

ICMR 2019

8th International Conference on Multidisciplinary Research

ACTIVE AGEING IN MALAYSIA: CASE STUDY IN GEORGETOWN

Saidatulakmal Mohd (a), Norhafiza Md Sharif (b)*
*Corresponding author

(a) School of Social Sciences, Universiti Sains Malaysia, eieydd@usm.my

(b) School of Social Sciences, Universiti Sains Malaysia, norhafiza_mdsharif@usm.my

Abstract

The concept of active ageing requires elderly to remain active and participate in beneficial activities, in which travel is one of the activities that support active ageing. Active ageing concept ensures that elderly continues participating in all social, economic, cultural, spiritual and civic affairs and activities at old age. To do so, it is imperative that cities and transportation are elderly friendly. Thus, this article intends to analyze the elderly's travel patterns in Georgetown. This study is a quantitative research and a structured questionnaire was developed to collect the information of the respondents by using cluster sampling of 255 elderly (60 years old and above) in Georgetown. The study found that the majority (52.2%) of elderly in Georgetown are women and most of them (45.5%) are in the Middle Old age category (65 to 75 years). In terms of ethnicity, the majority (52.9%) of the elderly are Malays and most elderly (44.7%) have educational backgrounds up to primary school. The majority (67.1%) of the elderly were retired and 50.6% of them received a monthly income of RM1000 to RM4000. This study also identified the travelling behaviour among the elderly such as travel mode, trip purpose, trip category, and modes share in Georgetown.

2357-1330 © 2020 Published by European Publisher.

Keywords: Active ageing, travel patterns, elderly.



This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

1. Introduction

Active aging refers to the process of optimizing the opportunities and involvement of elderly citizens in families and communities towards nurturing elderly citizens to improve their well-being. This aspect encompasses the quantity, quality and scope of social networks, reciprocal roles and relationships between lifelong generations (Department of Social Welfare Malaysia, 2019a, 2019b). The number of elderly people around the world is increasing at an unprecedented rate, not only in the developed/industrialized countries, but also in the developing countries. In Malaysia, The Elderly National Policy defines elderly as individuals aged 60 years and above as adopted in the United Nations World Assembly on Aging held in Vienna in 1982 and among ASEAN countries (Department of Social Welfare Malaysia, 2019a, 2019b). Based on the age structure of the population in Malaysia, the percentage of the elderly population (60 years and above) is seen rising. Similarly, the statistics of elderly population in Pulau Pinang were increases within five years. As shown in Figure 01, the total of elderly in Pulau Pinang in 2014 were 188,500 elderly followed by 196,700 elderly in 2015. The number of elderly rose to 204,700 in 2016 and further increased to 214,300 elderly in 2017. In 2018, the number of elderly population continued to surge to 224,800 elderly. The statistics also reported the same proportion for each age group from 2014 to 2018, where the number of elderly is seen decreasing as age increases.

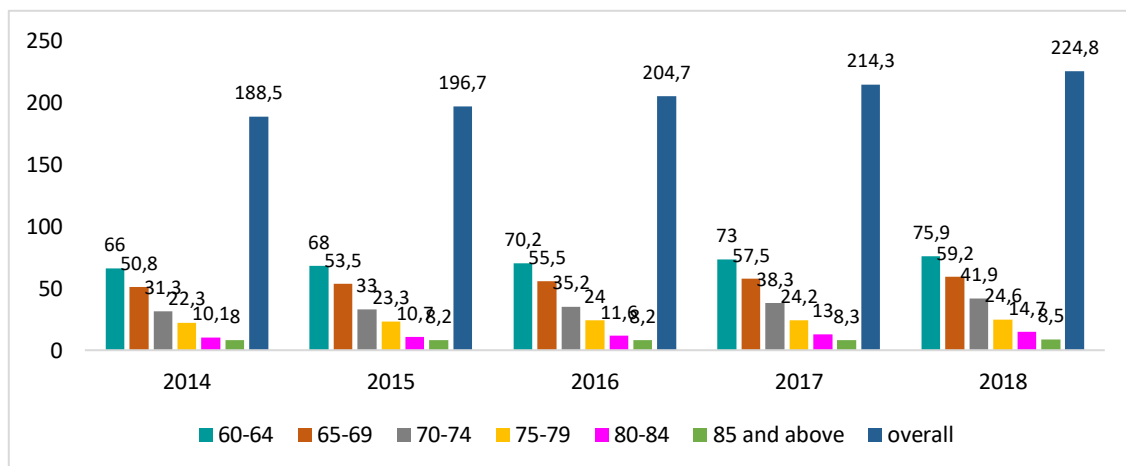


Figure 01. Population by age, Pulau Pinang 2014-2018 ('000)
 Source: Department of Statistics, Malaysia (2014-201)

2. Problem Statement

Mobility or the ability to get from place to place, is important for everyone. Mobility is defined as the ability of an individual to purposively move about her environment (Rosso, Taylor, Tabb, & Micheal, 2013). In addition, mobility enables people to conduct the activities of daily life, stay socially connected with their world, participate in activities that make life enjoyable, and maintain their quality of life (Kostyniuk, Renée, Zanier, Eby, & Molnar, 2012). According to Giuliano and Hwa Hu (2003), mobility or the ability to travel depends on individual resources: time, money, car availability, and physical capacity. Mobility also depends on the supply of transportation services and the spatial distribution of activity destinations. In addition, accessibility refers to the ease of movement between places, and hence is a function of spatial structure and transportation supply. As movement between any two places becomes less

costly, accessibility increases.

In Malaysia, the government focused on developing a sustainable transport sector that drives economic growth and supports the well-being of the people in line with the status of developing countries. Through the National Transport Policy (2019) for 2019-2030, the government aims to provide mobility that meets the needs of the people and inclusively, enhances public transport mode sharing, provides a smart and safe transportation system and ensures that the transport sector utilizes resources sustainably. Consequently, many cities in the world have adopted the concept of sustainable mobility and offers numerous examples of best practices that can be implemented.

Travel patterns such as travel distance and travel time are related with the elderly's travel preferences. Previous research by Colliá, Sharp, and Giesbrecht (2003) and Heaslip (2007) found that older people are less likely to travel compared to the younger age groups. In fact, the older people may also prefer to travel in a shorter distance. This means that the preferences of travel among the elderly can be associated with the socio-demographic factors as well as physical and mental conditions of the elderly.

Colliá et al. (2003) found that only (12%) of the older people stated that medical conditions had affected their travel using special transportation services such as dial-a-ride on day trips. A previous study conducted by Heaslip (2007) showed that there was a dramatic increase in the number of travels made by older groups for medical, religious as well as social and recreational purposes. In addition, older people aged 75 years and older prefer to use the auto-mobile based transport due to reasons such as personal safety, convenience, reliability and flexibility. Other than that, the elderly's non-driver is prefer to ask for rides to their friends or family (Coughlin, 2002).

In term of transport modes, the elderly most commonly uses the private car, although elderly car usage (as well as walking and cycling) decreases with older age to the benefit of public transport (Schwanen, Dijst, & Dieleman, 2001). In addition, the elderly with a high household income tend to use cars for travel (Kim, 2011), while Kim and Ulfarsson (2004) reported that elderly with higher incomes are more likely to drive or carpool. The elderly with a low household income or the unemployed elderly are more inclined to walk and use bicycles (Schwanen et al., 2001). In the United Kingdom, transport mode choices of the elderly and confirm that the private car is the most commonly used transport mode. However, unlike most of the earlier mentioned North American and Australian studies, their results indicate that the share of car use decreases at higher ages. Besides, elderly women are more likely to use the public transport (Schwanen et al., 2001), while Zong, Liu, and Zhang (2013) stated that cars are used the most during travels whose purpose is shopping.

As people are expected to live longer, and also preserve an active lifestyle longer, the total number of journeys made by the elderly will increase (Sundling, Berglund, & Pendrill, 2014). To do so, it is imperative that cities and transportation are elderly friendly. An important way to analyze this is to investigate the travel patterns among the elderly in a city, the main focus of this research. Thus, this article purposes to examine the travel patterns among the older people in Georgetown, Pulau Pinang.

3. Research Questions

The study seeks to answer the question of how factors such as travel mode, travel destinations, travel categories, and ways of sharing influence the travelling behaviour among the elderly parents in Georgetown.

4. Purpose of the Study

Understanding the travel patterns will add to the existing knowledge of elderly travel behaviours and may be useful in policy-making and transportation planning to accommodate the ageing population in Georgetown, Pulau Pinang. Specifically, the objectives are:

- To assess the mobility characteristics of the elderly in Georgetown, Pulau Pinang
- To analyse the travel behaviour among the elderly in Georgetown, Pulau Pinang

5. Research Methods

This study was conducted on 255 elderly aged 60 years and over in Georgetown, Penang in October until November 2018 using cluster sampling method based on age group, gender and ethnicity to select the sample of the elderly. Sociodemographic variables were assessed by a sociodemographic questionnaire designed and approved by the researcher and experts including age, gender, ethnicity, education level, occupational sector, income and family size. While, travel information of elderly consists of mobility, travel mode, trip purpose, trip category and reason not travel.

6. Findings

6.1. Sociodemographic characteristic

As shown in Table 01, the highest frequency (45.5%) or (116 respondents) belongs to elderly of the middle old group (65-75 years), followed by 35.5% (90 respondents) of the young old group (60-64 years old) and 19.2% (49 respondents) of the old-old group (76 years and above). Most of the respondents (52.2%) were women and 47.8% were men. In terms of ethnicity, the majority (52.9%) or 135 respondents were Malays, followed by 34.5% (88 respondents) were Chinese and 12.5% (32 respondents) were Indian. Most of the elderly (44.7%) only have primary education levels and 18% (46 respondents) of the elderly have no formal education. In terms of occupation sector, the findings found that 67.1% of the elderly did not work or retired, followed by 28.6% of the elderly who were still employed in the informal sector. 34.9% of the them received income of RM 1,000.00 to RM 4,000.00 and 49.8% of the elderly have family size less than 4 people.

Table 01. Respondent sociodemographic information

Sociodemographic Information	Age category (year)							
	60-64		65-75		76 and above		Total	
	N	%	n	%	n	%	n	%
Gender								
Men	43	47.8	53	45.7	26	53.1	122	47.8
Women	47	52.2	63	54.3	23	46.9	133	52.2
<i>Total</i>	90	100	116	100	49	100	255	100
Ethnicity								
Malay	47	52.2	63	54.3	25	51.0	135	52.9
Chinese	31	34.4	39	33.6	18	36.7	88	34.5
India	12	13.3	14	12.1	6	12.2	32	12.5
<i>Total</i>	90	100	116	100	49	100	255	100
Education Level								
Primary education	35	38.9	51	44.0	28	57.1	114	44.7
Secondary education	29	32.2	45	38.8	7	14.3	81	31.8
Higher education	11	12.2	3	2.6	0	0.0	14	5.5
No education	15	16.7	17	14.7	14	28.6	46	18.0
<i>Total</i>	90	100	116	100	49	100	255	100
Occupation								
Not working / retired	53	58.9	80	69.0	38	77.6	171	67.1
Administrator and clerical	2	2.2	2	1.7	0	0.0	4	1.6
Professionals and services	3	3.3	1	0.9	1	2.0	5	2.0
Informal sector	30	33.3	33	28.4	10	20.4	73	28.6
Technical	2	2.2	0	0	0	0	2	0.8
<i>Total</i>	90	100	116	100	49	100	255	100
Monthly income								
Less than RM 1000	25	27.8	36	31.0	18	36.7	79	31.0
RM 1,000 - RM 4,000	39	43.3	42	36.2	8	16.3	89	34.9
Over RM 4000	7	7.8	7	6.0	3	6.1	17	6.7
No income sources	19	21.1	31	26.7	20	40.8	70	27.5
<i>Total</i>	90	100	116	100	49	100	255	100
Family saiz								
Less than 4	40	44.4	68	58.6	19	38.8	127	49.8
4 to 5	30	33.3	32	27.6	17	34.7	79	31.0
More than 5	20	22.2	16	13.8	13	26.5	49	19.2
<i>Total</i>	90	100	116	100	49	100	255	100

6.2. Travel Patterns among the Elderly in Georgetown, Penang.

▪ The elderly mobility of age groups

The finding shows that majority of the elderly age group are able to walk and this is supported by (Hjorthol, Levin, & Sirén, 2010) which stated that elderly today have a more active lifestyle (i.e. they travel more) than previous generations. Only the elderly aged 76 years old and above (14.3%), 65-75 years old (6.9%) and 60-64 years old (1.1%) using wheelchairs. Similar results were reported by Shields (2004) which found that Canadians aged 65 and older are 4 times prefer to use a wheelchair compared to others. According to Brandt, Iwarsson, and Ståhle (2004), a wheelchair provides individuals with mobility that enables their continued participation in activities related to independence, work, and social engagement. Only 2% of elderly aged 76 years old and above, 65-75 years (1.7%) and 60-64 years (1.1%) decided to

use walking stick. According to Blackler, Brophy, O'Reilly, and Chamorro-Koc (2018), walkers sticks are essential for most people in aged care and additionally, elderly individuals begin to use a walking stick due to the decrease in the ability to maintain balance and increase in the rate of falling and need of psychological and physical support (Tinetti, 2003).

▪ **The elderly travel mode of age groups**

In tradition of transport research, mobility or travelling is seen primarily as a derived demand (Mokhtarian & Salomon, 2001), a manifestation of travel activity derived from people's activity patterns or lifestyle. The finding indicates the detail of all the travel mode of the elderly. 47% of young old (60-64 years old) are more likely to travel by their own vehicle as passenger. Similar to the Czech Republic, passenger car is the most important transport mode for all age groups. With respect to the elderly aged 65-75 years old, the use of car pool is the higher (100%) among the elderly, followed by use their own vehicle as driver (52%) and public transport (51%). With age increases (76 and above), the elderly mostly emphasis on cycling (50%) and walk (28%) as their travel mode. In Austria, walking is the preferred mode of transport for the elderly, followed by driving. However, active transportation (e.g. walking and cycling) has the potential to compensate for the diminished physical activity that accompanies aging. This is based on the many well-known health benefits of a physically active lifestyle (Janssen, 2007; Smith, Quine, Anderson, & Black, 2002). According to Su and Bell (2009), many elderly persons would like to engage in out-of-home activities more often, but transportation deficiencies constitute a main obstacle.

▪ **Trip purpose of the elderly in Georgetown**

Trip purposes are categorised into six groups including family commitment, hospital appointment, visit friends, have fun, work/business and personal needs. This finding shows that personal needs was the most commonly cited reason for making a daily trip by Malay elderly from all age group. Most Indian elderly aged 60-64 (60%) and aged 65-75 (80%) were also travel due to personal needs, while family commitment was the most reason of trip purpose by the Indian elderly aged 76 and above. In addition, personal needs and family commitment were also the most reason for trip purpose of the Chinese elderly aged 60-64 years old (30.4%), respectively, followed by Chinese elderly aged 65-75 years old (25.9%) travel due to personal needs and visit friends, while having fun 45.4% was the preferred trip purpose of the Chinese elderly aged 76 and above.

▪ **The elderly travel mode in Georgetown**

The result indicates that most of older men aged 60-64 (69.7%) and aged 65-75(63.9%) preferred to use their own vehicle as drivers compared to older women and this finding similar to Truong and Somenahalli (2011), which found that older men are more likely to drive a car as compared to older women. On the other hand, public transport was the best choice for older women aged 60-64 (37.5%) and 65-75(38.1%) as compared to older men aged 76-year-old (29.4%). This finding similar to Schwanen et al. (2001) which indicated that older women are tend to use the public transport services as well as stated that public transport becomes more important as older people age. Interestingly, older women aged 76-year-old (45.5%) mostly prefer walking as their mainly travel mode compared to men elderly (23.5%). There was also evidence that in Australia more women walk than men (Pollard & Wagnild, 2017).

▪ **Elderly trip category in Georgetown**

The result reveals that most of the older men of all age categories are seen travelled due to personal matter, followed by 28.6% of older men aged 76 and above traveling to worship. This finding contrary to Truong and Somenahalli (2011) which revealed that place of worships is considered as “not important” by the elderly in Adelaide. In addition, personal matter was also become the most important trip category for older women aged 76-year-old (66.7%), while shopping (40%) and personal matter (40%) were the higher trip category of older women. Similar to older women aged 65-75 years old, shopping (36.4%) and personal matter (36.4%) were also reach the higher trip category of the elderly. Similarly, He, Raeside, Chen, and Mc Quaid (2012) also found that older women aged 60-69 shop more often than their older men counterparts. However, this finding also stated that older men elderly were mostly travelled to go to work rather than older women elderly, and it is similar to the available statistics pertaining to selected European countries underline that older women tend to travel less for work than men do. According to Sewdas et al. (2017), the most important motives for working beyond retirement age were maintaining daily routines and financial benefit. In addition, all elderly was also travelled for business, recreation and medicine examinations purposes.

▪ **Elderly’s reason not travel in Georgetown**

Majority of Malays elderly aged 60-64 years (70%), 65-75 years (59.1%) and 76 and above (40%) did not travel because they prefer to stay in their home. Similarly, stay at home was also become the higher reason for Chinese elderly aged 60-64 (50%) and 76 and above (57.1%) and this finding can be associated to Roy, Dube, Despre’s, Freitas, and Le’gare (2018), which stated that older adults wish to stay at home during their late life years. However, this study showed that health condition was the higher reason for not travel among the Chinese elderly aged 65-75 (58.3%). This finding similar to Shrestha, Millonig, and McDonald (2017), which indicated that health problems and mental condition of elderly, they make fewer and shorter trips. Similar to Indian elderly, stay at home was the preferred reason among the Indian elderly aged 60-64 (57.1%) and aged 65-75 (100%), while 66.6% of the Indian elderly aged 76 and above stated that poor health conditions have prevented them from traveling.

▪ **Mode shares by elderly monthly income**

Affordability is an important issue for many elderly as they probably have less disposable income in retirement. With limited resources, the cost of travelling could be a major barrier for many old people to travel as often as they would like (Shrestha et al., 2017). The finding shows that 31.8% of elderly who have no monthly income preferred to use their own vehicle as passengers. On the other hand, public transport was the higher mode share among elderly (47.6%) among the lower income group (under RM 1,000). When compared to the lower income group, higher income groups of RM 1,000 - RM 4,000 (47.2%) and more than RM 4,000 (61.5%) have a higher percentage of mode shares by their own vehicles as drivers. In addition, bicycle (2.3%) and car pool (4.5%) were also preferred by elderly who have no monthly income, while walking (26.2%) was the higher choice of the elderly received monthly income lower than RM1000 as their mode shares. This finding is similar to Schwanen et al. (2001) which found that lower income and unemployed elderly are more likely to walk and cycle, while it is contrary to Kim and Ulfarsson (2004) which reported that elderly with higher incomes are more likely to carpool.

▪ **Mode shares by elderly trip purpose**

Most of the elderly travel using their own vehicles as drivers for friend invitation (46.7%), work/business (37.5%), and personal needs (32%). The elderly mostly uses their own vehicle as drivers (35.7%) and their own vehicles as passengers (35.7%) for the family commitment, while 33.3% of the elderly use their own vehicle as drivers and their own vehicles as passengers as well as public transport service for hospital appointments. In addition, most elderly (27.3%) travel for fun and enjoy by using their own vehicles as driver and walk. This finding also similar to (Hjorthol et al., 2010), which stated that most elderly prefer to go from place to place by car rather than by walk or use of public transport.

7. Conclusion

In general, most respondents involved in the study consist of elderly from middle age groups (65-75 years old), Malays, low education level, unemployed or retired, receive income from RM 1,000.00 to RM 4,000.00 and have size family less than 4 people. In terms of mobility, most of the elderly in Georgetown can walk alone. In terms of travel mode, the majority of elderly aged 60-64 years old use their own vehicles as passengers, aged 65-75 years old, traveling with carpool while elderly aged 76 and above use bicycle. In terms of travel, most Malay and Indian elderly travel to fulfil personal needs, while Chinese elderly travel to enjoy. With regard to travel mode, older men use their own vehicles as drivers, while older women use public transport. In terms of category trip, older men and women travel on personal matters. With respect to the reason not to travel, most Malays and Indians state the reason for staying home, while Chinese elderly claim health reasons. In terms of income, elderly with no income prefer to use their own vehicles as passengers, while elderly earn less than RM1000 using public transport, while elderly receiving monthly income of RM 1,000 - RM 4,000 and above RM4000 using their own vehicle as a driver. The findings also found that most people use their own vehicles as drivers, using their own vehicles as passengers, public transport and walking for family commitments, hospital appointments, friend invitations, fun and pleasure, work/business and personal needs.

The findings suggest several implications for transportation policy. The government needs to provide an efficient and equitable urban structure, as far as possible, to enable all its members, especially older peoples to all areas and facilities, as well as to enable everyone to enjoy maximum urban living. In addition, the government also needs to plan urban transport effectively. The Federal Government is responsible for transportation plans, policy guidelines and matters relating to overall transportation planning and administration. Particular attention should be paid to areas around major public transport stations to ensure that they incorporate facilities that allow them to easily reach out to older persons and disabled people. The government also needs to provide guidelines and standards for the needs of the elderly and the disabled to be adopted on new pedestrian networks, terminals and public transport stations as well as various mod interchange stations. The use of bicycles will continue to be encouraged as a form of leisure and as an alternative of private transportation for short trips in residential and recreational areas.

Acknowledgments

This research benefited from USM RU Top-Down research grant 1001/PSOSIAL/8070001.

References

- Blackler, A., Brophy, C., O'Reilly, M., & Chamorro-Koc, M. (2018). Seating in aged care: Physical fit, independence and comfort. *SAGE Open Medicine*, 6, 1–17.
- Brandt, Å., Iwarsson, S., & Ståhle, A. (2004). Older people's use of powered wheelchairs for activity and participation. *J Rehabil Med*, 36(2), 70-77.
- Collia, D. V., Sharp, J., & Giesbrecht, L. (2003). The 2001 national household travel survey: A look into the travel patterns of older Americans. *Journal of Safety Research*, 34(4), 461-470.
- Coughlin, J. (2002). Transportation and older persons: Perceptions and Preferences –A Report on Focus groups. Retrieved from https://assets.aarp.org/rgcenter/il/2001_05_transport.pdf
- Department of Social Welfare Malaysia. (2019a). Retrieved from <http://www.jkm.gov.my/jkm/index.php?r=portal/keputusanUndi&id=SHNzVEDjWmRyUFKeExLKzJFdksvZz09>
- Department of Social Welfare Malaysia. (2019b). Retrieved from <http://www.jkm.gov.my/jkm/index.php?r=portal/left&id=VEpUUXV3THFURkZETmxWNjZpQ1BXdz09>
- Giuliano, G., & Hwa Hu, H. (2003). *Travel Patterns of the Elderly: The Role of Land Use*. Final Report
- He, L., Raeside, R., Chen, T., & Mc Quaid R.W. (2012). Population ageing, gender and the transportation system. *Research in Transportation Economics*, 34(1), 39-47.
- Heaslip, K. (2007). Are Travel Patterns of Older Drivers are Changing? In *29th International Association for Time Research Conference, Use Research Conference*. Washington, DC.
- Hjorthol, R., Levin, L., & Sirén, A. (2010). Mobility in different generations of older persons. The development of daily travel in different cohorts in Denmark, Norway and Sweden. *J Transp Geogr*, 18, 624–634.
- Janssen I. (2007). Physical activity guidelines for children and youth. *Canadian journal of public health*, 98(Suppl 2), 109-121.
- Kim, S. (2011). Assessing mobility in an aging society: Personal and built environment factors associated with older people's subjective transportation deficiency in the US. *Transportation Research Part Traffic Psychology and Behaviour*, 14(5), 422-429.
- Kim, S., & Ulfarsson, G. (2004). Travel mode choice of the elderly: effects of personal, household, neighborhood, and trip characteristics. *Transportation Research Record*, 1894(1), 117-126.
- Kostyniuk, L. P., Renée M., Zanier, N., Eby, D. W., & Molnar, L. J. (2012). Transportation, mobility, and older adults in rural Michigan. Retrieved from <https://deepblue.lib.umich.edu/handle/2027.42/91979>
- Mokhtarian, P. L., & Salomon, I. (2001). How derived is the demand for travel? Some conceptual and measurement considerations. *Transportation Research Part a Policy and Practice*, 35(8) 695-719.
- National Transport Policy. (2019). National Transport Policy for 2019-2030, Retrieved from https://www.pmo.gov.my/wp-content/uploads/2019/10/Dasar-Pengangkutan-Negara-2019_2030BM.pdf
- Pollard, T. S., & Wagnild, J. M. (2017). Gender differences in walking (for leisure, transport and in total) across adult life: a systematic review. *Pollard and Wagnild BMC Public Health*, 17(1), 341.
- Rosso, A., Taylor, J. A., Tabb, L. P., & Micheal, Y. L. (2013). Mobility, Disability, and Social Engagement in Older Adults. *J Aging Health*, 25(4), 617–637.
- Roy, N., Dube, R., Despre's, C., Freitas, A., & Le'gare, F. (2018). Choosing between staying at home or moving: A systematic review of factors influencing housing decisions among frail older adults. *PLoS ONE*, 13(1), e0189266.
- Schwanen, T., Dijst, M., & Dieleman, F.M. (2001). Leisure trips of senior citizens: determinants of modal choice. *Tijdschrift voor Economische en Sociale Geografie*, 92(3), 347-360.
- Sewdas, R., de Wind, A., van der Zwaan, L. G. L., van der Borg, W. E., Steenbeek, R., van der Beek, A. J., & Boot, C. R. L. (2017). Why older workers work beyond the retirement age: a qualitative study. *BMC Public Health*, 17(1), 672.
- Shields, M. (2004). Use of wheelchairs and other mobility support devices. *Health Reports*, 15(3), 37–41.

- Shrestha, B. P., Millonig, A., & McDonald, M. (2017). Review of Public Transport Needs of Older People in European Context. *Population Ageing*, 10(4), 343–361.
- Smith, R., Quine, S., Anderson, J., & Black, K. (2002). Assistive devices: self-reported use by older people in Victoria. *Aust Health Rev*, 25(4), 169–177.
- Su, F., & Bell, M. G. H. (2009). Transport for older people: Characteristics and solutions. *Research in Transportation Economics*, 25(1), 46-55.
- Sundling, C., Berglund, B., & Pendrill, L. R. (2014). Overall Accessibility to Traveling by Rail for the Elderly with and without Functional Limitations: The Whole-Trip Perspective. *Int. J. Environ. Res. Public Health*, 11(12), 12938-12968.
- Tinetti, M. E. (2003). Clinical practice. Preventing falls in elderly persons. *N Engl J Med*, 348(1), 42–49.
- Truong, L. T. (2011). Exploring mobility of older people: a case study of Adelaide. In *Australasian Transport Research Forum 2011 Proceedings*. Adelaide: Australia Publication. Retrieved from <http://www.patrec.org/atrf.aspx>
- Zong, G., Liu, W., & Zhang, C. (2013). A household decision-based disaggregate mode choice model. *Hunan Daxue Xuebao/Journal of Hunan University Natural Sciences*, 40(4), 100–103.