooked, posing challenges, especially for women (Greed, 2008, 2019). The 1992 Rio Declaration prioritizes social equity, economic viability, and environmental sustainability (United Nations, 1992). Figure 1 illustrates how integrating SDG goal number five (gender equality) into transport planning can contribute to multiple SDGs, including reducing inequalities, poverty, improving accessibility, and fostering sustainable cities and communities, ultimately promoting peaceful and just societies.



Figure 1: Gender focus in transport planning and Sustainable Development Goals

Source: Own creation based on United Nations (2015)

Gender perspectives in academia date back to the 1960s but have gained renewed importance due to recent developments in transportation, particularly in (im)mobility related to caregiving responsibilities and gender issues, previously associated mainly with women.

Contemporary societal changes, such as increased female workforce participation, demand a revaluation of mobility from a gender perspective. Women have adapted their mobility patterns to balance productive and reproductive roles, while men have traditionally focused on work-related mobility.

The concept of "mobility of care," introduced by Sánchez de Madariaga (2009), highlights that this mobility primarily affects women due to societal norms, gender stereotypes, and labour divisions. Despite claims of being "technically neutral," transport planning often favours male-oriented work commutes, neglecting gendered implications.

Insufficient transportation access is a significant barrier for women, limiting their participation in various aspects of life. To achieve economic efficiency and social development, integrating gender considerations into infrastructure and transportation is crucial.

However, gender analysis faces challenges due to data gaps and inadequate collection methods. Accurately quantifying "mobility of care" requires improving data collection, as current statistics tend to underestimate care-related trips, mostly undertaken by women.

In summary, this research seeks to broaden the discourse by examining the societal context of (im)mobility and policy implications, particularly for those with caregiving responsibilities. It involves quantitative data collection and statistical analysis through a gender-focused lens, using mobility data from Santiago, Chile, with potential applications in diverse scenarios and geographic contexts.

This paper is structured as follows: First, we present definitions used in our research and a short bibliographic review. In the third section, we explain how we prepared the questionnaire for our survey. In the fourth section, we present the results of the gender analysis of Santiago's mobility survey and our survey results. Finally, section five ends with the conclusion of this research.

2. DEFINITIONS AND LITERATURE REVIEW

In this section, we will explain the basic concept used in this research and provide a brief literature review to set a common ground for analysis.

2.1. Gender and Concept Definitions

"Sex" denotes biological differences, while "gender" encompasses societal constructs like behaviour patterns, roles, and expectations based on biological sex, which can vary across time, place, culture, and politics.

In this study, gender is viewed as a social construct shaping behaviour patterns tied to biological sex, influenced by stereotypes dictating suitable conduct and activities. These stereotypes impact how individuals are perceived and treated.

Contemporary women often associate womanhood with hard work and empowerment, signalling shifts from traditional roles of dependence.

Transport analysis with a gender perspective involves evaluating how transport policy affects various groups, considering intersections like gender, age, and education. This approach ensures inclusive transport projects benefiting everyone in society.

2.2. Literature Review

Sánchez de Madariaga (2009) introduced "care mobility" to emphasize gender-based differences in travel behaviours. She highlighted that mobility studies often overlook short trips and underestimate the significance of care-related trips as a motive for travel. However, when considering care tasks as a motive, they surpass the traditionally prioritized work-related motives in transport planning (Figure 2).

The concept of "care-tasks chains" by Sánchez de Madariaga refers to caregivers' daily movements as they perform various care-related tasks. Typically carried out by women, these trips differ from men's typical commutes to work, involving intricate routes with diverse motives, resulting in polygonal trajectories.

Another crucial concept is "interdependency" (Jirón, 2017; Jirón & Gómez, 2018), which views mobility as a network connecting routines, resources, needs, and roles of individuals bound by emotional and practical ties in daily life. This concept extends beyond households, encompassing social networks and economic resources. It acknowledges that individuals with different social networks and income levels experience mobility differently, highlighting the negotiation of care tasks and daily activities among individuals with varying power levels and relationships, influenced by factors like life stage, economic status, and gender roles. Gender plays a crucial role in identifying who performs care tasks and is affected by limited mobility due to these responsibilities.

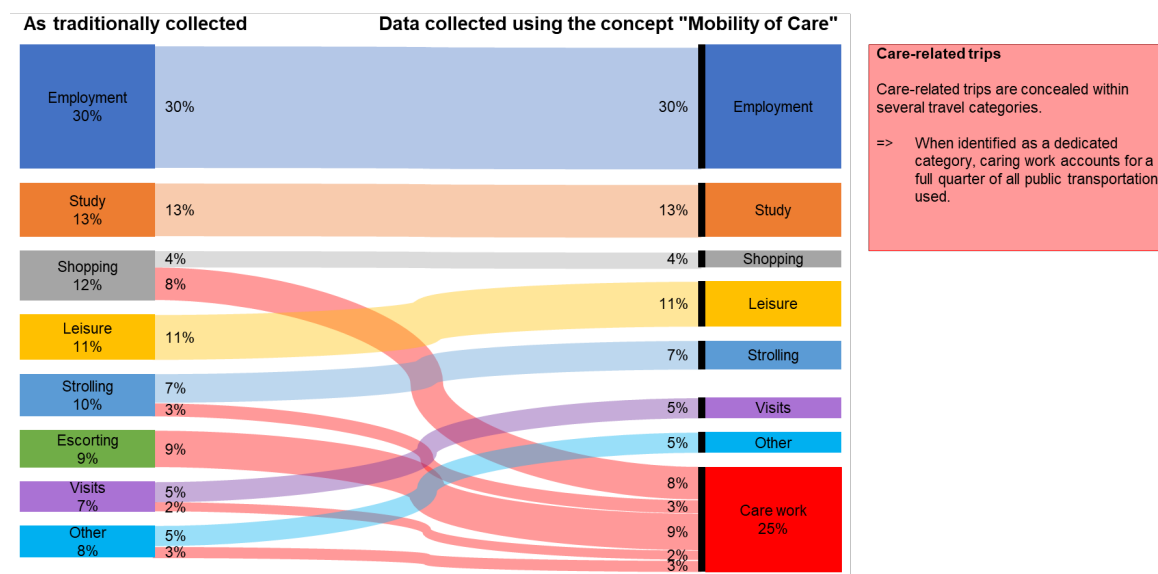


Figure 2: Estimation of care-related trips for journeys made by public transport in Spain 2007.
Source: Own creation based on Sánchez de Madariaga (2013)

A substantial volume of research has been conducted to address women's and men's travel behaviour (Adetunji, 2013; Andrews, 1978; Avilés-Lucero, 2020; Basarić et al., 2016; Chapple, 2001; Diaz Muñoz & Jiménez Gigante, 2007; Ericksen, 1977; Estela, 2012; Fagnani, 1981; Fox, 1983; Gordon et al., 1989; Hanson & Hanson, 1980; Jirón & Gómez, 2018; Law, 1999; Lodhi et al., 2022; Lu & Pas, 1999; Mahadevia & Advani, 2016; Ministerio de Transportes y Telecomunicaciones, 2018; Naess, 2008; Olmo Sánchez & Maeso González, 2016; Pas, 1984; Priya Uteng & Cresswell, 2008; Rogers, 2010; Rosenbloom & Burns, 1993; Rosenbloom & Plessis-Fraissard, 2011; Sánchez de Madariaga & Zucchini, 2020; Sastry, 2019; Simićević et al., 2016; Tilley & Houston, 2016; Tobío, 1995; Uteng, 2012; Zamorano, 2021; Zucchini, 2016) (Blumen & Kellerman, 1990; Boarnet & Hsu, 2015; Cichocki, 1980; Hanson & Johnston, 1985; Hecht, 1974; Jirón & Gómez, 2018; Loukaitou-Sideris, 2020; Madden, 1981; Nasrin & Bunker, 2021; Ng & Acker, 2018; Olmo Sánchez & Maeso González, 2016; PICKUP, 1984; Ravensbergen et al., 2022; Sánchez de Madariaga & Zucchini, 2020; Singeh & Lillydahl, 1986). Women exhibit significant different travel behaviour compared to their male counterparts, both in developed and

developing countries. On the one hand, these studies have found that women's travel patterns vary with a complex combination of variables (Figure 3).

These variables affect female mobility, while only age (closely related to activities) affects male mobility. On the other hand, women have different trip characteristics and patterns (Figure 4) that arise from the different combinations of variables.

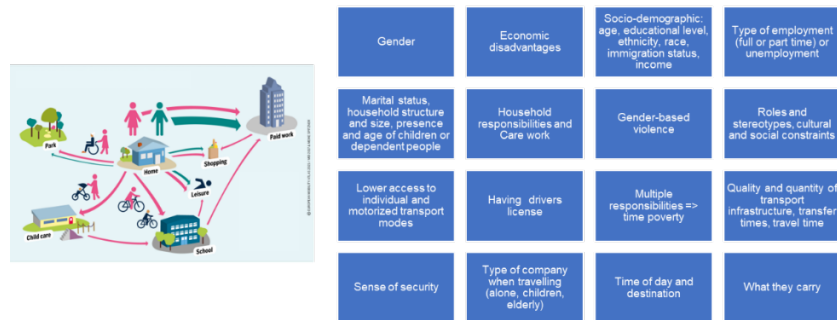


Figure 3: Variables that affect mobility patterns of women

Source: Own creation

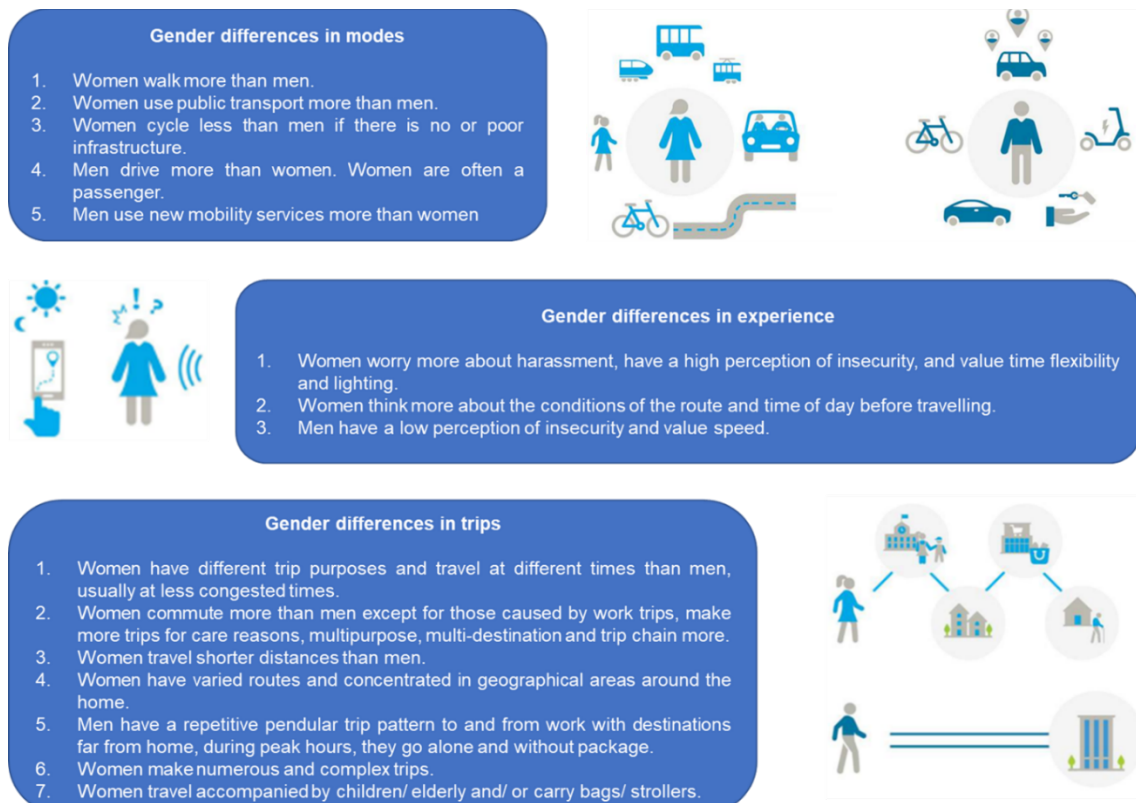


Figure 4: Differences in mobility patterns between men and women

Source: Own creation

Many studies primarily concentrate on developed countries and often generalize women as a single group (Gonzalez et al., 2020; Uteng, 2012). They tend to overlook significant disparities in travel behaviour among women in various social classes in developing countries, such as low-income, lower-middle-income, middle-income, upper-middle-income, and higher-income groups (Uteng, 2012). These differences result from highly unequal income distribution, income-based urban segregation, and varying sociocultural factors, including distinct social norms, gender-related disadvantages, patriarchal systems, religious constraints, economic disparities, informal employment prevalence, and limited opportunities for women (Uteng, 2012).

Our research aims to explore how these intersecting variables influence female mobility, impacting women's independence and opportunities in areas like education and employment. This comprehensive analysis can provide policymakers with valuable insights into policy implementation and its varying effects on women and men based on individual characteristics, such as socioeconomic status and education.

3. METHODOLOGY

To accomplish the above objectives, a series of tasks have been formulated:

- Analysis Santiago 2012 mobility survey with a gender perspective.
- Conduct a survey including variables that, according to the literature, are relevant but are not included in Santiago's mobility survey.
- This new survey aims to include variables like care-task as a travel motive and compare these results with traditional motives from Santiago's mobility survey.

Data manipulation: for Santiago's mobility survey, it was necessary to eliminate rows with missing data. We use a household classification provided by Zamorano (2021) based on Santiago's mobility survey.

Survey: 220 complete questionnaires, taken in June and July during the whole week by intercept in schools, supermarkets, plazas, and health centres.

3.1. Questionnaire Preparation

Based on our literature review, we added many variables to our survey and made changes to trip definition to be able to measure trip chains. This is explained in the following paragraphs.

Firstly, Santiago's mobility survey considers a trip as each movement between an origin and destination, independent if this is only a stop to a further destination (chained trip). To capture chained trips, we changed the definition to movements between origin and home as the final destination (Figure 5), asking for all middle destinations and characteristics of every stage in between.



Figure 5: Survey trip definition

Source: Own creation

Secondly, according to our literature review, we added variables (Table 1) that are not considered in Santiago's mobility survey but are important to understand mobility from a gender point of view. Finally, for our analysis, we considered all trips, regardless of length or duration.

Table 1. Variables added to our survey

Trip characterization	Number of stages for each trip Mode of transport used for each stage of a trip Added motorbike, mobility apps and institutional buses to mode of transport If using public transport, did they have pass one train, bus, etc.
Trip characteristics related to care mobility	Description of destination (i.e., supermarket, school, pharmacy, etc.) for each stage Motive for each stage Necessity: for the home, help others, for their own Accompanied with small children: with strollers or without strollers Accompanied by someone with low mobility: with or without wheelchair or similar With bulky objects Mode of transport well equipped to travel with small children (under 13) or a person with low mobility for each stage.
Safety and emotions	Did they feel safe at each stage of a trip
Immobility	If they could not travel due to care reasons
Socio-economic characterization	Nationality Association to first nation population Education: postgraduate studies
Household characterization	How many people live at home How many elderly and dependent people live at home If they have or life with children Age of each child at home Who is the mayor contributor of income
Care-tasks	If they take care of someone dependent either at their home or outside How household tasks are distributed and if they have paid help

Source: Own creation

4. RESULTS

Significant differences in mobility patterns between genders exist at a statistical level. A gender-based analysis reveals that women and men exhibit distinct travel behaviours, using different modes of transportation and experiencing mobility differently (Figure 4). However, the literature emphasizes the importance of considering an individual's characteristics (Figure 3) and recognizes that mobility is influenced by the combination of various variables, known as intersectionality. These variables play a significant role in shaping women's mobility but have a lesser impact on men's mobility (Sánchez de Madariaga, 2009; Tobío, 1995). Among these variables, age is the primary factor affecting men's mobility, closely linked to their activity (Tobío, 1995). It's also crucial to consider shifts in social structure, such as the increasing prevalence of uniparental households, growing immigrant populations, and an aging demographic, when analysing mobility patterns.

Moreover, when discussing the gender perspective in transportation, it's essential to account for intersections between variables. Unlike men, women do not form a homogenous group, and their mobility is more diverse. The average mobility of women is not representative of the diverse mobility patterns within different groups of women due to the intersectionality of the various variables mentioned in Figure 3, creating distinct subgroups (Sánchez de Madariaga, 2009; Tobío, 1995; Uteng et al., 2020; Zamorano, 2021; Zucchini, 2016).

4.1. Care-task chain and care-task motive

As discussed previously, women's typical day can be described as a series of care-related tasks that lead to chained trips. Sánchez de Madariaga (2009) and Zucchini (2016) highlight that women's task chains differ significantly from those of men. Women's task chains tend to be more extensive, as they often combine work with family responsibilities.

The construction of these task chains is influenced by various factors (Figure 3). Additionally, Sánchez de Madariaga (2009) and Zucchini (2016) note that these task chains evolve throughout a woman's life cycle. For example, the chains become more intricate for middle-aged women who juggle work and caring for young children compared to those who don't have such responsibilities.

4.1.1. Chained trips

From our survey, we've identified that 33.7% of weekly trips are chained, with a similar proportion for both men and women regardless of the day. Table 2 illustrates that the primary reasons for chained trips are work-related, followed by shopping and accompanying someone. However, a notable gender disparity exists: on a typical workday, 42.9% of men chain trips for work purposes, whereas only 16.9% of women do the same. Throughout the week, men predominantly chain trips for work, while women do so to accompany someone. On weekends, both men and women primarily chain trips for shopping.

When considering whether chained trips are made from personal necessity or for caregiving reasons, our survey reveals a significant gender gap. Nearly twice as many women make chained trips for caregiving purposes (28.4%) compared to men (14.8%).

Table 2. Chained trips motive according to own survey

	Labour Day			Saturday			Sunday			Total
	Women	Men	Total	Women	Men	Total	Women	Men	Total	
Work	16,9%	42,9%	23,1%	33,3%		25,0%		50,0%	25,0%	23,2%
Studies										1,6%
Errands	3,4%	3,6%	3,4%							3,2%
Health	1,1%		0,9%							0,8%
Shopping	16,9%	3,6%	13,7%	33,3%		25,0%	50,0%		25,0%	14,4%
Accompany someone	9,0%	7,1%	8,5%		100,0%	25,0%				8,8%
Pick or leave something	1,1%		0,9%							0,8%
Visit someone	3,4%	3,6%	3,4%							3,2%
Recreation	1,1%	7,1%	2,6%							2,4%
Eat/ drink something	3,4%		2,6%							2,4%
Other	2,2%		1,7%							1,6%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Own creation

In Santiago's mobility survey, the analysis of age groups conducting chained trips (Table 3a) reveals that most individuals fall within the 30 to 60 years age range. Notably, a significant number of minors are also involved in care-related chained trips, highlighting that even in the Global South, minors engage in such tasks. A closer look at the age of these minors shows that boys are typically ten or older, while girls are nine or older. When we focus on households with children (Table 3b), the gender gap widens, indicating that when children are present in a household, women tend to take on caregiving responsibilities, leading to more care-related chained trips.

When we examine our survey results (Table 4), we observe that regardless of the household type, the age group of 30 to 45 years tends to engage in chained trips. However, as with Santiago's mobility survey, in households with children (Table 4b), the gender difference for this age group becomes more pronounced, while there is no significant gender difference when considering all types of households (Table 4a).

Table 3. Age group of women and men that make chain-trips for all households and households with children, according to Santiago's mobility survey

a) All households	Men	Women	Total	b) Households with children	Men	Women	Total
Minor	11,88%	9,59%	10,63%	Minor	8,16%	5,84%	6,76%
18 to 29 years	15,57%	16,88%	16,28%	18 to 29 years	21,01%	23,28%	22,38%
30 to 45 years	29,49%	31,71%	30,69%	30 to 45 years	19,03%	27,26%	24,00%
46 to 60 years	26,87%	25,13%	25,93%	46 to 60 years	33,77%	31,66%	32,50%
61 to 65 years	7,13%	5,51%	6,25%	61 to 65 years	11,39%	7,38%	8,97%
Older than 66 years	9,07%	11,18%	10,22%	Older than 66 years	6,64%	4,58%	5,39%
Total	100 %	100%	100%	Total	100%	100%	100%

Source: Own creation

Table 4. Age group of women and men that make chain-trips for all households and households with children, according to own survey

a) All households	Women	Men	Total	b) Households with children	Women	Men	Total
18 to 29 years	11,3%	29,4%	15,7%	18 to 29 years	12,0%	12,5%	12,1%
30 to 45 years	55,7%	55,9%	55,7%	30 to 45 years	68,0%	81,3%	71,2%
46 to 60 years	13,2%	8,8%	12,1%	46 to 60 years	8,0%	6,3%	7,6%
61 to 65 years	8,5%	5,9%	7,9%	61 to 65 years	12,0%		9,1%
Older than 66 years	11,3%		8,6%	Older than 66 years			
Total	100%	100%	100%	Total	100%	100%	100%

Source: Own creation

According to Santiago's mobility survey, most individuals conducting chained trips are workers, with 71% of men and 46% of women using chained trips for work-related purposes. In the categories of students and retired individuals, there isn't a significant gender difference. However, when it comes to stay-at-home spouses, there is a notable gender gap, with 35% of women being housewives compared to only 7% of men being househusbands. Similar findings are reflected in our survey, where most chained trips are undertaken by workers, with a significant difference between men (88.2%) and women (49.1%).

In terms of transportation modes (Table 5a), chained trips are primarily made using public transport, followed by cars. Men use both public transport and cars in roughly equal proportions, while women predominantly rely on public transport. It's worth noting that car usage increases for both men and women when conducting chained trips, likely due to the convenience that cars offer for care-related trips and chained travel.

Table 5. Mode of transport for chained trips and non-chained trips according to own survey

a) Chained trips	Women	Men	Total	b) Non chained trips	Women	Men	Total
Car	28,1%	38,7%	30,7%	Car	28,3%	33,9%	29,6%
Public Transport	32,3%	38,7%	33,9%	Public Transport	37,9%	30,5%	36,2%
Taxi/ App/ Taxi colectivo	6,3%	3,2%	5,5%	Public Transport/ Taxi/ App/ Taxi colectivo	1,5%		1,2%
Walking	26,0%	16,1%	23,6%	Taxi/ App/ Taxi colectivo	5,6%	3,4%	5,1%
Biking	2,1%	3,2%	2,4%	Walking	21,7%	23,7%	22,2%
Other	5,2%		3,9%	Biking	2,0%	8,5%	3,5%
Total	100%	100%	100%	Other	3,0%	0,0%	2,3%
				Total	100%	100%	100%

Source: Own creation

According to our survey, both women and men, on average, have chained trips with approximately 3.47 stages. Specifically, women make trips with an average of 3.63 stages, while men have 3.08 stages. However, 6.2% of women make trips with five or more stages, while no men have trips with five or more stages. When considering households with children (Table 6), there's generally no difference in the number of stages for women, whether they live in households with or without children. However, men living in households with children tend to have chained trips with more stages, averaging 3.25 stages, compared to men in households without children, who have an average of three stages. This increase in stages is noticeable when children are present in the household.

Regarding nationality, non-Chilean women tend to have trips with more stages (an average of 4.0) compared to Chilean women (average of 3.57). However, there is no statistical difference between non-Chilean and Chilean men in terms of the number of stages in their trips. Lastly, marital status also plays a role in the number of stages in chained trips. Single mothers tend to have trips with the most stages (average of 4.0), followed by married or partnered women (average of 3.56).

Table 6. Number of chained trips depending on if the household has children or not

Household with children	Women			Men			Total
	No	Yes	Total	No	Yes	Total	
3	52,6%	38,5%	46,9%	100,0%	75,0%	92,3%	60,0%
4	36,8%	61,5%	46,9%		25,0%	7,7%	35,6%
5	5,3%		3,1%				2,2%
6	5,3%		3,1%				2,2%
Total	100%	100%	100%	100%	100%	100%	100%

Source: Own creation

4.1.2. Care-task motive

In our survey, we found that about 31.2% of trips are for care-related reasons, with a gender difference - women make 32.8% of their trips for care, while men make 26.2% for care. Figure 6 reveals that care-related purposes constitute 31.2% of all trips, and many shopping trips fall under this category.

Table 7 shows that most care-related trips are for shopping, but there's a notable gender gap. About half of women's care-related trips are for shopping, while only 37.5% of men's care-related trips serve this purpose. Men primarily make care-related trips to pick up or drop off someone.

Regarding the number of stages in care-related versus non-care-related trips, there's a significant difference. Care-related trips average 2.7 stages, while non-care-related trips have 2.4 stages.

Women make care-related trips with an average of 2.7 stages, while men make them with an average of 2.5 stages. Women also have care-related trips with up to six stages, indicating their complexity.

Table 7. Motive for care-trips

Motive	Women	Men	Total
Pick up/ leave someone	23,73%	50,0%	29,3%
Pick up/ leave something	1,7%		1,3%
Eat/ drink something	5,1%		4,0%
Shopping	50,9%	37,5%	48,0%
Recreation		6,3%	1,3%
Errands	10,2%		8,0%
Visit someone	8,5%	6,3%	8,0%

Source: Own creation



Figure 6: Estimation of care-related trips

Source: Own creation

Comparing households with and without children, we see a significant difference in trips for care-related reasons. In households without children, 25.4% of trips are for care purposes, with a noticeable gender gap - women make twice as many care-related trips as men. However, in households with children, this gender difference is less pronounced, suggesting a more equitable distribution of care-related trips between women and men, possibly due to shared parenting responsibilities.

Most care-related trips are taken by working individuals, but men outnumber women in this category. Additionally, individuals aged 30 to 45 years make most care-related trips, with no care-related trips reported by men over 66 years old.

Table 8. Age group for care-trips

Age group	Women	Men	Total
18 to 29 years	2,9%	16,7%	5,7%
30 to 45 years	47,8%	66,7%	51,7%
46 to 60 years	23,2%	11,1%	20,7%
61 to 65 years	13,0%	5,6%	11,5%
Older than 66 years	13,0%	0,0%	10,3%
Total	100%	100%	100%

Source: Own creation

Considering the mode of transport used for care-related trips and those that are not, Table 9 shows that most trips are made by public transport. Still, this changes when only looking at care-related trips since most are made by car or walking, with a significant difference between genders. While women use the car or walk in the same proportion, men use the car for half of care-related trips.

Table 9. Mode of transport for care-trips and non-care trips

	Care trips			Non-care trips			Total
	Women	Men	Total	Women	Men	Total	
Car	34,8%	50,0%	37,9%	24,9%	29,7%	26,0%	28,8%
Public Transport	20,3%	11,1%	18,4%	41,6%	37,5%	40,7%	35,5%
Public Transport/ Taxi/ App/ Taxi colectivo				1,4%		1,1%	0,8%
Taxi/ App/ Taxi colectivo	4,3%		3,4%	5,9%	4,7%	5,6%	5,1%
Walking	34,8%	38,9%	35,6%	19,9%	20,3%	20,0%	23,7%
Biking	1,4%		1,1%	2,3%	7,8%	3,5%	3,0%
Other	4,3%		3,4%	4,1%		3,2%	3,2%
Total	100%	100%	100%	100%	100%	100%	100%

Source: Own creation

Table 10 shows how care related trips are made in relation of travelling with children, people that need help moving and/ or bulky objects. There is a difference between genders, women declare to travel with children, people that needed help moving and/ or bulky objects much more than men.

Table 10. Care trips with children, people that needed help or bulky objects

With children	Women	Men	Total
No	68,10%	82,40%	70,90%
Yes	29,00%	17,60%	26,70%
With stroller	2,90%		2,30%
Total	100%	100%	100%

With someone that needed help	Women	Men	Total
No	89,90%	100%	91,90%
Yes	10,10%		8,10%
Total	100%	100%	100%

Bulky objects	Women	Men	Total
No	73,90%	88,20%	76,70%
Yes	26,10%	11,80%	23,30%
Total	100%	100%	100%

Source: Own creation

4.2. (In)mobility

Just as important in how various categories of women travel, it is important to analyse why women do not travel. In this case, the Santiago mobility survey shows that 21,7% of adult women do not travel during the week, compared with 16,5% of men.

Table 11 shows several reasons for not travelling. Most adults that do not travel do it for rest, which is about half of the men; however, the number of women staying at home for housework is nine times greater than that for men.

Table 11. Reasons for not travelling during a workday

	Men	Women	Total
Because of work	13,58%	6,00%	9,16%
Because of studies	1,63%	1,32%	1,45%
Because of housework	2,76%	25,15%	15,82%
For rest	49,97%	33,58%	40,42%
Sickness	17,04%	18,19%	17,71%
Other	15,02%	15,75%	15,44%
Total	100%	100%	100%

Source: Own creation

4.3. Ethnicity and immigration status

"In our survey analysis, we observed significant differences in transportation patterns related to ethnicity. Non-Chilean women tend to make more complex trips with more chains compared to Chilean women. For instance, 33.3% of non-Chilean women make trips with three or more chains, while only 21.8% of Chilean women do the same. This trend extends to the number of daily trips, with 66.7% of non-Chilean women making two or more daily trips, compared to 52.9% of Chilean women. Among non-Chilean men, 100% of them make three or more trips a day, while only 23.3% of Chilean men do so. In terms of security perceptions, non-Chilean individuals, both women and men, tend to feel more insecure than their Chilean counterparts. Specifically, 42.8% of non-Chilean individuals feel somewhat insecure or insecure, while only 14.5% of Chilean individuals share the same sentiment. Similar proportions are observed when analysing this by gender.

Moreover, individuals identifying as part of a first nation exhibit distinct travel behaviour patterns. First nation women tend to make more daily trips than non-first nation women, with 80% of them making two or more daily trips compared to 52.3% of non-first nation women. A similar pattern is observed among men, with 60% of first nation men making more than two daily trips, while 53.9% of non-first nation men make two or more daily trips. It's important to note that Santiago's mobility survey lacks information regarding nationality, limiting direct comparisons."

5. CONCLUSIONS

The early work of Sánchez de Madariaga (2009) laid the foundation for understanding "care mobility" and how it differs between men and women. She highlighted a gap in mobility studies, which often overlook short trips related to care tasks. These care tasks deserve special attention as

a distinct mobility motive. Our research follows this recommendation, helping us better understand the characteristics of chained trips conducted by different genders.

Gender perspectives in transport are vital because transportation structures and systems perpetuate systemic differences and reinforce women's exclusion and subordination (Cresswell & Uteng, 2008). Modern society values accessibility over mobility due to environmental and social concerns (Sheller, 2008).

Transport planning cannot remain "technically neutral" (Ministerio de Transportes y Telecomunicaciones, 2018; Sánchez de Madariaga, 2009). It has traditionally focused on infrastructure for work trips, causing harm to women by not addressing their unique mobility needs (Jirón & Gómez, 2018; Sánchez de Madariaga, 2009). These disparities hinder women's participation and maintain gender inequality (Tobío, 1995).

Our findings reveal stark gender inequalities in the impact of public transport on (in)mobility, independence, and opportunities. The underrepresentation of women's needs in transport planning results from a social construct that assigns care responsibilities to women, while infrastructure and planning cater to male-centric mobility patterns.

To address these issues, gender-sensitive policies are essential. Transport planning should consider women's diverse mobility patterns, reflecting their social positions influenced by factors like the labour market, unpaid household work, and resource access. Mobility surveys and data collection methods should be updated to capture the significance of care-related trips and break gender bias in transportation planning.

For true sustainable transport policies, the interplay between land-use patterns, trip-chaining, and time-budgeting, especially regarding care and interdependence, needs to be addressed (Greed, 2019; Jirón, 2017). Tackling the "unfair distribution of accessibility" and recognizing the Right to the City for all urban inhabitants, irrespective of gender, are essential goals (Levy, 2019).

Transport policies must account for differential mobilities between men and women, gendered design processes, and gender biases within mobility discourses. Understanding women's travel patterns is critical for achieving gender equity in urban transportation.

Analysing transport through a gender lens involves revealing hidden concepts, highlighting data collection limitations and biases, and answering questions about care tasks, how they are performed, and their implications (Jirón & Gómez, 2018). Collecting gender-disaggregated mobility data is a crucial first step to address women's specific mobility needs. Additionally, considering nationality and indigenous identities in data collection can provide insights into how these factors impact mobility patterns and public transport use, particularly important given the increasing influence of immigrants on public policies.

ACKNOWLEDGEMENTS

We thank William Porath and Victoria León Porath for their insight into social matters, without whom this research would not have the multidisciplinary point of view it has. We would also like

to show our gratitude to Cesar Hormazábal and Paul Basnak for providing the mathematical background needed for our data analysis and helping in the fieldwork of the surveys. Finally, we would like to thank the support of the BRT + Centre of Excellence funded by the Volvo Research and Educational Foundations.

REFERENCES

Adetunji, musilimu A. (2013). Gender Travel Behaviour and Women Mobility Constraints in Ilesa, Nigeria. *International Journal for Traffic and Transport Engineering*, 3, 220–229. [https://doi.org/10.7708/ijtte.2013.3\(2\).09](https://doi.org/10.7708/ijtte.2013.3(2).09)

Allen, H. (2018). Approaches for gender responsive urban mobility. In *Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities Module 7*. GIZ/ SUTP. https://docs.euromedwomen.foundation/files/ermwf-documents/8186_4.240.approachesforgenderresponsiveurbantransport.pdf

Alvarez, O. (2006). El enfoque de género y la violencia contra las mujeres: aproximación al análisis de los conceptos. *Revista Venezolana de Estudios de La Mujer*, 11(26), 45–54. http://ve.scielo.org/scielo.php?script=sci_abstract&pid=S1316-37012006000100003&lng=en&nrm=iso&tlng=es

Andrews, H. F. (1978). Journey to work considerations in the labour force participation of married women. *Regional Studies*, 12(1), 11–20. <https://doi.org/10.1080/09595237800185021>

Avilés-Lucero, F. (2020). Estimación del Trabajo Doméstico no Remunerado. Banco Central Chile. <https://www.bcentral.cl/documents/33528/3015423/estimacion-trabajo-domestico-no-remunerado.pdf/977aa3c3-7a61-20fe-be66-85c68c7707b0>

Basarić, V., Vujičić, A., Simić, J. M., Bogdanović, V., & Saulić, N. (2016). Gender and Age Differences in the Travel Behavior – A Novi Sad Case Study. *Transportation Research Procedia*, 14, 4324–4333. <https://doi.org/https://doi.org/10.1016/j.trpro.2016.05.354>

Blumen, O., & Kellerman, A. (1990). GENDER DIFFERENCES IN COMMUTING DISTANCE, RESIDENCE, AND EMPLOYMENT LOCATION: METROPOLITAN HAIFA 1972 AND 1983. *The Professional Geographer*, 42(1), 54–71. <https://doi.org/10.1111/j.0033-0124.1990.00054.x>

Boarnet, M. G., & Hsu, H. P. (2015). The gender gap in non-work travel: The relative roles of income earning potential and land use. *Journal of Urban Economics*, 86, 111–127. <https://doi.org/10.1016/J.JUE.2015.01.005>

Brújula. (2017). Estudio Cualitativo Percepción de Usuarías del Transporte Público.

Ceccato, V., & Loukaitou-Sideris, A. (2020). Transit Crime and Sexual Violence in Cities. In *Transit Crime and Sexual Violence in Cities*. <https://doi.org/10.4324/9780429290244>

Chapple, K. (2001). Time to Work: Job Search Strategies and Commute Time for Women on Welfare in San Francisco. *Journal of Urban Affairs*, 23(2), 155–173. <https://doi.org/10.1111/0735-2166.00081>

Cichocki, M. K. (1980). Women's Travel Patterns in a Suburban Development. In *New Space for Women*.

Comas-d'Argemir, D. (2017). Cuidados, género y ciudad en la gestión de la vida cotidiana. In P. Ramirez Kuri (Ed.), *La erosión del espacio público en la ciudad neoliberal*. unam, Instituto de Investigaciones Sociales : Facultad de Arquitectura.

Cresswell, T., & Uteng, T. P. (2008). Gendered Mobilities: Towards an Holistic Understanding. In T. Priya Uteng & T. Cresswell (Eds.), *Gendered Mobilities*. Ashgate Publishing Limited. <https://www.routledge.com/Gendered-Mobilities/Cresswell-Uteng/p/book/9781138252820>

Criado Pérez, C. (2019). *Invisible women: Data Bias in a World designed for Men*. Abrams Press. https://www.abramsbooks.com/product/invisible-women_9781419735219/

Diaz Muñoz, M. A., & Jiménez Gigante, F. J. (2007). Transportes y movilidad: ¿necesidades diferenciales según género? *Terr@ Plural*, 1(1), 91–101. <https://revistas.uepg.br/index.php/tp/article/view/1144>

Ericksen, J. A. (1977). An Analysis of the Journey to Work for Women. *Social Problems*, 24(4), 428–435. <https://doi.org/10.2307/800136>

Estela, S. (2012). Entre el aislamiento y la libertad. Prácticas de movilidad cotidiana y diferencias de género en el sudeste bonaerense (Argentina). *Brazilian Geographical Journal: Geosciences and Humanities Research Medium*, 3(2), 267–298. <https://seer.ufu.br/index.php/braziliangeojournal/article/view/19625>

Fagnani, J. (1981). Women's Commuting Patterns in the Paris Region. *Tijdschrift Voor Economische En Sociale Geografie*, 74, 12–24. <https://doi.org/10.1111/j.1467-9663.1983.tb01492.x>.

Fox, M. B. (1983). Working Women and Travel The Access of Women to Work and Community Facilities. *Journal of the American Planning Association*, 49(2), 156–170. <https://doi.org/10.1080/01944368308977059>

Gonzalez, K., Machado, A. L., Alves, B. B., Raffo, V., Guerrero, S., & Portabales, I. (2020). Why does she move? A Study of Women's Mobility in Latin American Cities. World Bank. <https://documents1.worldbank.org/curated/en/276931583534671806/pdf/Why-Does-She-Move-A-Study-of-Womens-Mobility-in-Latin-American-Cities.pdf>

Gordon, P., Kumar, A., & Richardson, H. W. (1989). Gender Differences in Metropolitan Travel Behaviour. *Regional Studies*, 23(6), 499–510. <https://doi.org/10.1080/00343408912331345672>

Greed, C. (2008). Are We There Yet? Women and Transport Revisited. In T. Priya Uteng & T. Cresswell (Eds.), *Gendered Mobilities* (pp. 257–268). Ashgate Publishing Limited. <https://www.routledge.com/Gendered-Mobilities/Cresswell-Uteng/p/book/9781138252820>

Greed, C. (2019). Are We Still Not There Yet? Moving Further Along the Gender Highway. In T. Joelsson & L. Scholtenm (Eds.), *Integrating Gender into Transport Planning*. Palgrave Macmillan. <https://doi.org/10.1007/978-3-030-05042-9>

Hanson, S. (2010). Gender and mobility: new approaches for informing sustainability. *Gender, Place & Culture*, 17(1), 5–23. <https://doi.org/10.1080/09663690903498225>

Hanson, S., & Hanson, P. (1980). Gender and Urban Activity Patterns in Uppsala, Sweden. *Geographical Review*, 70(3), 291–299. <https://doi.org/https://doi.org/10.2307/214257>

Hanson, S., & Johnston, I. (1985). Gender differences in work-trip length: Explanations and implications. *Urban Geography*, 6(3), 193–219. <https://doi.org/10.2747/0272-3638.6.3.193>

Hanson, S., & Pratt, G. (1995). *Gender, Work and Space*. Routledge. <https://doi.org/https://doi.org/10.4324/9780203397411>

Hecht, A. (1974). THE JOURNEY-TO-WORK DISTANCE IN RELATION TO THE SOCIO-ECONOMIC CHARACTERISTICS OF WORKERS. *Canadian Geographer*, 18(4), 367–377.

Hercé, M. (2009). Sobre la movilidad en en la ciudad. In *Sobre la movilidad en la ciudad : propuestas para recuperar un derecho ciudadano*. Editorial Reverté.

Hjorthol, R. (1998). Travel activities in everyday life: an analysis of women's and men's daily travel activities in Oslo. [https://www.toi.no/getfile.php/135988-1178259222/Publikasjoner/TØI rapporter/1998/391-1998/sum-391-98.pdf](https://www.toi.no/getfile.php/135988-1178259222/Publikasjoner/TØI%20rapporter/1998/391-1998/sum-391-98.pdf)

Hjorthol, R. (2008). Daily Mobility of Men and Women – A Barometer of Gender Equality? In T. Priya Uteng & T. Cresswell (Eds.), *Gendered Mobilities* (pp. 207–224). Ashgate Publishing Limited. <https://www.routledge.com/Gendered-Mobilities/Cresswell-Uteng/p/book/9781138252820>

Jirón, P. (2017). Planificación urbana y del transporte a partir de relaciones de interdependencia y movilidad del cuidado. In M. Nives Rico & O. Segovia (Eds.), *¿Quién cuida en la ciudad? Aportes para políticas urbanas de igualdad* (pp. 405–432). Cepal. <https://www.un-ilibrary.org/content/books/9789210586085s009-c001>

Jirón, P., & Gómez, J. (2018). Interdependencia, cuidado y género: estrategias de movilidad en la ciudad de Santiago. *Tempo Social*, 30(2), 55–72. <https://doi.org/10.11606/0103-2070.ts.2018.14224>

Lallement, D. (2013). 9 . Infrastructure and gender equity. In *Handbook of Research on Gender and Economic Life* (pp. 132–149). Edward elgar Publishing Limited. <https://www.elgaronline.com/view/edcoll/9780857930941/9780857930941.xml>

Law, R. (1999). Beyond 'women and transport': towards new geographies of gender and daily mobility. *Progress in Human Geography*, 23(4), 567–588. <https://doi.org/10.1191/030913299666161864>

Levy, C. (2019). Travel Choice Reframed: “Deep Distribution” and Gender in Urban Transport. In *Integrating Gender into Transport Planning: From one to many tracks*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-05042-9>

Lodhi, R. H., Rana, I. A., & Waheed, A. (2022). Gendered mode choice preferences and characteristics for educational trips in Abbottabad, Pakistan: An empirical investigation. *Case Studies on Transport Policy*, 10(4), 2102–2110. <https://doi.org/10.1016/j.cstp.2022.09.010>

Loukaitou-Sideris, A. (2020). A Gendered View of Mobility and Transport Next Steps and Future Directions. In *Engendering Cities*.

Lu, X., & Pas, E. I. (1999). Socio-demographics, activity participation and travel behavior. *Transportation Research Part A: Policy and Practice*, 33(1), 1–18. [https://doi.org/https://doi.org/10.1016/S0965-8564\(98\)00020-2](https://doi.org/https://doi.org/10.1016/S0965-8564(98)00020-2)

Madden, J. F. (1981). Why Women Work Closer to Home. *Urban Studies*. <https://doi.org/https://doi.org/10.1080/00420988120080341>

Maeso González, E., & Olmo Sánchez, M. I. (2013). Diferencias de Género en la Movilidad en Regiones Urbanas de Andalucía. *Revista Latino-Americana de Geografía e Género*, 4(2), 13–28. <https://doi.org/10.5212/Rlagg.v.4.i2.013028>

Mahadevia, D., & Advani, D. (2016). Gender differentials in travel pattern - The case of a mid-sized city, Rajkot, India. *Transportation Research Part D: Transport and Environment*, 44, 292–302. <https://doi.org/10.1016/j.trd.2016.01.002>

Ministerio de Transportes y Telecomunicaciones. (2018). Política de Equidad de Género en Transporte: Hacia un sistema de transporte para todos y todas.

Miralles-Guasch, C., & Cebollada, A. (2009). Movilidad cotidiana y sostenibilidad: una interpretación desde la geografía humana. *Boletín de La Asociación de Geógrafos Españoles*, 50, 193–216. https://www.researchgate.net/publication/40700310_Movilidad_cotidiana_y_sostenibilidad_una_interpretacion_desde_la_geografia_humana

Montoya-Robledo, V., Montes Calero, L., Bernal Carvajal, V., Galarza Molina, D. C., Pipicano, W., Peña, A. J., Pipicano, C., López Valderrama, J. S., Fernández, M. A., Porras, I., Arias, N., & Miranda, L. (2020). Gender stereotypes affecting active mobility of care in Bogotá. *Transportation Research Part D*, 86, 102470. <https://doi.org/10.1016/j.trd.2020.102470>

Naess, P. (2008). Gender Differences in the Influences of Urban Structure on Daily Travel. In T. Priya Uteng & T. Cresswell (Eds.), *Gendered Mobilities* (pp. 187–206). Ashgate Publishing

Limited. <https://www.routledge.com/Gendered-Mobilities/Cresswell-Uteng/p/book/9781138252820>

Nasrin, S., & Bunker, J. (2021). Analyzing significant variables for choosing different modes by female travelers. *Transport Policy*, 114(August 2020), 312–329. <https://doi.org/10.1016/j.tranpol.2021.10.017>

Ng, W.-S., & Acker, A. (2018). Understanding urban travel behaviour by gender for efficient and equitable transport policies. *International Transport Forum*, 2018–01, 1–19. <https://www.econstor.eu/handle/10419/194064>

Olmo Sánchez, M. I., & Maeso González, E. (2014). Travel Patterns, Regarding Different Activities: Work, Studies, Household Responsibilities and Leisure. *Transportation Research Procedia*, 3, 119–128. <https://doi.org/https://doi.org/10.1016/j.trpro.2014.10.097>

Olmo Sánchez, M. I., & Maeso González, E. (2016). Gender Differences in Commuting Behavior: Women's Greater Sensitivity. *Transportation Research Procedia*, 18(June), 66–72. <https://doi.org/10.1016/j.trpro.2016.12.009>

Pas, E. I. (1984). The Effect of Selected Sociodemographic Characteristics on Daily Travel-Activity Behavior. *Environment and Planning A: Economy and Space*, 16(5), 571–581. <https://doi.org/10.1068/a160571>

PICKUP, L. (1984). Women's Gender-Role and its Influence on Travel Behaviour. *Built Environment* (1978-), 10(1), 61–68. <http://www.jstor.org/stable/23286009>

Priya Uteng, T., & Cresswell, T. (2008). *Gendered Mobilities*. In *Gendered Mobilities*. Ashgate Publishing Limited. <https://www.routledge.com/Gendered-Mobilities/Cresswell-Uteng/p/book/9781138252820>

Ravensbergen, L., Fournier, J., & El-Geneidy, A. (2022). Exploratory Analysis of Mobility of Care in Montreal, Canada. *Transportation Research Record: Journal of the Transportation Research Board*, 036119812211050. <https://doi.org/10.1177/03611981221105070>

Rogers, W. H. (2010). The housing price impact of covenant restrictions and other subdivision characteristics. *Journal of Real Estate Finance and Economics*, 40(2), 203–220. <https://doi.org/10.1007/s11146-008-9134-2>

Rosenbloom, S., & Burns, E. (1993). Gender Differences in Commuter Travel in Tucson: Implications for Travel Demand management Programs. UC Berkeley: University of California Transportation Center. <https://escholarship.org/uc/item/036776w2>

Rosenbloom, S., & Plessis-Fraissard, M. (2011). Women's travel in developed and developing countries. In *Women's Issues in Transportation: Summary of the 4th International Conference, Volume 1: Conference Overview and Plenary Papers (Vol. 1)*. The National Academies. <https://doi.org/10.17226/22901>

Sabaté Martínez, A., Rodríguez, J. M., & Díaz Muñoz, M. Á. (1995). *Mujeres, espacio y sociedad: hacia una geografía del género* (Vol. 30). Síntesis S.A.

Sagaris, L., & Tiznado-Aitken, I. (2020). Sustainable transport and gender equity: Insights from Santiago, Chile. *Transport and Sustainability*, 12, 103–134. <https://doi.org/10.1108/S2044-994120200000012009>

Sánchez de Madariaga, I. (2009). Vivienda, movilidad y urbanismo para la igualdad en la diversidad: ciudades, género y dependencia. *Ciudad y Territorio Estudios Territoriales (CyTET)*, 41(1), 581–598. <https://recyt.fecyt.es/index.php/CyTET/article/view/75953>

Sánchez de Madariaga, I., & Zucchini, E. (2020). “Movilidad del cuidado” en Madrid: nuevos criterios para las políticas de transporte. *Ciudad Y Territorio Estudios Territoriales*, 52(203), 89–102. <https://doi.org/https://doi.org/10.37230/CyTET.2020.203.08>

Sastry, P. (2019). Poverty and transport accessibility in Bangalore: the need for a gendered perspective.

Sheller, M. (2008). Gendered Mobilities: Epilogue. In T. Priya Uteng & T. Cresswekk (Eds.), *Gendered Mobilities* (pp. 257–265). Ashgate Publishing Limited. <https://www.routledge.com/Gendered-Mobilities/Cresswell-Uteng/p/book/9781138252820>

Simićević, J., Milosavljević, N., & Djoric, V. (2016). Gender differences in travel behaviour and willingness to adopt sustainable behaviour. *Transportation Planning and Technology*, 39(5), 527–537. <https://doi.org/10.1080/03081060.2016.1174367>

Singeh, L. D., & Lillydahl, J. H. (1986). An Empirical Analysis of the Commute to Work Patterns of Males and Females in Two-Earner Households. 119–129.

Tilley, S., & Houston, D. (2016). The gender turnaround: Young women now travelling more than young men. *Journal of Transport Geography*, 54, 349–358. <https://doi.org/https://doi.org/10.1016/j.jtrangeo.2016.06.022>

Tobío, C. (1995). Estructura urbana, movilidad y género en la ciudad moderna. *Conferencia En La Escuela de Verano Jaime Vera, Galapagar*, 0(13), 1–9. <http://polired.upm.es/index.php/boletincfs/article/view/2622>

United Nations. (1992). Rio Declaration. Report of the United Nations Conference on Environment and Development. <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N92/836/55/PDF/N9283655.pdf?OpenElement>

United Nations. (2015). The 17 Goals. <https://sdgs.un.org/goals>

Uteng, T. P. (2012). Gender and Mobility in the Developing World. In *World Development Report 2012 - Gender equality and development -Background Paper*. World Bank. <http://hdl.handle.net/10986/9111>

Uteng, T. P., Christensen, H. R., & Levin, L. (2020). *Gendering Smart Mobilities* (1st ed.). Routledge. <https://doi.org/https://doi.org/10.4324/9780429466601>

Zamorano, D. (2021). Construcción y definición de tipologías de hogar y patrones de movilidad para entender y cuantificar la movilidad del cuidado desde una perspectiva de género. Pontificia Universidad Católica de Chile.

Zucchini, E. (2016). Género y transporte: análisis de la movilidad del cuidado como punto de partida para construir una base de conocimiento más amplia de los patrones de movilidad. El caso de Madrid. Universidad Politécnica de Madrid.