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RESEARCH ARTICLE

Understanding Gender, Income and Travel Behavior in Casablanca City – Morocco

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Abstract:

Objective:

The purpose of this paper is to extend the research on gendered differences in travel behavior in developing countries by analyzing travel behavior variability within as well as across gender and income groups in the case of Casablanca city.

Methods:

Data from the 2018 Casablanca Travel Survey show that overall, women are less mobile than men, make fewer work-related trips and more household maintenance trips, but these differences are heterogeneously distributed across income groups. With the increase in income, women tend to carry out more trips than men; the inverse is observed for the middle- and low-income categories.

Results:

While for the lowest income groups, walking is the most predominant mode for both men and women, we notice that the private car has the highest modal share within the highest income groups as with the increase in household income, both genders avoid non-motorized transport modes. The particular status of women in some households as breadwinners and reproducers as well as the socio-cultural context of the city shape their mobility and the choice of their activities.

Conclusion:

Hence, these findings suggest, from a policy perspective, that the public transit system along with spatial planning strategies need to be improved to help overcome women's mobility constraints, especially when they belong to low-income households so they can fully access the city amenities and opportunities. On the other hand, transport policies need to be not only gender-sensitive but also “vulnerable groups” sensitive as mobility impediments are similarly experienced by males and females in some contexts.

Keywords: Travel behavior, Public transit system, Gender, Income, Motorized transport, Mobility.

Article History

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1. INTRODUCTION

Human capital is recognized as one of the pivotal driving forces of sustainable development [1, 2]. Countries, particularly developing ones, need to fully benefit from all their men and women having the potential to progress towards their development goals, and thus, they need to create an environment favourable not only for creating socio-economic opportunities but also seizing them. Hence, taking into account the factors of mobility and accessibility is necessary to design policies and programs that address development challenges equitably with regard to different socio-economic groups.

Indicators are usually set to measure progress towards achieving these goals at the national or local level. Some commonly used indicators include human development indices. In parallel, mobility is the ability to access essential services like labour market, education and health care [3]. For individuals and groups experiencing mobility constraints, poor physical access to socio-economic opportunities is argued as the source of social exclusion and poverty [4 - 6]. Consequently, considering accessibility-related issues is extremely important in designing better strategies for addressing a wide panel of human development problems.

In developing countries, existing literature suggests that women, especially low-income ones, are one of the groups experiencing mobility impediments affecting negatively their

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access to resources, employment, and education. Hence, due to this lack of accessibility, they experience narrowing set of capabilities and their possibilities of uplifting their living standards become limited, as suggested by Anand and Tiwari for the Indian context [7]. Previous research has pointed that women tend to be less mobile and more reliant on non-motorized transport or public transport in some contexts; they make less work-related trips but more household maintenance-related trips compared to men [8]. These gendered mobility dissimilarities can be explained by differences in personality traits, attitudes and preferences that are inherent to each gender, or by the socially constructed gender roles as women are usually held responsible for the private sphere and household in terms of caring and nurturing roles. As they are assigned to multiple roles as producers (workers), reproducers (undertaking household maintenance tasks), and community organizers, women face more mobility constraints and are pressurized with respect to their time [9].

Consequently, gender and mobility are intertwined as gender roles shape mobility and mobility shapes gender roles [10].

We present here the existing research works in the literature that have examined the travel behaviour patterns from a gender perspective in developed and developing countries.

The interest of the current paper lies in examining mobility patterns with regard to gender in Casablanca City by quantifying daily mobility levels of the city men and women and studying the impact of income across gender. This analysis will provide useful insights into the gender-based mobility inequality in Casablanca that can drive transport policies towards more gender-inclusive response. This paper is also the first, to the best of our knowledge, to analyse the 2018 Casablanca Metropolitan Travel Survey dataset. We have made an attempt to answer the following research questions:

1. Do men and women show similarities in mobility patterns in terms of trips characteristics?
2. How do travel patterns vary across gender and income groups?

2. PRIOR RESEARCH

2.1. Gender-Based (Dis) Similarities in Mobility Patterns

Previous research work has demonstrated that the output of one study with respect to gendered variations in mobility patterns cannot be generalized to another geographical and/or social context as they remain inextricably intertwined to the context where they have been identified [11]. However, looking into existing literature provides a broad and useful understanding of gender and transport issues necessary for our case study.

Studies show that females make fewer work trips while more health care and social connections related trips, and are more reliant on public transport than men [12 - 14]. Women evolve in a smaller spatial range as they travel more to places proximal to their houses and neighborhoods, even in rich countries [15]. Women also tend to engage in more complex trip structures with multiple stops to carry out tasks as picking

up children from the school [16 - 18]. These gendered differentials are, mostly, due to the distribution of the roles in the household that still attribute household responsibilities and child care tasks to women [19 - 21]. Some studies have explored the impact of household structure on travel patterns, especially the breadwinner status in the USA [8, 22]. Social roles are significant in explaining some of the mobility characteristics in the Pakistani context, for instance, Adeel [23] demonstrated that the mobility level of men increases with marriage and age compared to women whose mobility level decreases with the same parameters.

Moreover, differences in access level to private motorized transport influence destination choices, distances traveled and mode choice [18, 24]. For example, in Rajkot-India, men make more trips as car drivers than females [25], whereas in Great Britain, women are more likely to use cars to go to work than their male counterparts [26]. This same trend is observed in Pakistan, where women use cars more often as transport mode when accessible [23].

Matsushita [27] points out that men of higher-income groups in Japan are more involved in travel-related physical activity. In Geneva, the study by DePalma and Rochat [28], highlighted the insignificance of income impact on mode choice but showed its influence on the number of cars owned by the household. In Vishakhapatam, India, males travel longer distances than females across all the SEWS - socio-economic wellbeing score-groups [11]. In Rajkot, India, women tend to be less mobile as the family income increases in contrast with men whose trip rates increase with income. This can be explained by women dropping out of the labor market with the increase in the household income, resulting in no need for them to make daily trips [25].

The literature also highlights personal safety and security as a factor affecting women's travel mode choice. Due to their concerns related to safety and fear of crime in the case of public transit, studies have found that women, compared to men, are more likely to avoid walking after dark [29, 30], and prefer to drive or take a taxi rather than walk or use public transit [31 - 33]. Research shows that factors, such as darkness, poor lighting and isolation, contribute more to women's fear of crime in their communities, as well as regarding public transit [31, 34 - 36]. Women often mention lonely bus stops, unstaffed stations and pedestrian subways among the places that cause them to fear [37]. In addition, they report higher perceived insecurity while walking at night in parks and subways, and when waiting at bus stops or platforms in isolated areas [33]. These factors can lead women to take more inconvenient routes or less frequent trips in order to avoid fear-causing situations [38].

2.2. Gender and Transport in Casablanca

The 2011 World Bank Report on Gender and Transport in MENA Region [39] stresses out that the frequently used transport modes vary across gender and different socio-economic classes in Casablanca, as men and women of high-income classes living near the city center enjoy better transport options whereas the lowest income groups living in the fringe of the city have limited transport access, which reduces their

set of possible education and employment opportunities.

The remainder of this section will highlight and analyze the main conclusions of this report.

Walking is the most important travel mode across the city, particularly for the middle-income and lower-income groups, and residents of the urban periphery. However, while walking does not fall under any specific socially constructed restriction for women, they are still advised against walking long distances due to the high risks of exposition to verbal or physical harassment and theft. Security is, in fact, one of the main challenges and constraints faced by women in Casablanca, not only when walking but also while using the different public transport modes. Many women, while traveling, do not consider their best options in terms of transport modes and take the first one that arrives to avoid the wait that can increase the risk of harassment on the street. In areas that are poorly served by public transport, women often prefer to stop their job search rather than being subject to public transport unreliability. Buses are one of the main public transport modes in Casablanca, however, this mode has failed to offer a safe environment for women to accomplish their trips. As a matter of fact, buses are often overcrowded and constitute spaces where harassment and theft incidents are frequent. Consequently, when taxis are available and can be afforded, they are women's first choice as they offer greater security; taxis are constrained with respect to the maximum number of passengers, that is allowed by authorities, and clients can report any misconduct to the taxi company or directly to the police. The lack of street lighting is also a serious problem in Casablanca, especially in the periphery, so women feel unsafe conducting any trips after the dark.

In Casablanca, where women are not provided safe and reliable transport, their access to health, education and employment opportunities is hindered; 60% of the women interviewed for the World Bank Report on Gender and Transport in MENA Region [39] consider that the lack of transport has reduced their ability to improve their income; 52% feel that poor transport prevents them from reaching labor pools, and 47% believe it negatively impacts their careers. Poor access to transport modes is a barrier to achieving autonomy for 80% of interviewed women. The Report's findings also point out that transport-related issues negatively impact access to the main and basic services, such as health and education, for both men and women, with men however not burdened as heavily as women.

With regard to all the issues laid down above, this World Bank study recommends to opt for more gender-informed policies and regulations and to use gender-inclusive participatory approaches for a better understanding of women's needs and actual experiences in terms of mobility.

This paper aims to bring to the light gender-based mobility dissimilarities in Casablanca, to examine how they vary across income groups, and to explain the data patterns. However, this study does not aim to identify every issue that could constraint women's mobility in the city.

3. CONTEXT

3.1. Introducing Casablanca City

The city of Casablanca is located on the Atlantic coast, in

the Central West of Morocco. It is the most economically developed city in the country, contributing to 19,2% of the GDP. With a population of 4.2 million in 2014, the demographic growth has registered a clear shift from the city center to its periphery in the last decade, with both a decrease of the hyper centre population and strong demographic growth in the inner-city suburbs. The average city density is 3700 persons per sq km, with central districts more populated than their peripheral counterparts even if the most marked demographic growth is registered in the city-suburban fringe.

In 2014, the active population reached 1, 4 million with an unemployment rate of 11, 3% (slightly higher than the national score of 9, 9%).

Public urban transport in Casablanca suffers from inefficiency and several quality and organizational issues. To meet the growing demand for mobility, policies promoting the use of private cars (such as simplified car loans processes) have been adopted. They have led to a rapid and uncontrolled increase in car ownership in the last decade that has prompted the emergence of congestion-related problems (113 car /1000 inhabitants). Congestion is not the only significant concern in the city, poor road safety is one as well. With 18,800 incidents, including 333 engendering fatalities, 978 serious injuries, as well as 24,250 slight injuries in 2017, Casablanca is leading the score in Morocco in terms of traffic accidents.

Intermodal interoperability is almost inexistent; every operator runs its own lines with no regard to complementarity with other modes or operators. The lack of intermodal transport scheme challenges the implementation of a fare integration system that would refrain the users to combine inefficiently different passes, tickets and fares for the same trip. Despite the relatively low fares of public transport in Casablanca, they can be unaffordable for low-income groups as they have to combine different modes that are not integrated in terms of fares. Another intermodal interoperability-related issue is uncoordinated schedules for the different transport modes and ineffective connections when they exist; commuters have to use individual or shared taxis, park their cars in distant parking areas, and/or walk increasingly long distances to the connection point. Real-time passenger information systems are also lacking, especially for buses, denying timely and accurate information to potential users in order to organize their trips.

Transport spatial coverage and availability is a rising problem in suburban areas, with more people settling in the periphery where the housing is more affordable. Consequently, transport system accessibility with all its components needs to be greatly improved.

Inadequate access to public transport disproportionately affects the different groups of the society; it impedes access to employment, education and health services for groups that are the most negatively impacted, such as people with low-income, women, and individuals with disabilities.

Gender issues have also become increasingly relevant with the rise of the number of employed women that use public urban transport to reach their jobs and the different city amenities.

To alleviate some of the issues noted above, the city has commissioned two tramlines that entered into service in 2012

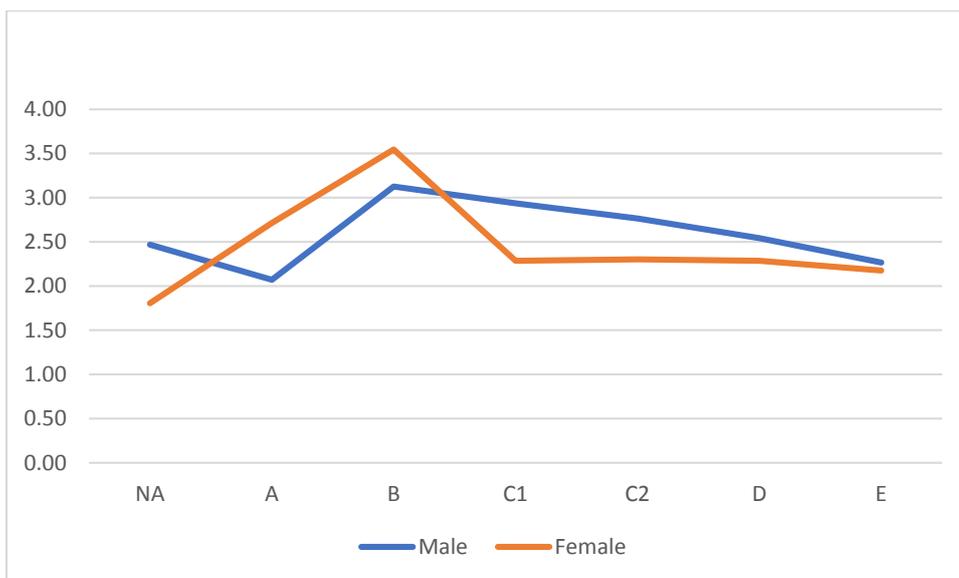


Fig. (1). Trip rate by income category and gender.

and 2019, respectively; however, most women still experience some constraints, particularly in terms of safety, which obstruct their access to basic social services, limit their labor force participation, and potentially reduce their income, a situation that needs to be addressed by adequate transport policies.

4. DATA AND METHODOLOGY

This study is based on the 2018 Casablanca Household Travel Survey dataset. A valid sample of 7019 households and 22,960 individuals has been used for this survey. It captures two information levels: household-related information, like income and number of owned vehicles, and individual-related information, such as gender, age, occupation and travel behavior characteristics. The survey was carried out among all permanent resident members of a household, who were aged more than 6 years old and were available to respond to the survey questions.

51% of the total sample comprised females. 82% of the households reportedly earned less than 7000 MAD/month (700 USD /month), and only less than 2% earned more than 30 000 MAD/month (3000 USD /month).

The households were categorized into six socio-economic groups using monthly household income data. Six mutually exclusive categories, namely, A, B, C1, C2, D, E, have been created and defined as follows:

E: This definition corresponds to very low income households, where the monthly household income is less than 1500 MAD.

D: This definition corresponds to low income households, where the monthly household income ranges from 1500 MAD to 2999 MAD.

C2: This definition corresponds to middle income households, where the monthly household income ranges from 3000 to 6999 MAD.

C1: This definition corresponds to upper middle income

households, where the monthly household income ranges from 7000 to 14,999 MAD.

B: This definition corresponds to high income households, where the monthly household income ranges from 15 000 to 29,999 MAD.

A: This definition corresponds to very high income households, where the monthly household income is greater than 30,000 MAD.

Since the scope of this paper is passenger transport, a trip is defined as a one-way intracity trip within the study boundaries.

5. GENDER, INCOME AND TRAVEL BEHAVIOR IN CASABLANCA

Approximately, 57% of the females stay at home as compared to 3% of males (Fig. 1). Of the total females, 92% have not declared or do not have an individual income in contrast to 36% of men.

The lower the household income, the more is walking as the main trip mode (62% of trips). This trend is inversely proportional to the use of the car, which is wide in the highest-income households. Public transport is not popular among the highest-income households with less than 6% of their modal share (Table 1).

5.1. Gender Differences in Mobility

Our analysis of the Metropolitan Travel Survey of Casablanca shows that gender mobility differences are significant and wide. Women make nearly 30% less trips on average (1, 81) than men (2, 5). Their average trip duration (19, 70 min) is slightly less than men (25, 4 min). Kruskal-Wallis H-test results confirm significant gender differences in daily trip rate (statistic=1684.3809845702758, p-value=0.0) and trip average duration (statistic=1299.3776429620177, p-value=1.5433650133833618e-284)

Table 1. Gendered principal activity differentials.

S.No	-	Gender	
		Male	Female
-	Principal Activity		
1	Full Time Job	47%	5%
2	Part Time Job	10%	2%
3	Training, Internship	1%	1%
4	Student Job	1%	0%
5	Post High School Student	10%	11%
6	Pre High School Student	19%	19%
7	Unemployed	4%	5%
8	Retired	6%	0%
9	Stay at Home	3%	57%

Table 2. Mode choice by gender.

-	Gender	
	Male	Female
Trip Principal Mode		
2 Wheels	3.03%	2.85%
Other	1.58%	1.85%
Walking	69.66%	69.79%
Public Transport	7.31%	7.05%
Taxis	6.04%	5.82%
Private car	12.38%	12.64%

Table 3. Split of trip purposes by gender.

S.No	-	Gender	
		Male	Female
-	Trip purpose		
1	Catching a Transport Mode	75,00%	25,00%
2	Accompanying Somebody	35,22%	64,78%
3	Go to Work	89,76%	10,24%
4	Work Related Trip	94,41%	5,59%
5	Groceries Shopping	14,56%	85,44%
6	Studies	52,14%	47,86%
7	Doctor, Bank, Personal Matters	30,41%	69,59%
8	Places of Worship	88,58%	11,42%
9	Leisure Activities	80,27%	19,73%
10	Administrative Procedures	64,15%	35,85%
11	Relatives and Friends Visit	33,18%	66,82%
12	Back Home Trip	58,42%	41,58%

Table 4. Trip purpose share by gender.

-	Male	Female
Accompanying Somebody	0.77%	2.11%
Work	45.42%	7.81%
Work Related	2.08%	0.19%
Groceries	2.96%	26.39%
Studies	25.23%	34.78%
Doctor, Bank & other Personal Matters	3.68%	12.71%
Worship Places	3.11%	0.58%
Leisure Activities	13.08%	4.85%
Administrative Procedures	0.23%	0.19%
Visiting Friends and Relatives	3.45%	10.38%

In terms of mode choice, nearly 62% of trips in Casablanca are performed by walking. We note that female share of walking is almost equivalent to male's (69, 79% vs. 69, 66%). We also observed that public transport use is equivalent among both genders (7, 31% for males and 7, 05% for females). Both sexes have a similar share of private car-based trips (12, 38% vs. 12, and 64%). Chi square test confirms that gender distribution and mode choice are independent for all modes.

In terms of purpose from the trip, women are less likely to travel for work (7,81%) compared to males (45,42%). Work-related trips account for 31,76% of the total trips. 30% of women trips are more likely to be carried for other purposes, like grocery shopping, bank or doctor appointment, leisure and visiting friends (Table 2).

85,44% of grocery shopping trips and 69,59% doctor and bank appointments trips are performed by females, whereas 89,76% of work-related trips are performed by males (Table 3). This can be explained by household tasks division where women carry out more household maintenance tasks and men are more likely to be breadwinners, as confirmed by the 2011 national timetable survey.

5.2. Income Influence on Gendered Travel Behavior

Our Casablanca data show that there is gender difference in terms of mobility on the whole as well as across income categories. Despite that women's average trip rate is less than men, the differentiation is not homogenous across income groups (Table 4 and Fig. 1).

Women who have not declared to have any income perform 1,81 trips/day vs. 2,41 for men belonging to the same category. This trip rate jumps to 2,71 and 3,55 for women belonging to high and very high-income categories. For these same categories, men are less mobile than women. In fact, women belonging to high-income categories are more likely to work outside the house as well as to accomplish household-related trips, like groceries or accompanying children to schools; they are expected to be more mobile than men. This high trip rate drops for women with middle income and accounts for 2,18 for category E women. We remark that for category E, women and men have similar trip rates.

In Casablanca, there is no marked difference in modal choice by gender on the whole, but there are notable gender differences across income groups. First, for both males and females, the walking share increases with the decrease in the income; the inverse occurs for private car share, as when income increases, the private car use also increases. Private car use rate is similar between men and women overall, when it is accessible, across the income groups and within the same income group. Public transport is avoided by women if they afford the use of a private car; women from A & B income groups did not report to travel by public transport (Table 5).

Fig. (2) shows the significant effect of gender and income on the average trip duration. Concerning women, this duration increases with a decrease in the income for the high- and middle-income categories, and it drops as the income falls for the lowest income classes. However, for men, the trip duration decreases with the increase in the income (from 43,86 min for Cat A to 18,67 min for the lowest income cat). Men have been observed to travel more minutes than women in the highest income category A (by 18 minutes), however, they make less trips (Fig. 2).

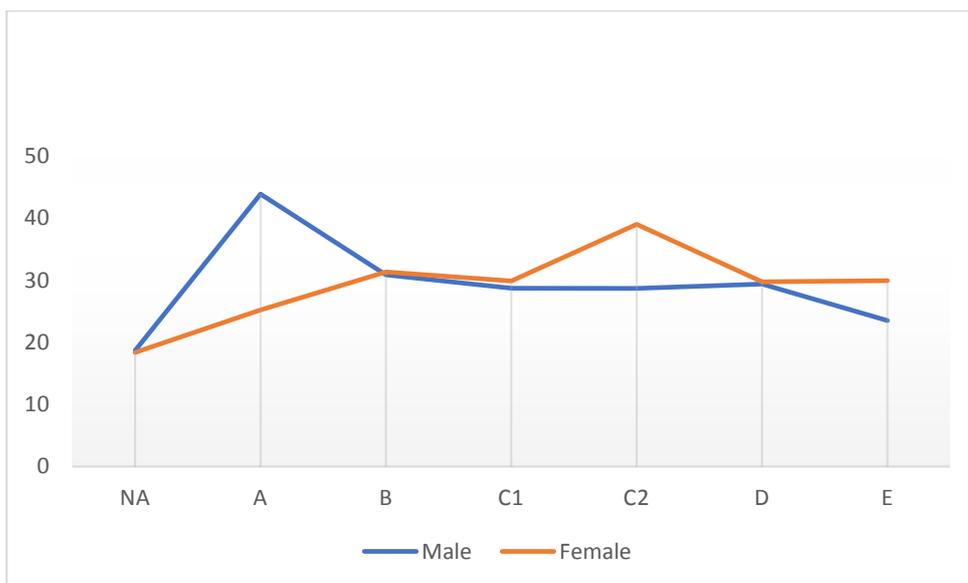


Fig. (2). Average trip duration (min) by income and gender.

Table 5. Trip modal choice by gender and income.

Mode Choice	NA		A		B		C1		C2		D		E	
	Male	Female												
2 Wheels	3.73%	0.13%	0.70%	0.00%	0.40%	0.83%	0.33%	0.00%	4.86%	0.53%	6.29%	1.41%	5.27%	0.38%
Other	1.22%	1.22%	0.00%	0.00%	0.00%	0.00%	0.17%	0.00%	0.60%	0.53%	1.78%	1.27%	0.91%	1.88%
Walking	81.98%	81.88%	16.72%	39.29%	27.66%	19.17%	37.88%	29.97%	44.62%	37.09%	51.77%	53.31%	67.50%	60.34%
Public Transport	8.28%	7.61%	2.09%	0.00%	2.10%	0.00%	4.45%	17.77%	13.29%	15.01%	18.77%	21.29%	14.60%	18.42%
Taxis	3.62%	6.52%	8.54%	0.00%	2.40%	11.67%	3.69%	5.92%	9.36%	15.41%	12.26%	17.10%	7.77%	16.54%
Private Car	1.18%	2.63%	71.95%	60.71%	67.43%	68.33%	53.48%	46.34%	27.27%	31.42%	9.14%	5.63%	3.94%	2.44%

Table 6. Trip purposes split by gender and income group.

Trip Purpose	NA		A		B		C1		C2		D		E	
	Male	Female												
Accompanying Somebody	1.10%	2.25%	2.02%	0.00%	1.34%	0.00%	0.53%	0.00%	0.70%	0.76%	0.39%	0.96%	0.71%	1.01%
Work	0.39%	0.18%	67.68%	25.00%	65.10%	62.50%	66.49%	69.57%	69.06%	75.67%	69.58%	81.38%	41.27%	72.73%
Work Related	0.29%	0.03%	2.02%	12.50%	4.70%	0.00%	3.71%	0.00%	3.03%	2.66%	2.41%	0.96%	3.77%	2.02%
Groceries	3.28%	28.70%	2.02%	0.00%	1.34%	6.25%	2.12%	8.70%	2.52%	3.80%	2.47%	5.18%	10.85%	9.09%
Studies	76.00%	38.50%	1.01%	25.00%	0.00%	0.00%	0.09%	0.00%	0.14%	1.52%	0.06%	0.19%	1.18%	0.00%
Doctor, Bank & other Personal Matters	3.22%	13.49%	4.04%	25.00%	2.68%	6.25%	2.39%	2.17%	3.98%	6.08%	3.89%	5.37%	7.55%	5.05%
Worship Places	1.22%	0.56%	7.07%	0.00%	0.67%	0.00%	1.06%	0.00%	3.11%	1.52%	5.01%	0.38%	16.04%	1.01%
Leisure Activities	9.54%	4.94%	7.07%	0.00%	18.79%	12.50%	20.78%	10.87%	14.77%	4.94%	12.98%	2.88%	13.68%	4.04%
Administrative Procedures	0.23%	0.16%	3.03%	0.00%	0.00%	6.25%	0.27%	0.00%	0.17%	0.76%	0.22%	0.19%	0.47%	0.00%
Visiting Friends and Relatives	4.73%	11.17%	4.04%	12.50%	5.37%	6.25%	2.56%	8.70%	2.52%	2.28%	2.99%	2.50%	4.48%	5.05%

Exclusive of the no-income category, the share of work trips of both men and women in income Category B, C1 and C2 is similarly distributed. However, we notice that for the highest income category, there is a significant gender difference in terms of work trip share, with men performing

more work trips (67% for men vs. 25% for women), and also for the lowest income groups D and E, where women perform the most work trips (73% vs. 42% for men). Women of the no income category and the highest income category show similar share of visiting relatives and friends related trips (11,7%,

12,5%), and it displays the highest share across all income categories and genders. Men's leisure activities related trip share is higher than women within all income categories (Table 6).

CONCLUSION

This paper studies the gender mobility differences in Casablanca City and examines the effects of income on such differences. Our findings confirm the existence of significant gendered differences nuanced by the income effect. Women are overall less mobile than men; they make 30% fewer trips on average. On a random day, they are more likely to stay at home than travel, but this "less" mobility is not observed homogeneously across all income groups. Women in the highest income groups perform more trips than men due to their position in the household, as they are responsible for the family maintenance tasks in addition to working out of the home. With an increase in income, women also tend to shift to the use of private car for more than 60% of their total daily trips, which is 33 times higher than that of men and women from the lowest income categories. In fact, due to safety concerns when walking or using public transport, such as buses, and when the income allows it, women rely more on the use of private motorized transport. Public transport in Casablanca is avoided when the car can be afforded. The analysis also shows that males and females belonging to the low-income group are more dependent on non-motorized transport, especially walking; women and men of the lowest income categories are both "no choice walkers". These latter findings highlight that travel mode choice in Casablanca disparity is more income-based than gender-based. This situation is linked to a particular socio-cultural context in the city (and the country), which sees the car as the safest and more convenient transport mode, especially for long-distance trips (more than 10 min). The car is also culturally associated with high social status, autonomy and reliability. Whereas, public transport is perceived as unreliable, uncomfortable and with an inadequate offer.

For the highest and lowest income groups, work trips share is gender-sensitive; with an increase in the income, women tend to perform less work-related trips than their male counterparts, whereas for middle-income categories, work trips share is similar between both the genders. For the poorest households, it is now more common that women are the breadwinners in their families.

To explain gender-income based dissimilarities in travel patterns in Casablanca, some social, cultural and geographical aspects need to be deeply examined, such as:

- Women participation in the labor market and their breadwinner status in some families.
- Women's time constraints.
- Non-motorized transport perception in terms of safety, reliability, comfort and coverage.
- Land use mix and built environment.

When on one hand, more than 50% of the sample females are out of the labor market, which impacts their financial resources, especially when they belong to low-income

household groups, and on the other hand, the Casablanca city lacks efficient public transport and safe walking public spaces, it is our understanding that unless immediate neighborhoods are designed to include all the basic and necessary services, women experience accessibility constraints in terms of education, healthcare and employment. This limited accessibility is exacerbated for women living in the city periphery due to the lack of effective transport connections between Casablanca suburbs and downtown, where most of the services are concentrated. To improve the accessibility of women to services and resources, it is recommended to adopt urban transport designing strategies that combine a reliable and safe public transport offer and spatial planning tools in order to provide equal accessibility opportunity to people experiencing resource constraints and reduce unnecessary automobile reliance among middle-income groups. This will not only benefit women but all the vulnerable groups experiencing mobility impediments. The ongoing bus reform, tramlines and BRT programs can be part of the solution if it takes into consideration the relationship between individual mobility needs, transport system and land use characteristics.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available within the article.

FUNDING

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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