Travel Behaviour and Society 9 (2017) 10–20

Contents lists available at ScienceDirect

Travel Behaviour and Society

journal homepage: www.elsevier.com/locate/tbs

Spatio-temporal travel characteristics of the elderly in an ageing society

W.Y. Szeto *, Linchuan Yang, R.C.P. Wong, Y.C. Li, S.C. Wong

Department of Civil Engineering, The University of Hong Kong, Hong Kong, China

ARTICLE INFO

Article history:
Received 21 December 2016
Received in revised form 17 July 2017
Accepted 28 July 2017

Keywords:
Spatio-temporal travel characteristics
Elderly
Ageing society
Household interview survey
Public transport policy measures
High-density and transit-oriented cities

ABSTRACT

Hong Kong's population is ageing at an unprecedented and considerable rate, predominantly due to sustained low fertility and mortality rates. In 2013, the proportion of people aged 60 years or above was the second highest in Asia, exceeded only by that in Japan. Given that Hong Kong is a high-density, transit-oriented city, the predicted rapid growth of its elderly population is expected to significantly affect the existing public transport systems. To provide suitable policy recommendations that cater to the travel needs of an ageing society, we must investigate and understand the travel behavior and preferences of Hong Kong's elderly citizens. In this study, we extracted the household interview survey data from the 2011 Travel Characteristics Survey to identify the travel patterns of the elderly and compare them with other age cohorts and among subgroups of the elderly population. We visualize and uncover the spatio-temporal travel characteristics of the elderly, and offer policy insights that promote age-friendly public transport systems. We believe that the findings and discussions herein will prove useful in future studies aiming to establish effective and appropriate public transport policy measures to improve elderly mobility.

1. Introduction

Population ageing has become a notable and common demographic phenomenon in most countries. The proportion of the population aged 60 years or over is growing substantially, with the number of elderly in the world projected to grow by 56%, from 0.9 billion to 1.4 billion, between 2015 and 2030. Research has also shown that there will be 2.0 billion elderly adults by 2050, constituting an even larger share of society, with about 80% of them living in developing countries (United Nations, 2015). Obviously, this anticipated rapid growth in the elderly population poses a great challenge for transport operators and urban planners tasked with offering travel options that consider the unique and complex travel patterns of the elderly (Alsnih and Hensher, 2003; Hess, 2009). Thus, it is generally believed that ageing's effect on transport systems should receive more attention, compared with the other challenges that ageing poses for the economy and for health care and retirement systems (Buehler and Nobis, 2010).

1.1. Ageing population in Hong Kong

Predominantly due to sustained low fertility and mortality rates, the population in Hong Kong is ageing at an unprecedented and considerable rate. In 2015, the percentage of elderly people aged 60 or above in Hong Kong was 21.7%, the second highest in Asia and exceeded only by Japan, which topped the global list (United Nations, 2015). According to population projection data for 2012–2041, the proportion of people aged 60 or above is expected to reach 36.3% in 2041 (Census and Statistics Department, 2012). Indeed, Hong Kong's ageing population has already created numerous social and economic challenges, such as health care, the old age allowance, and senior residence provisions (Financial Services and the Treasury Bureau, 2013). Unfortunately, the effects of ageing populations on transport systems have been largely ignored by government officials and policy makers, such that the existing transport system is inadequate to support the striking increase in the elderly population in the near future. There is no doubt that improvements in elderly mobility facilitate the promotion of overall societal development, especially in the transport sector (Olawole and Aloba, 2014). Therefore, such improvements should be a top priority for transport policy makers. The vision of "Transport for All," which initiates the development of a transport system accessible to all people to improve mobility, has been emphasized in Hong Kong's transport policies. Particular attention has been paid to the needs of the disabled, but few policies have targeted the needs of senior citizens. Although the transport needs of elderly and disabled people are vastly different, the current transport policy measures for the former are essentially identical to those developed to meet the needs of the latter, which may not be sufficient to guarantee the former's mobility.

* Corresponding author.
E-mail address: ceszeto@hku.hk (W.Y. Szeto).

http://dx.doi.org/10.1016/j.tbs.2017.07.005
2214-367X/

To provide suitable policy recommendations that consider the considerable growth in ageing populations in Hong Kong, a prerequisite is to investigate and understand the travel behavior of elderly citizens. Hence, it is of paramount importance to conduct a comprehensive study on their daily travel patterns and spatio-temporal travel characteristics. In an effort to understand and improve elderly mobility, numerous studies have focused on the travel patterns of the elderly in Western countries, particularly the United States and Europe (Hildebrand, 2003; Buehler and Nobis, 2010; Currie and Delbosc, 2010; Ipingbemi, 2010; King and Scott-Parker, 2016; Rahman et al., 2016; van den Berg et al., 2016). In most of the countries concerned, driving is the primary means of transport, and only a small proportion of elderly people use public transport services. For example, the transit share in the United States is only 1.9% (Department of Transportation, 2011). Likewise, in most European countries, such as the United Kingdom, Germany, and Denmark, the transit shares are less than 20% (European Environment Agency, 2009). In contrast, Hong Kong is a unique city, where nearly 90% of the population uses public transport and only a few of them use private vehicles. Therefore, the public transport policy measures suggested in the literature are not appropriate in the Hong Kong context.

1.2. Travel characteristics of the elderly

To improve the mobility of the elderly, numerous studies with varying degrees of depth and sophistication have focused on their travel patterns and behavior (Hildebrand, 2003; Buehler and Nobis, 2010; Currie and Delbosc, 2010; Ipingbemi, 2010; Rahman et al., 2016; van den Berg et al., 2016). Traditional travel demand modeling generally assumes travel activities to be age-related (Figueroa et al., 2014). As age increases, the willingness and ability to drive decrease, resulting in decreased travel activity, journey time, and distance. Johansson-Stenman (2002) found that travel distance reaches its peak at about the age of 50. In addition, the observable trend becomes significant once retirement age is reached (Collia et al., 2003; Somenahalli and Shipton, 2013). Despite this, today's elderly individuals appear to be as mobile as their younger counterparts with respect to the number of trips. Interestingly, the elderly were more likely to have a driver's license, take more trips, and drive more than older adults a decade ago. The elderly were more mobile than ever before, and the trends toward increased trip rates and distances could be witnessed. In a recent study, van den Berg et al. (2011) revealed that there are no significant age effects on travel distance and time among young adults and the elderly in the Netherlands.

Cars (for drivers and passengers alike) are the most important travel mode for the elderly in Western countries. In Canada, car drivers and car passengers were the two dominant transport modes for the elderly, with public transport (train and bus) ranked the most unpopular mode (Newbold et al., 2005). Similarly, Rosenbloom (2004) reported that in the United States, older adults made most of their trips by car, with only around 6% walking and 2% using public transit. The situation is similar in Australia, with the shares of automobiles and public transport being 83% and 7%, respectively (Truong and Somenahalli, 2015). Numerous studies have revealed that the shares of cars and taxis are much higher than those of buses, coaches, and rail in European countries. For example, in the United Kingdom, older adults (70 and above) make about 50% of their trips by private car (includes driving and car-sharing) and only 12% by bus (Department of Environment, Transport and Regions, 2000). In the Netherlands, nearly 50% of the elderly aged 65 or above make their trips by car, with less than 10% made by public transport (Tacken, 1998). It is worth noting that as compared to the United States, European countries have a larger proportion of old adults depending on public transport services. However, due to the increasing car-accessible rate of the elder generation, the segment of the transport service-dependent seniors will probably shrink (Haustein and Siren, 2015; Siren and Haustein, 2016). In contrast, in a few developing countries such as China, characterized by lower car and driving license ownership rates, the elderly travel mostly on foot (49%), followed by public transport (43%), bicycle (4%), and car (less than 1%) (Hu et al., 2013).

For most of the elderly, work is no longer part of their activities. Hence, the changes generated by retirement can affect their trip-making behavior (van den Berg et al., 2011; Siren and Haustein, 2016). Beyond staying at home, the activities of the elderly include visiting, shopping, and recreational activities. For example, Newbold et al. (2005) stated that traveling for goods and services ranked first among all outdoor activities for the elderly in Canada. However, traveling to religious places constituted the highest proportion of total trips generated by the elderly in Nigeria (Olawole and Aloba, 2014). In Asian countries such as China, the two major trip purposes for the elderly were shopping (21%) and leisure (11%) (Hu et al., 2013). Understandably, the travel patterns of the elderly are substantially different in differing settings. Considerable research has been conducted on the travel patterns of the elderly, but most have been focused on countries where driving is the primary means of mobility, with a very low patronage of public transport. Excellent review of earlier work was published by Cui et al. (2016) on travel behavior and mobility needs of older adults in an ageing and car-dependent society. To the best of our knowledge, there are limited local studies revealing the travel patterns of the elderly in Hong Kong—a high-density, transit-oriented city.

1.3. Objectives of this research

To reveal the travel patterns and behavior of Hong Kong's elderly population, this study investigates their basic travel characteristics based on the 2011 household interview survey data from the Travel Characteristics Survey (TCS2011) (Transport Department, 2014). This work illustrates and uncovers the spatio-temporal characteristics of elderly travel. Then, based on the findings, suggestions are made regarding how to improve public transport services for the elderly. The results will serve as a valuable reference for the city government in establishing effective and appropriate public transport policies that enhance elderly mobility.

The contributions of this paper include the following: 1) uncovering the travel patterns and preferences of local citizens in different age cohorts and genders based on household interview survey data; 2) presenting the spatio-temporal travel characteristics of the elderly and comparing them with those of young adults; and 3) discussing policy insights to improve public transport services for the elderly.

The remainder of the paper proceeds as follows. Section 2 introduces the household interview survey data adopted in this study. Sections 3 and 4 present the findings of travel patterns and a spatio-temporal travel analysis of young adults and the elderly. Section 5 discusses the policy insights, and Section 6 concludes the paper and suggests a few research directions for future studies.

2. Household interview survey data

Household interview surveys have been widely used to study the travel patterns and behavior of the elderly in previous studies (e.g., Collia et al., 2003; Choi et al., 2014; Figueroa et al., 2014). However, as mentioned, there is scant literature on the travel behavior of older populations in high-density, transit-oriented cities such as Hong Kong. The travel characteristics of the elderly