



Socio-demographic and built environment determinants of car use among older adults in Iran



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ABSTRACT

Internationally, an age-friendly built environment, including safe, affordable, and convenient transportation, has been identified as crucial in enhancing the quality of life for increasingly large numbers of elderly people. This study presents data on the urban travel and mobility patterns of older adults in Shiraz, Iran – a country where the population is ageing faster than the average of western societies. The relationship between car use and socio-demographic and built environment variables is investigated through Ordinary Least Squares and Geographically Weighted Regression models. These models show that the main determinants of car use among older adults are: employment status; household size; car ownership rate; trip purpose; property prices; and mixed land-uses. Also, the study reveals that car dependency is significant and more pronounced among wealthier individuals, who tend to be clustered in the northern section of the city. The population density and road network design characteristics do not affect car use among older adults, while a mix of land-uses tends to attenuate car dependency. Gender gaps in car use are much wider than in the West, and some level of spatial mismatch between travel needs and car access is observed in the southern section of the city. Clearly, Iranian cities must move away from the current car-centric development model.

1. Introduction

The world population is ageing (WHO, 2011). In Iran, a country of > 80 million inhabitants, the population is ageing faster than the average of western societies (UN, 2015). In addition to increasing life expectancy, declining birth rates and youth out-migration are contributing to the ageing of Iran's population (Statistical Center of Iran, 2017). In the 2016 census, 11% of the population was aged over 60, and 18% of this segment of population was employed (Statistical Centre of Iran 2016). Moreover, the growth rate in the number of older adults is higher than the total population growth rate in the country. By 2050, about a quarter of Iran's population is expected to be aged 60 and above (UN, 2015).

In the West, older people constitute a significant share of the car driving market (Banister and Bowling, 2004). Many are very reluctant to cease driving (Mifsud et al., 2017). Therefore, car dependency among the elderly has become a major concern in Western societies with ageing populations (Boschmann and Brady, 2013; Newbold et al., 2005). Car-dependency is partly driven by a lack of alternative travel options, and limited access to necessary daily services. Therefore, to

enhance the quality of life for increasingly large numbers of elderly people, an age-friendly built environment, including safe, affordable, and convenient transportation, is crucial (WHO, 2011).

In Iran, the rate of car ownership is low compared to developed countries and even many developing countries. For example, based on the Shiraz Household Travel Survey (SHTS), this rate was about 293 cars per 1000 inhabitants in 2015. Nonetheless, the rate of private car use is very high, including among the elderly.

The World Health Organization has launched the Age-Friendly Environments Programme. However, this program is hardly operational in many Global South countries due to a lack of sufficient physical, financial, and social infrastructure. In Iran, poorly-designed walking and cycling environments and weak public transportation systems have been identified as two main factors which hinder the independent mobility of the elderly. In addition, a harsh climate with scorching summers and snowy winters in some regions, and cultural imperatives for women preclude the use of non-motorized transportation among older adults. (For example, until recently women were prohibited from cycling due to religious/ideological protocols.) The problem of independent mobility among the elderly in Iranian cities is slowly

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assuming crisis dimensions. But in urban transportation, as in other arenas, elderly affairs are marginalized. The available evidence reveals little success in empowering older people and incorporating their needs into national or local planning policies (Goharinezhad et al., 2016).

At present, very little is known about the relationship between transportation and ageing in the Middle Eastern region. Most existing studies, which are briefly reviewed in the next section, are based in high-income Western countries. This article presents data on the urban travel and mobility patterns of older adults in Shiraz. This is the first study of its kind based in Iran. A principal aim is to quantify the effect of socio-demographic and built environment characteristics on car ownership and use among older adults. The international literature suggest that these characteristics are associated with older adults' trip patterns (Feng et al., 2013; Roorda et al., 2010). The research is based on a comprehensive, large-scale survey of 20,000 households in the Shiraz metropolitan area, conducted by Shiraz University. The study outcomes can be of use not only to policy makers in Iran but also to researchers who seek to conduct international comparative studies on transportation and ageing.

2. Literature review

2.1. Elderly travel patterns in the Global North

The Global North has been the focus of most research to date. Here older people have been found to exhibit a rather complex travel behavior (Hildebrand, 2003). Overall, older people are making more daily trips and driving longer distances than ever before (Mifsud et al., 2017). However, it is clear that, compared to youth, older people encounter more hurdles in their daily transportation and mobility, partly due to the ageing process itself, and partly owing to the social and physical arrangement of their community (Banister and Bowling, 2004; Li et al., 2012; Schwanen and Páez, 2010). In other words, the activity spaces and travel modes of older people are determined by (1) health factors; (2) socio-demographic factors; (3) built environment factors.

2.1.1. Health factors

These include musculoskeletal weakness, chronic illness, visual or hearing loss, and a general decline in physical and mental health with advancing age. The relationship between health and car use by older adults is beyond the scope of this study. The effects of the other two sets of factors are unpacked below.

2.1.2. Socio-demographic factors

These include life transitions such as retirement, community support network, gender, age, ethnicity, affordability, and even perceptions about travel options. Single individuals living alone may find it difficult to access grocery stores, medical services, and social activities. This may lead to isolation, loss of freedom, and even hopelessness (Chaudhury et al., 2011; Musselwhite and Haddad, 2010; Schwanen and Páez, 2010; WHO, 2011). In terms of gender, men are more dependent on cars whereas women employ a broader variety of transportation modes. As their needs increase and capabilities decrease, older adults often make progressive adjustments to their travel behavior. Sometimes, these adjustments are prompted by family members who are aware of the increased risk of traffic accidents associated with ageing (Blanchard et al., 2010; Li et al., 2012; Takahashi et al., 2017).

However, for many, the private car remains vital in preserving independence (Banister and Bowling, 2004; Nakanishi and Black, 2015; Newbold et al., 2005; Schwanen and Páez, 2010). In fact, the 75–84 age cohort tends to rely most heavily on cars (Boschmann and Brady, 2013; Collia et al., 2003; Cui et al., 2017; Mercado and Newbold, 2009; Schmöcker et al., 2008; Schwanen et al., 2001). Only very advanced age (85 and over) finally forces people to give up driving. When this occurs, men are more likely to replace driving with walking and transit use, whereas women tend to rely on rides from others (Boschmann and

Brady, 2013). An exception is impoverished retirees for whom private cars may become unaffordable (if they ever were affordable). In this case, it is a diminished income rather than advanced age that leads to giving up driving (Adler and Rottunda, 2006). Being more car-dependent, men might find it harder to adjust to this transition - especially in the absence of efficient and easy-to-use public transit (Banister and Bowling, 2004; Feng, 2017).

2.1.3. Built environment factors

These include transportation mode availability and preference, residential location, local land-use, and density. Generally, low-quality and unreliable transit systems are unlikely to satisfy the complex needs of different clusters of senior adults (Davey, 2007; Engels and Liu, 2011; Hildebrand, 2003; Kostyniuk and Shope, 2003; Risser et al., 2010). In recent years, demand-responsive transportation and car-sharing services have provided a middle ground between owning a car and being entirely carless. However, these services may be unaffordable to some, and unacceptable to others accustomed to owning and driving a car. Non-motorized transportation, including walking and cycling is also important in extending independent mobility for the elderly (Feng, 2017; Roorda et al., 2010). If sidewalks, road crossings, pedestrian signal timings, and cycle paths are not designed with the elderly in mind, travel by car might end up being the only option.

Urban design features, especially around the place of residence, significantly impact older adults' choice of travel modes (Alsnih and Hensher, 2003). Those who live in urban cores tend to be more mobile than those who live in remote suburban or rural areas. Generally, the elderly tend to avoid long distances or complex trips; therefore, an appropriate residential location, within reach of necessary services, may be more critical in old age than at any other time in life (Giuliano et al., 2003; Truong and Somenahalli, 2015). Urban environments with higher densities, diverse land-uses, and pedestrian-friendly streets are better poised to meet the needs of older people - especially as the importance of recreational-, social-, and shopping-related travel increases whereas the role of work-related trips declines (Chudyk et al., 2015; Cui et al., 2017; Fobker and Grotz, 2006; van den Berg et al., 2011; Van Holle et al., 2014; Winters et al., 2015).

2.2. Elderly travel patterns in the Global South

One cannot assume that the foregoing findings pertaining to Global North countries will apply to the Global South (Schwanen and Páez, 2010). The differences of meanings, understandings, and perceptions of older people in different geographical and cultural contexts justify more detailed empirical studies. Research set in the South is increasing slowly and on a case study by case study basis (see Ipingbemi (2010) on Ibadan, Nigeria; Gómez et al. (2010) on Bogota, Colombia; Pettersson and Schmöcker (2010) on Manila, Philippines; Corseuil et al. (2011) on Florianopolis, Brazil). One consistent finding is that public transit use seems to be increasing (Ipingbemi, 2010; Kim, 2011). However, the available studies ask different research questions and apply differing methodologies. Therefore no full picture has emerged of the travel and transport needs and patterns of the elderly in Global South.

3. Methodology

To reiterate, the objectives of this study include: (1) Examining the travel and mobility characteristics of older adults in Shiraz, and (2) Quantifying the effect of socio-demographic and built environment factors on car use among older adults in Shiraz.

3.1. Case study

The study is set in Shiraz, a city in southern Iran. A word on Iran's socio-economic and demographic situation is in order prior to discussing the case study.

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