

Accessible transportation and mobility issues of elderly — how does Australia compare with Japan?

Sekhar Somenahalli*, Yoshitsugu Hayashi, Michael Taylor, Tetsuo Akiyama, Timothy Adair and Daisuke Sawada

¹ University of South Australia, Adelaide, 5095, Australia

² Nagoya University, Nagoya, 464-8602, Japan

³ University of South Australia, Adelaide, 5000, Australia

⁴ University of Chuo, Tokyo, 192-0393, Japan

⁵ The University of Melbourne, Melbourne, 3010, Australia

⁶ ECOMO foundation, Tokyo, Japan

Abstract: Accessible transportation is a key aspect of independent living. As the impact of population ageing on future transport systems is expected to be increasingly felt over the next few decades in a number of countries, including Australia and Japan, it is logical to recognise the importance of formulating appropriate transport policies in ageing societies. However, few studies in Australia have focussed on this issue as most of them have been devoted to the physical dimensions of health. This paper is based on a recent survey of older South Australians and a series of in-depth discussions conducted with key stakeholders both in Australia and Japan, conducted by the principal author. This paper highlights the accessible transportation and mobility issues in Australia's ageing society by shedding light on some of the important policies and laws prevailing in Japan, which have already reached the proportion of the older population that Australia is projected to be 10 years from now. Our findings would provide answers and new approaches into the challenges from a policy and legislative perspective to help formulate recommendations for the stakeholders.

Keywords: ageing, universal design, transport polices, mobility scooter usage issues, driving licence issues of elderly

*Correspondence to: Sekhar Somenahalli, University of South Australia, Adelaide, 5095, Australia; Email: Sekhar.somenahalli@unisa.edu.au

Received: November 11, 2015; **Accepted:** April 12, 2016; **Published Online:** June 1, 2016

Citation: Somenahalli S, Hayashi Y, Taylor M, *et al.* 2016, Accessible transportation and mobility issues of elderly — how does Australia compare with Japan? *Journal of Sustainable Urbanization, Planning and Progress*, vol.1(1): xx-xx.

<http://dx.doi.org/10.18063/JSUPP.2016.01.001>.

1. Introduction

It is well documented that the absolute number and share of older people are on the significant increase in developed countries^[1-5]. There is also evidence that mobility declines with increasing age^[1,3]. In this context, it is important to examine the issues relating to accessible transportation and mobility needs of an ageing society. Accessible transportation is a key aspect of independent living. Accessible

transportation includes public transport services and terminals, personal vehicles and road infrastructures especially pedestrian infrastructures. A majority of older Australians prefer to live independently with their spouse or alone, rather than to live with other people^[6]. Older people who live with others, either family members, a spouse or in a care facility are more likely to have support networks to assist with daily living such as shopping, cooking, personal care, mobility and transport. However, for the older person

(especially females) living alone, life can be even more challenging especially if reliable support networks are not in place and if the person experiences health and mobility limitations. If their transport mobility needs are not adequately met by transport services, they will become socially excluded. Older people's transport needs are diverse and treating all persons over 65 years as one homogeneous group is also not appropriate. As the impact of population ageing on future transport systems is expected to be increasingly felt over the next few decades in a number of countries including Australia and Japan, it is logical to recognise the importance of formulating appropriate transport policies in ageing societies.

This paper is based on a recent survey of older South Australians and a series of in-depth discussions conducted with key stakeholders both in Australia and Japan, conducted by the principal author. This paper highlights the accessible transportation and mobility issues in the ageing society of Australia by shedding light on some of the important policies and laws prevailing in Japan, which have already reached the proportion of the older population that Australia is projected to be 10 years from now. Japan was selected because it has demographics and ageing trends similar or more acute to those in Australia and has strong traffic safety records. Moreover, both countries are highly developed and have a long life expectancy^[7]. Our findings would provide answers and new approaches into the challenges from a policy and legislative perspective to help formulate recommendations for the stakeholders.

2. Universal Design

2.1 Universal Design Issues — Australia

Although the concept of universal design emerged mainly with people with disabilities in mind, universal design helps everyone with support and assistance including the elderly, pregnant women, children and people with a temporary illness or injury^[8]. Until recently, transport planners have focussed on the ageing and transport issues in terms of social equity dimension; however, the current argument is that this issue has wider ramifications, especially the role of transport on health and overall quality of life in an ageing society is an important one^[9]. Nevertheless, few studies in Australia have focussed on this issue as most of them have been devoted to the physical dimensions of health. In Australia, urban transport is a state and ter-

ritory responsibility although Australian Government policies do affect the level and pattern of urban travel demand^[10]. Infrastructure Australia is a national body assisting governments to develop a strategic blueprint for unlocking infrastructure bottlenecks and modernising the nation's economic infrastructure. Austroads, the Association of Australian and New Zealand road transport and traffic authority functions much like the American Association of State Highway and Transportation Officials (AASHTO) in the USA. In general, Australia has followed the Federal Highway Administration (FHWA) model very closely on handbook and training course development paired with changes in existing standards to better address the specific needs of older road users^[11]. The Australian transport policy framework is not specifically targeted to senior citizens. In relation to the disability access framework, Australia (and South Australia) has formulated Acts, Policies and Strategies, Plans, Standards and Guidelines, both at national and state levels. However, there is no data relating to the progress of implementation of the framework.

The *Disability Discrimination Act 1992* (DDA) is part of the package of federal anti-discrimination laws providing protection for everyone in Australia against discrimination based on disability. Disability Standards for Accessible Public Transport have been prepared under the *Disability Discrimination Act 1992* to specify rights and responsibilities about equal access and the opportunity to use public transport for people with a disability^[12]. These were the first Disability Standards to be introduced in Australia^[13]. Traffic Engineering Standards such as the Austroads Guidelines and the Australian Standards have not been given the force of law under the DDA except where they are specifically referenced by the Disability Standards for Accessible Public Transport (DSAPT). However, one main issue is that compliance is not enforced unless a complaint is made. Transport Standards has a 30-year implementation timetable; however, the progress so far is an uneven and a piecemeal approach rather than a wholesale implementation.

There are a number of other issues with regards to the implementation of transport standards including (i) The lack of baseline data on public transport patronage usage by people with disabilities, (ii) The extent to which rail infrastructure in the States and Territories is accessible is not fully satisfactory—as per the ACG report^[13], less than 40% of railway stations all the states are fully compliant, (iii) Reporting on accessi-

bility and compliance is the responsibility of state governments, without any uniform national framework being in place.

2.2 Universal Design Issues — Japan

The Ministry of Land, Infrastructure, and Transport (MLIT) is responsible at the national level for making transport policies and coordinating other agencies in implementing them. Japan has a unitary system of government in which local jurisdictions are largely financially dependent on the national government. At the local level, metropolitan districts, urban prefectures and rural prefectures serve mainly as an extension arm of the national government. In contrast, Australia has a federal system of states and territories and administration is more decentralised. However, for any national projects implemented at the local area, the national government is still involved in implementation.

In Japan's ageing society, for people to continue enjoying happiness throughout their lives, the national government enacted 'The Basic Law on Measures for the Aging Society' (Law No.129, 1995). This law is designed to promote, in a comprehensive manner, measures to appropriately deal with the ageing society. As per this law, the national government has the duty to enact and implement comprehensive measures for an ageing society which conform to the basic objective states in a number of articles of this law. In the year 2000, the 'The Transportation Accessibility Improvement Law' was enacted to promote easy accessibility to public transportation for the aged and the disabled. This law promotes barrier-free facilities in train stations, bus terminals, ferry terminals, airport passenger terminals, trains, buses, ferries, and aircraft. The law sets progress targets to be achieved within a decade of its implementation including removal of barriers from terminal stations and vehicles. It also stipulated that municipalities should formulate fundamental policies for barrier-free facilities and ensure that areas around railway stations are accessible to all. The Transportation Accessibility Improvement Law 2000 and "Heart Building Law" (Haato biruhou) were combined into one new law in 2006^[14]. This new law aims to achieve comprehensive development for accessible buildings and transport amongst other facilities. This law (revised in 2011) now stipulates that any passenger station which serves 3000 people or more per day should implement barrier-free designs.

The measures in Japan included spatial planning

around the passenger terminals, and this approach is not seen in Australia. The Japanese Ministry of Construction has specified minimum sidewalk widths, path gradients, and height of the sidewalks for barrier-free access. For example, they have changed the minimum width of sidewalks from 1.5 to 2.0 metres to allow two wheelchair users to cross in front of each other. They have also changed the downhill gradient of sidewalks to roadways from 8% to 5% and the standard height of sidewalks from roadways from 150 mm to 50 mm, as per the new law. The ministry has initiated a project to install escalators or elevators. It covers all train stations with more than 5000 users a day and staircases that are five metres or greater in height. The cost is being shared equally by the national government, local governments, and railway companies^[15]. The penalties proposed in this law offer momentum for the introduction of barrier-free facilities in public transport systems^[16]. The accessibility standards, similar to the Disabilities Act standards in Australia also serve the needs of older road users by specifying kerb heights, tactile markings, and sidewalk widths to aid older people with mobility limitations. Many prefectures and municipalities have enacted the 'Welfare City Planning Ordinances'. Bus companies have adopted lift-equipped and low-floored buses, and the central government enacted a guideline for installing elevators in railway stations^[15]. Japan is also making widespread use of text messages and symbols in pavement markings. Good progress is being made with respect to achieving barrier-free facilities. For example, there are about 9500 railway stations in Japan and out of those, 2800 key stations are being used by 5000 passengers or more per day. Currently, 85% of these stations are barrier free. Similarly, more than 90% of bus terminals have barrier-free facilities, 97% of the key railway stations and 86% of key bus terminals are equipped with tactile guide blocks. Japan has also developed Universal Design (UD) taxis and it is estimated that 28 000 UD taxis will be needed in Japan by 2020. Similar targets are in place for ferries and aircraft.

3. Mobility Scooters

3.1 Mobility Scooter Issues — Australia

A mobility scooter is a mobility aid equivalent to a wheelchair but configured like a motor scooter and is usually battery powered. Mobility scooters (or 'go-phers', as colloquially known in South Australia) or

buggies are a convenient alternative way to travel to shops or around the community for people with walking difficulties^[17]. They are increasingly popular among older Australians^[18,19]. The *Australian Road Rules* states that a person using a mobility scooter is classed as a pedestrian and the maximum speed on level ground cannot exceed 10 km/h. Riders do not need a driver's licence and they must observe the same road rules that apply to pedestrians and must not travel along a road if there is a footpath or verge area adjacent to the road. However, at many instances, mobility scooters are known to be used on road pavements which are unsafe. Moreover, some mobility scooters have low ground clearance which can make it difficult travelling in some suburbs without proper kerb cuts. Of the Australian states and territories, only Queensland requires registration of mobility scooters^[20] and riders need a medical certificate to prove that the scooter is for mobility purposes. The scooter also needs to be inspected before use in Queensland but not in other states^[21].

The South Australian Motor Accident Commission provides third party bodily injury insurance for claims involving incidents that occur on the road or footpath where the rider of the mobility scooter was at fault. However, this insurance is not mandatory. Due to concerns over safety issues and problems with bringing prosecutions against irresponsible users under existing laws, there is an on-going debate in Australia to consider whether to make third party insurance mandatory, consider the introduction of compulsory training for users and discuss how to bring scooter users under wider road traffic legislation. Australia's first national survey of mobility scooter users^[22] reported that mobility scooter users cannot be characterised just as elderly road users with over 50% of scooter users aged less than 60 years. Another surprising finding from this survey is that a large proportion of scooter users live in rural areas, which has ramifications regarding training, safety and servicing of these vehicles. Although there are no crash records involving mobility scooters for all of Australia, [Figure 1](#) depicts the situation in Adelaide, which has a population of 1.2 million people. Though currently the situation is not alarming, in the next 10 years it will be similar to Japan.

3.2 Mobility Scooters Issues — Japan

In Japan, the aged services community view mobility scooters as an important alternative form of transportation to retain personal mobility. There are nearly half

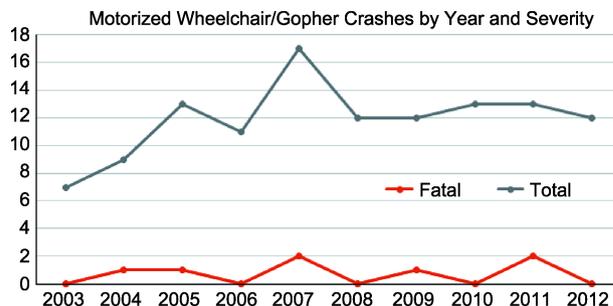


Figure 1. Reported motor scooter accidents in Adelaide, South Australia.

a million mobility scooters recorded at the point of shipment with around 15 000 vehicles added annually. The specifications for mobility scooters are defined in Japan Industrial Standards (JIS) T9208, established in 2009^[23]. The maximum allowed speed for mobility scooters is 6 km/h and is treated as equivalent to a pedestrian (as in Australia) and hence are not allowed to ply on roads. There are two types of categories; namely, type 1 and type 2. Type 1 can pass through a 1.2 m right angle passage without counter steering whereas type 2 can pass through a 1 m passage. People can take both types of mobility scooters on most trains; provided the train station can accommodate them, i.e., having adequate facilities such as elevators. However, the Shinkansen (bullet train) which has passenger cabins separated from the entrance space for getting on and off will only allow type 2 mobile scooters due to limited space of the entranceway.

The long term care insurance policies helped older people to acquire any assisted devices. Long term care insurance is a system in which society as a whole supports people and their families who are faced with a situation in which someone needs long-term care. Under this system, all residents who are 40 years old and older pay an insurance premium. In order to use a service provided by the long-term care insurance, residents have to apply for a certification that they require long-term care or support. Based on the decision by the Long-term Care Approval Board, the applicant will be judged either unqualified (self-reliant), some support required (1 and 2) or long-term care required (Care Levels 1–5).

In accordance with the provisions of the Japanese Consumer Safety Act and the Consumer Product Safety Act, mobility scooter accidents are reported to the Consumer Agencies. [Figure 2](#) shows the reported accidents from 2003 to 2007. It is important to note that the total number of accidents and fatal accidents

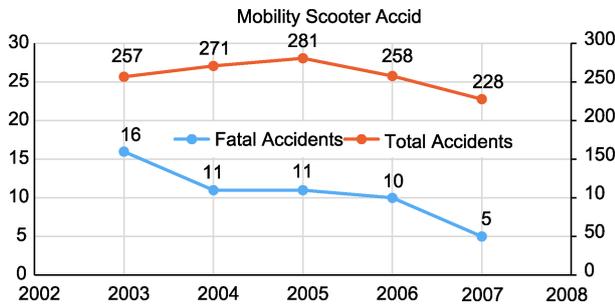


Figure 2. Reported motor scooter accidents in Japan (Source: The Association for Technical Aids Guide).

involving mobility scooters is on a gradual decline. The reasons for this are not fully clear, but it could be due to the change in laws regarding long term care insurance policy that were implemented in 2001, i.e., the mandatory requirement for potential buyers to get a certificate from the care manager for renting such devices might have resulted in lower sales and thus lower numbers of accidents.

It is also clear from Figure 3 below that a significant percentage of mobility scooter accidents occur while on shopping trips. This guide also reported that most of the fatal accidents (73.6%) occur at intersections.

The National Institute of Technology and Evaluation reported that 75% of mobility scooter accidents in Japan were caused by incorrect operation or negligence by the drivers^[23]. It also reported that accidents can be prevented if proper training and awareness is inculcated among the users, especially new riders. There are some programs initiated by the Japanese police for safe use of electric wheelchairs and mobility

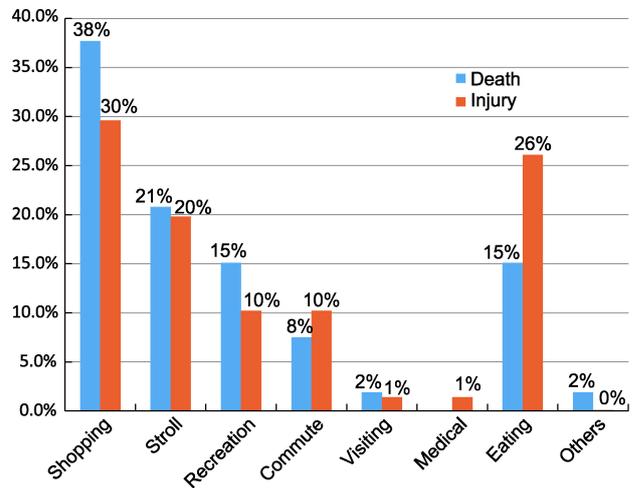


Figure 3. Purpose of the trips among motor scooter accidents (Source: The Association for Technical Aids Guide).

scooters by promoting traffic safety education but few people have participated in these training programs.

Another important issue relating to the accidents is that new riders, i.e., those who are using mobility scooters for less than a year, accounted for 40% of the accidents^[24] as they are not familiar with the usage of the vehicle. As shown in Figure 4, there are around 4.8 million people requiring long term care, a significant percentage of whom are female especially in the over 80 age group. Even with some regulations in place, the demand for mobility assistance devices will continue to grow and accordingly efforts should be made to register them and also in building safer mobility scooters. There are some efforts in this direction^[23] to develop mobility scooters with automatic deceleration using laser scanners to improve its operation and

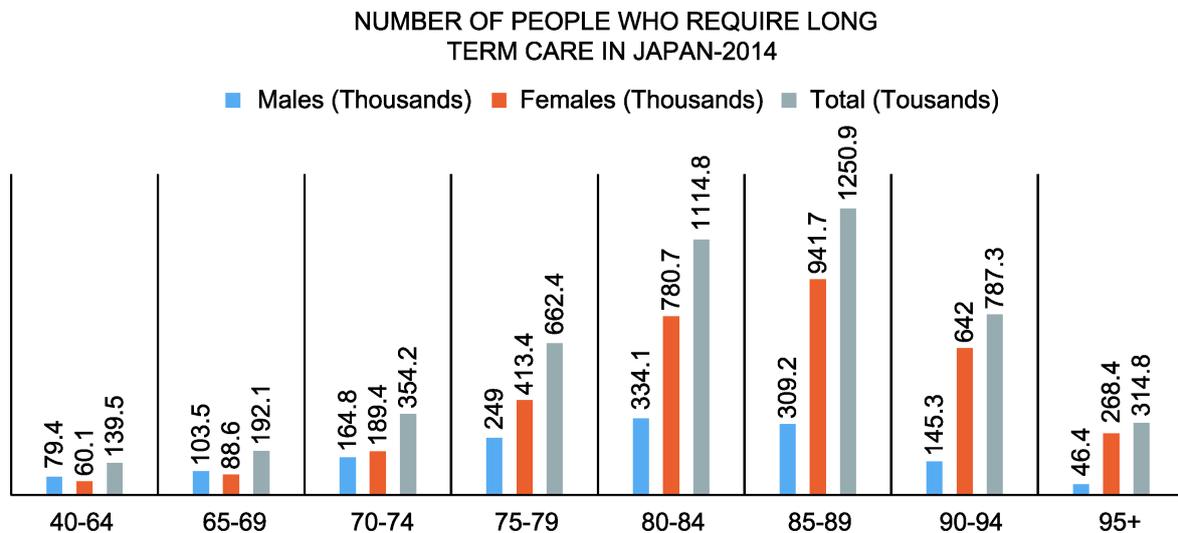


Figure 4. Number of people who require long term care in Japan – 2014.

safety without reducing the convenience. Such systems use laser scanners mounted in front of the mobility scooter to detect obstacles automatically and then gradually reduce the maximum speed to one-third of the initial speed.

In the city of Tsukuba (Ibaraki Prefecture), Japan and Toyota Motor Corporation (TMC) have recently demonstrated trials of the “Winglet”, a personal transport assistance robot ridden in a standing position^[25]. If successful, this might be attractive to the young elderly for undertaking short trips on sidewalks.

4. Adelaide Seniors Travel Survey (ASTS)

4.1 Data Collection

The following section reported an analysis of the primary data from the Adelaide Seniors Travel Survey (ASTS) conducted in 2012 by the principal author. The survey was targeted at people aged 65 and above. It sought details of respondents’ travel patterns during a normal week as well as their opinion on a number of related issues. The ASTS survey was a self-administered questionnaire survey conducted with the aim of recording travel behaviour, residential relocation after retirement and opinion about the use of mobility scooters and transport issues of older people who live in Metropolitan Adelaide.

The study area for the survey was restricted to the Adelaide Statistical Division (ASD). Since the elderly are not a homogeneous group, a sample was chosen that reflected diverse lifestyles. As a first step, older adults (over 65 years of age) were grouped into 3 categories: the young elderly (65–74), the elderly (75–84) and the older elderly (85 years and older). The sampling frame consisted of randomly selected residents aged 65 and over from each postcode in the ASD taken from those elderly residents who were members of the National Seniors Australia (NSA), an organisation representing the interests of people aged 50 years and over. Stratified sampling was used to ensure that there was even representation in the sampling from each of the postcodes in the ASD. Survey forms were posted to 1000 registered older adults (aged 65 and above) from the NSA database with the proportion of surveys posted to each of the above three age groups equal to the proportion in the 2006 Australian Census. The survey form was also published online and approximately 600 other registered older adults representing each of the above three categories were sent an e-mail requesting them to fill the on-line survey

questionnaire. In order to collect travel responses representing all days of the week, respondents were asked to fill their travel details for one day of the week, i.e., the day of the week that their birthday fell on the year 2012.

The period for completion and return of surveys was 16 weeks (from 1st June to 1st October 2012). The response rate for postal surveys was about 26% based on the valid questionnaire sets for the posted forms. There were a total of 264 returned questionnaire sets, but only 259 were considered valid. In the case of this on-line survey, there were only 26 (around 3.8%) valid responses out of the 600 older people contacted through e-mail. In total, 285 (259 + 26) respondents’ data is analysed in this paper.

4.2 Results of the ASTS

This study showed that more than 54% of the respondents share a house with someone and nearly 46% of the respondents live alone. When the living arrangements of old people were divided on the basis of gender, there were some very interesting findings; i.e., males tend to live in a shared household with 74% of them living either with their partner/spouse. However, out of the total of female respondents, over 73% of females live alone. A further breakdown of the figures according to the age group showed that 12% of solo elders are male in the age group of 65–74, 28% are males in the age group of 75–84 and 5% are males in the age group of 85 and over. Similarly, 37% of solo elders are females in the age group of 65–74, 28% are females in the age group of 75–84 and 8% are females 85 years and older.

Females in the age groups of 75–84 are potential customers for owning mobility scooters because a significant number of them live alone, have some form of difficulty in using conventional transport mode (Figure 5) and are more likely to lose their licence. Moreover, the elderly female population in that group is increasing more rapidly in Australia and more specifically in South Australia (Figure 6).

Figure 7 showed older people’s opinions about convenience, speed and safety of mobility scooters. Around 35% of older respondents had a neutral opinion about these issues. Safety of mobility scooters was of concern to some older people, as compared to convenience and speed.

Many respondents agreed that mobility scooters can provide independent travel to older and disabled people. However, many also indicated a need of training for mobility scooter drivers. Most respondents do not

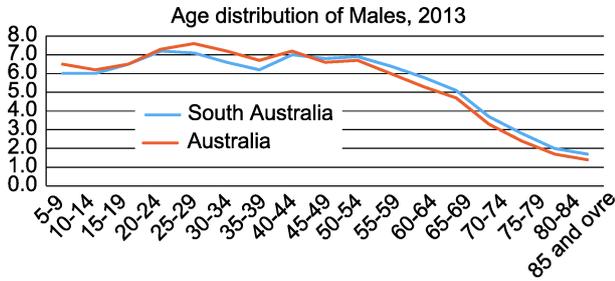


Figure 5. Age distribution of males in Australia and South Australia, % (DPTI 2013).

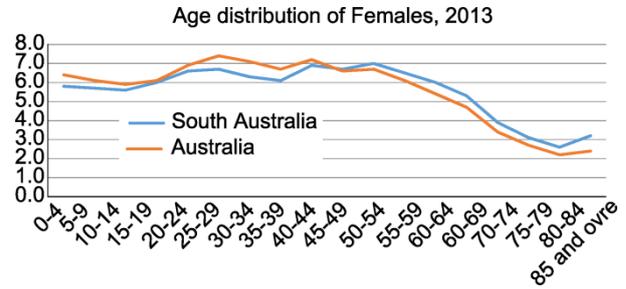


Figure 6. Age distribution of females in Australia and South Australia, % (DPTI 2013).

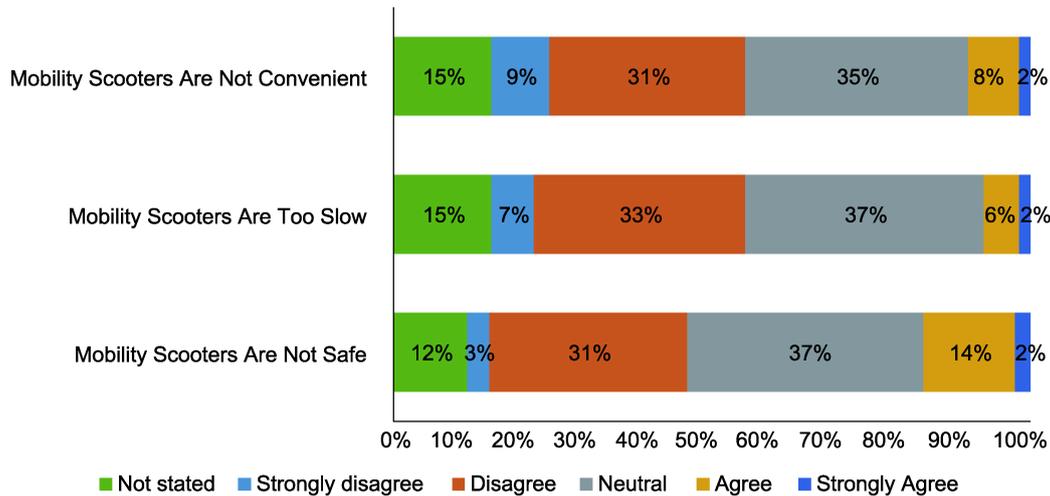


Figure 7. Opinion about mobility scooters, %.

have a mobility scooter (Figure 8). However, one concerning issue that might have an impact on policy was that 9% of them intended to buy one and 57% would consider buying one if needed, e.g., when they no longer drive a car.

Seniors were asked what factors limited their use of public transport. Forty-six per cent of seniors did not have any condition that limited their use of transport (Figure 9). Among the seniors who had issues with using transport, many reported difficulty in walking, standing and climbing steps. A small percentage of

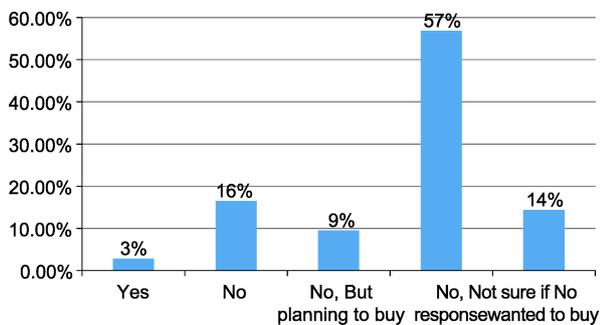


Figure 8. Ownership of mobility scooters.

seniors had conditions such as visual or hearing impairments and communication difficulties, which all limited the use of public transport.

When these results for seniors were categorised into three different age groups, the proportion of people without a condition decreased with age (Figure 10). There was a large increase in the percentage of seniors in the 75–84 and 85+ age groups who have difficulty climbing steps compared with the 65–74 age group. A significant percentage of people who are 85 or older had a hearing impairment. People aged 85 or older also had difficulty walking and standing compared to people in the 65–74 and 75–84 age groups. The number of people with vision impairment was similar across all three age groups.

5. Driving Licence Issues of the Elderly

5.1 Driving Licence issues of the Elderly—Australia

From the 2012 ASTS, a large majority of the respondents (89%) who are retired still have their driving licence. Out of the 285 respondents, 91% owned a car and when car ownership was divided on the basis of

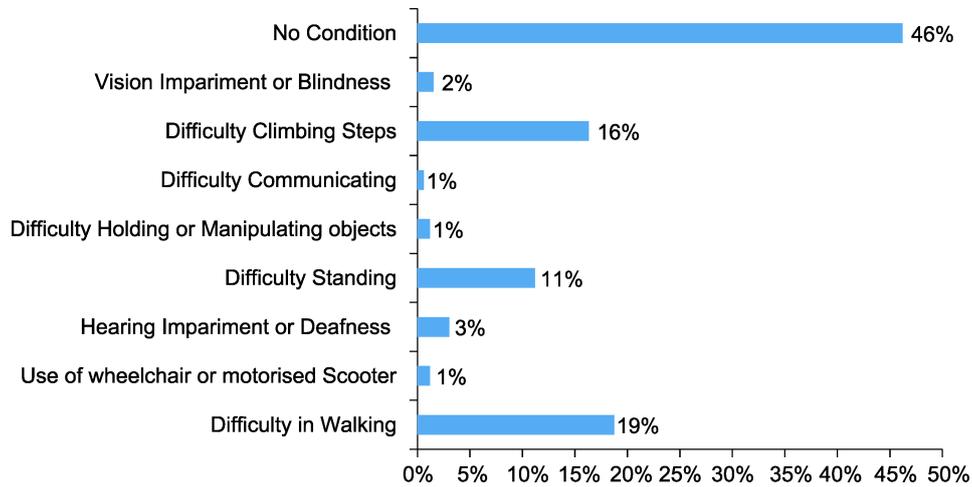


Figure 9. Factors Limiting Public Transport Use, %.

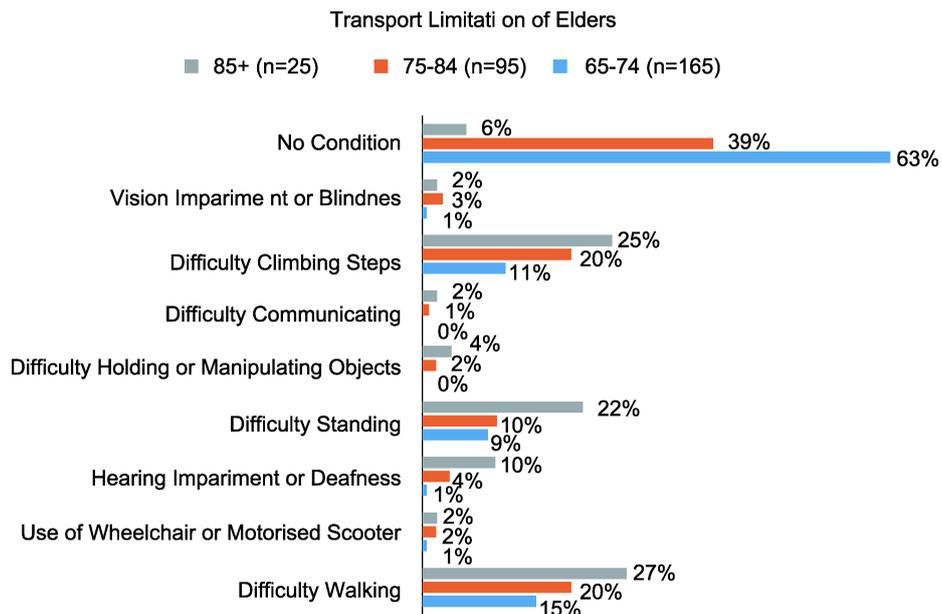


Figure 10. Factors limiting public transport use vs age.

gender it was revealed that males also had a higher percentage (95% against 88% for females) of car ownership. The Australian Bureau of Statistics^[26] also reported that as women in Australia age, their use of a passenger vehicle to get to work or study increased and their public transport use decreased. As per ASTS, the percentage of males owning a licence is higher than that of females (Figure 11). Not having a licence can act as a hindrance in mobility for older people given that most of the old people depend on a car as their preferred mode of transport.

There is no uniform policy in all Australian states on the issue of driving cessation, and various state governments are not clear in their approach in making

a balance between public safety and individual mobility. Transport alternatives for older people who no longer

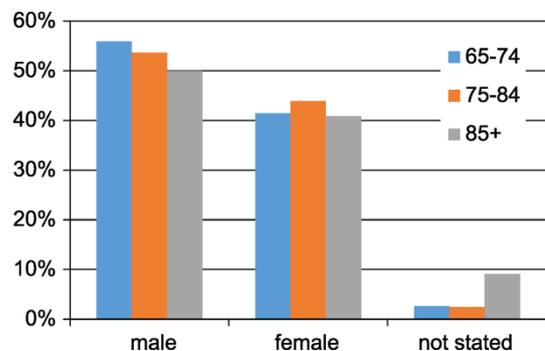


Figure 11. Age, gender and licence.

drive stands to become an increasing issue for the State Governments in Australia. Public transport and walking are not frequently used modes of transport for the elderly as a whole in many western nations including Australia^[1]. Once people lose their driving licence, people may become socially isolated. In relation to South Australia, whilst the road safety crash risk for older drivers is not as high (Figure 12) as young drivers (16 to 19 and 20–24 age groups), research has shown that crashes involving older drivers are increasing and are becoming of higher severity, probably due to the frailty of these older users (DPTI

2013). In relation to gender, females (Figure 13 and Figure 14) in the age group of 80–84 are involved in crashes more often when compared to their male counterparts. It was also reported that older drivers were more likely to be involved in fatal and serious injury crashes at intersections (52%) than other drivers, i.e., 52% of older driver crashes occur at intersections compared to 35% of all crashes^[27]. The reason could be that as intersections and junctions are complex traffic environments, a driver has to attend to a variety of information sources while under time pressures and perhaps the ability to do so decreases with age.

Serious casualties by age and population distribution -South Australia-2008-2012

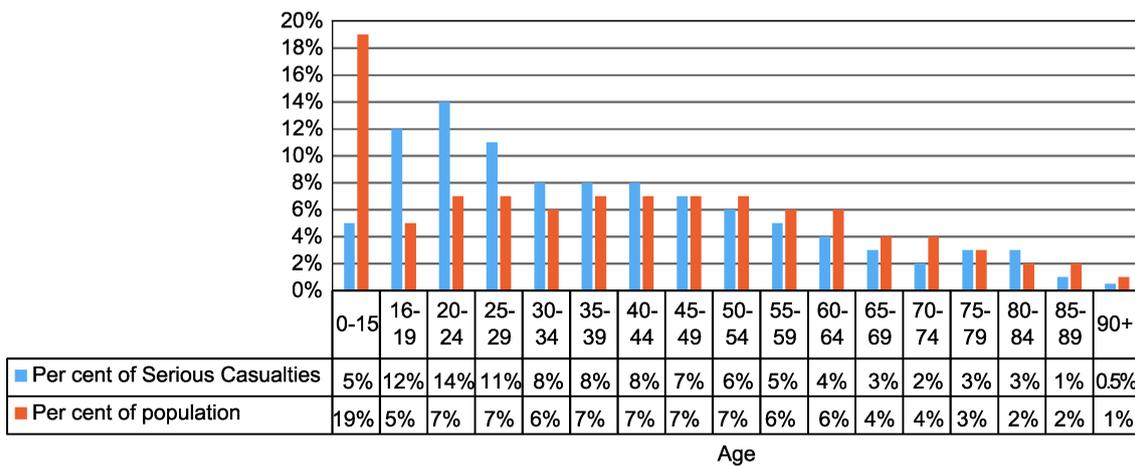


Figure 12. Serious casualties by age and population distribution – South Australia, 2008–2012 (DPT2013).

Road crash fatalities of Males by age group , South Australia, 2009-2013

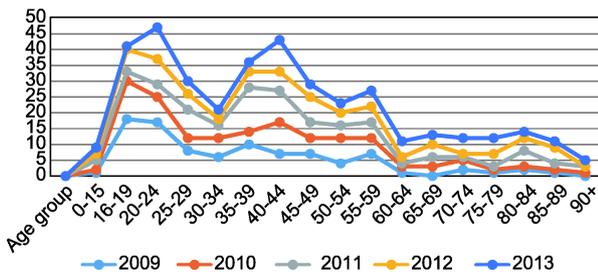


Figure 13. Road crash fatalities of males in South Australia.

Road crash fatalities Females by age group , South Australia, 2009-2013

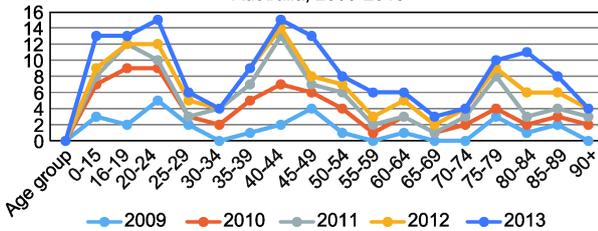


Figure 14. Road crash fatalities of females in South Australia (DPTI 2013).

5.2 Driving License Issues of the Elderly — Japan

In Japan, the law requires driver retesting at age 75. Elderly drivers between the ages of 70 and 74 are required to attend a seminar (that offers safety tips for driving) in order to continue their driving licence. As accidents involving older adults accounted for 13% of all accidents in the Tokyo 23 special ward district, the Tokyo metropolitan government has implemented an incentive program to encourage drivers aged 65 and over to voluntarily surrender their driving privileges. The idea of voluntary forfeiting the licence program is in response to the increase in number of accidents involving the elderly as well as the growing number of elderly drivers on the roadways. An earlier similar scheme was not popular as older drivers were keen to retain their driving licence for identification purposes. However, the authorities now issue driving career certificates which can act as an alternative form of identification and also offer discounts at various stores. When drivers over 65 years of age surrender their li-

cence, they can now receive a certificate of their entire driving career. There are believed to be about 300 000 elderly drivers with dementia in Japan. Although drivers over 75 must have a doctor's examination, there are indications that symptoms like dementia are overlooked. Thus, this preventive safety measure/policy aims to encourage drivers to stop driving while still physically and mentally fit. In addition to the incentive program to voluntarily surrender licences, a labelling system is now used in Japan to identify drivers over the age of 75. This system is developed by the Public Safety Commission in association with the National Police Agency. The driver must position the labels on both the front and rear of the car. The labelling program extends beyond the elderly; novice drivers, the hearing impaired, and handicap drivers. The current licence forfeiture program is still relatively new; therefore, its popularity with drivers aged 65 and over is not clearly established. Unofficially, there are reports that only around 10% of older drivers have registered for the program.

6. Discussion

6.1 The Australian Perspective

Australia, like Japan, should formulate transport policies that treat ageing issues as an opportunity rather than a burden. In South Australia and in Australia generally, progress in urban infrastructure planning around the needs of an ageing population is not yet satisfactory. For example, there is no consistency in implementing the installation of Tactile Ground Surface Indicators (TGSI) which could improve the life of people with vision impairment. Although vision impairment is not a major issue at present, it will be a more important issue in the near future. Similarly, there is a large increase in the percentage of older people in the age groups of 75–84 and 85+ who have difficulty climbing steps and there are many transport facilities which are still not suitable for an aged population with climbing difficulties. Some railway stations have been made more accessible but many stations still have many stairs with no lifts, and it is important that these are addressed as a matter of priority. State governments need to implement policies and design practices for the elimination of barriers and the installation of barrier-free facilities in public transport systems. Considerable investments and time are required to develop the infrastructure in order to attain the same standards that are now available in Japan. When accessibility

needs of the elderly and disabled are addressed during planning and construction, universal design costs are manageable and not expensive. For example, earlier studies^[6] have shown that providing fully accessible facilities increases building costs by as little as 0.5% to 1% if planned, designed and implemented from the outset.

There is an on-going debate in Australia regarding the rise in number of older people who use mobility scooters for transportation. As they have become more popular, mobility scooters have become more controversial. As there is no licence and insurance requirement, these mobility scooters are gradually becoming popular. There are no industry statistics that give an accurate sense of how the market is growing. While there is a consensus among older people that mobility scooters offer independent travel especially for the disabled, concerns about safety are evident. The analysis suggested a need for training mobility scooter drivers and increasing the visibility of mobility scooters, e.g., the compulsory use of flags. Older Australians (more so South Australians) prefer to live independently with their spouse or alone rather than to live with other people. Older people who live with others—either family members, a spouse, or in a care facility are more likely to have support networks to assist with daily living such as shopping, cooking, personal care, mobility and transport. However, for the older person (especially females) living alone, life can be more challenging, especially if reliable support networks are not in place and if the person experiences health and mobility limitations.

This is where spatial factors can play an important role in the quality of life. Living close to family, friends, medical services, and shopping facilities can mean the difference between the quality of life and detrimental social and health implications. Understanding the demographics of older people can assist with planning for future policy and service provisions. Many older people consider mobility scooters as having the potential for increasing independent travel in their later age. However, concerns about safety and the need for driver training are highlighted. Our survey results indicated that while only 9% of South Australian elders were planning to buy mobility scooters, some 57% were still undecided. The results suggested that the use of mobility scooters is likely to increase in the near future. Mobility scooters are mainly intended as an aid to mobility and not as a person's main or only means of transport. However, in

the future if no alternative transport options are available for older people, older adults especially more females may be tempted to use mobility scooters for longer trips which will lead to more serious and fatal crashes.

There should be clear ideas and policies on what should be done in terms of licensing, training or enforcement. Only Queensland has taken the lead by implementing a process for registration of mobility scooters. Though earlier literature^[4] suggested that older people chose to limit their driving as they age, resulting in declining ability and increasing dependence on friends, relatives and neighbours, the results from this study showed that a significant number of older people continue to drive as they age. Older people tend to use their cars. The ASTS survey results indicated that they are still keeping their licences active and use their private car for most of their travel needs. The use of public transportation was much inferior to the private car with only 4% of the elderly using it daily—in fact the ASTS indicated that more than 30% of South Australian elders never use the public transportation in their daily travel needs. This may be due to the distance of bus stops from residences as shown from the ASTS survey where 35% of the elders needed to walk at least 10 minutes to the nearest bus stop, and 38% have to walk more than 15 minutes to the nearest tram or train stops. As a significant number (18%) of people reported health issues that will limit their ability to walk, it is important to provide better public transport coverage (especially rail) to the suburbs where older people reside. There should be schemes for increased involvement of doctors and opticians in deciding whether drivers are safe to continue driving and perhaps some consideration of compulsory eye tests for people over 70 years old. Such programs will ensure that elderly drivers remain competent and ensure their own safety as well as the safety of others. Although there are similar programs in some states, there is no uniform policy for the entire nation. Similarly, there are no crash records focussing on mobility scooters and it is important to record and publish these periodically to understand the extent of the problem and trends.

All efforts should be made to assist older people to continue driving as long as possible as there is no adequate public transportation for the ageing population. The study results have highlighted the need for enhancing parking for older people. Car dependence among older people is evident as a vast majority of

them drive for travel. Therefore, providing more designated senior parking at shopping centres, senior citizens' centres and council facilities would benefit older people. Unlike Japan, there are no dedicated parking bays for older drivers. As a short term initiative, it might be worthwhile to allow people aged over 70 to use (share) the parking bays intended for disabled drivers. In order to implement such schemes as in Japan, there should be appropriate labelling schemes.

6.2 Japanese Perspective

Japan has begun to make dedicated, progressive changes to national policy which takes into account the needs of the increasing elderly population. The unique approach of Japan's transport policy is that it has started to treat the ageing issue as an opportunity rather than a burden, i.e., seeing an ageing society from a positive angle by creating a platform and harnessing resources and technologies. Therefore, it feels that by implementing measures to improve the quality of life of the elderly, they can achieve an overall higher quality of life for all. Japanese policies emphasize the participation of women and seniors in society. So it is very important to build barrier-free passenger and traffic facilities, vehicles, homes and public facilities. Another important difference in Japan's public transport's policy is that the developments are planned as social infrastructure responsive to the ageing society and not just to increase competition with car usage. Safety and social inclusions are high on the agenda. The economic objectives in Japanese transport policies include the need for enhancing global competitiveness, environmental objectives include achieving environmentally-friendly transportation, a developing environment that offer peace of mind to seniors and finally social objectives to include safety and dealings with an ageing society. From this, it is clear that ageing society concerns constitute the central theme of Japanese transport policy whereas senior citizens' issues do not form a central part of it.

Many policies including programs relating to land use and transport integration have been well articulated in Japan. When drivers elect to stop driving, the policies recognise that their transportation needs must be met by other means. One of the effective transport service implementation in Japan includes community-based transportation services which tend to take over where public transportation fails to reach. These services include programs where volunteer drivers using their own cars provide door-to-door transporta-

tion services for nearby elderly residents. However, in rural areas there are few choices for the drivers who give up their driving licences as community-based transportation services do not cover all areas of Japan. Researchers in Japan are also exploring mobility from the view point of quality of life (QoL) and position it within urban space structure, i.e., where QoL is derived based on the accessibility to services within a metropolitan area^[28].

Conflict of Interest and Funding

No conflict of interest was reported by the authors.

Acknowledgements

This research was supported by the Mawson Lakes Fellowship and University of South Australia's Professional Experience Programs. The authors would also like to thank National Seniors Australia for providing access to the membership database to enable the survey participants to be contacted. The time and effort of respondents to complete the survey is also appreciated.

This paper was prepared after a series of consultations both in Japan and in Australia. The authors would like to acknowledge the following people who have contributed their opinions during various meetings and discussions. They are:

- Professor Graham Currie, Chair, Director of Research (Transport Engineering) — Monash University
- Ms. Julie Holmes — Department of Planning, Transport and Infrastructure, South Australia
- Dr. Masayuki Fukumoto — Toyota Transportation Research Institute, Japan
- Professor Hirokazu Kato — Nagoya University, Japan
- Mr. Naoto Fujii — Kanagawa University of Human Services, Kanagawa Prefecture, Japan
- Professor Hiroto Inoi — Osaka University, Japan
- Dr. Hiroshi Kitagawa — The Hyogo Institute of Assistive Technology, Kobe, Japan

References

1. Alsnih R and Hensher D A, 2003, The mobility and accessibility expectations of seniors in an aging population. *Transportation Research Part A*, vol.37(10): 903–916. [http://dx.doi.org/10.1016/S0965-8564\(03\)00073-9](http://dx.doi.org/10.1016/S0965-8564(03)00073-9).
2. Hugo G, 2013, Global and regional perspectives: The changing demographics of Australia over the last 30 years. *Australasian Journal on Ageing* 32, vol.32(s2): 18–27. <http://dx.doi.org/10.1111/ajag.12113>.
3. Metz D H, 2000, Mobility of older people and their quality of life. *Transport Policy*, vol.7(2): 149–152. [http://dx.doi.org/10.1016/S0967-070X\(00\)00004-4](http://dx.doi.org/10.1016/S0967-070X(00)00004-4).
4. Rosenbloom S, 2001, Sustainability and automobility among the elderly: an international assessment. *Transportation*, vol.28(4): 375–408. <http://dx.doi.org/10.1023/A:1011802707259>.
5. Somenahalli S V C and Taylor M A P, 2007, Elderly mobility: issues, opinions and analysis of trip making in Adelaide, *Proceedings of the 30th Australasian Transport Research Forum, January 1, 2007: Social Research in Transport (SORT) Clearinghouse*, Institute of Transport Studies, Monash University.
6. Australian Bureau of Statistics, 2011, *Reflecting a nation: stories from the 2011 Census, 2012–2013*, viewed June 21, 2015, <<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2071.0main+features902012-2013>>
7. Commonwealth Government of Australia, 2000, *A comparison of aged care in Australia and Japan*, Department of Health and Ageing, Canberra.
8. AusAid, 2013, *Accessibility design guide: universal design principles for Australia's aid program*, viewed November 10, 2015, <<http://dfat.gov.au/aboutus/publications/Documents/accessibility-design-guide.pdf>>
9. Mercado R, Páez A, Scott D M, et al. 2007, *transport policy in aging societies: an international comparison and implications for Canada. The Open Transportation Journal*, vol.1: 1–13.
10. Australian Government, Infrastructure Australia, 2013, *Infrastructure Australia: urban transport strategy*, viewed November 10, 2015, <http://infrastructureaustralia.gov.au/policy-publications/publications/files/InfrastructureAus_Rep_UrbanStrategy.pdf>
11. Federal Highway Administration, U.S. Department of Transportation, 2008, *Improving safety and mobility for older road users in Australia and Japan*, , viewed November 10, 2015, <<http://international.fhwa.dot.gov/pubs/pl09001/>>
12. Department for Transport Energy and Infrastructure, 2008, *Guidelines for disability access in the pedestrian environment*, viewed November 10, 2015, <https://www.lga.sa.gov.au/webdata/resources/files/Draft_DTEI_Guidelines_for_Disability_Access_in_the_Pedestrian_Environment_-_July_2008.pdf>
13. The Allen Consulting Group, 2009, *Report to the Min-*

- ister for infrastructure, transport, regional development and local government: review of the disability standards for accessible public transport, Australia.
14. Akiyama T, 2005, Japan's transportation policies for the elderly and disabled, in *Paper Presented to the European Conference of Ministers of Transport, March 2–3, 2005: Workshop on Implementing Sustainable Urban Travel Policies in Japan and Other Asia-Pacific Countries*, Ministry of Land, Infrastructure and Transport, Tokyo.
 15. Nakanishi Y O, 2000, *Accessibility plan in Japan*, viewed April 15, 2014, <<http://homepage2.nifty.com/ADI/Access.html>>
 16. Akiyama T, Kamata M, Wahira Y, et al. 2001, Vehicle accessibility in Japan today and the outlook for the future. *IATSS Research*, vol.25(1): 9. [http://dx.doi.org/10.1016/S0386-1112\(14\)60005-4](http://dx.doi.org/10.1016/S0386-1112(14)60005-4).
 17. Australian Competition and Consumer Commission, 2010, *Help cut mobility scooter accidents*, viewed November 10, 2015, <<https://www.accc.gov.au/system/files/Help%20cut%20mobility%20scooter%20accidents%20-%20v2.pdf>>
 18. Brownsdon A and Marcar C, 2002, *Scooter Safe. Use of electric scooters and wheelchairs in the ACT: policy implications and recommendations*, Council of the Ageing (Australian Capital Territory), Hughes Community Centre, Canberra, viewed November 10, 2015, <http://www.seniormovingsafely.org.au/download_documents/scooter_safe_final_report.pdf>
 19. Department for Transport Energy and Infrastructure, 2006, *Self-propelled wheelchairs*, Government of South Australia, Adelaide.
 20. Johnson M, Rose G. and Oxley J, 2013, Motorised mobility scooters — understanding a growing transport mode for older Australians. *Proceedings of the 36th Australasian Transport Research Forum (ATRF), Brisbane, Australia, October 2–4, 2013*.
 21. Choice Magazine 2010, *Mobility scooter guide*, viewed November 10, 2015, <http://nulldave.com/doc/pdf/download/www_independentliving_com_au-images-choice-mobility-scooter-guide.pdf>
 22. Australian Competition and Consumer Commission, NRMA Motoring & Services, Choice, et al. 2012, *Mobility scooter usage and safety survey report*, viewed September 10, 2015, <<https://www.productsafety.gov.au/content/item.phtml?itemId=996221&nodeId=275b9d64bad1829eea219e664ad8ab2b&fn=Mobility%20scooter%20usage%20and%20safety%20survey%20report.pdf>>
 23. Inoi H, Shinya H, Tatyoshi K, et al. 2013, Safety improvement for mobility scooters using automatic deceleration, *Proceedings of the 13th World Conference on Transport Research (WCTR), Rio de Janeiro, Brazil, July 15–18, 2013*.
 24. National Institute of Technology and Evaluation, 2013, *For prevention of accidents caused by electric wheelchair*, viewed April 16, 2015, <<http://www.nite.go.jp/jiko/press/prs130912.html>>
 25. *Toyota begins testing Segway-like Winglet in Japan*, n.d., viewed February 19, 2015, <<http://www.autoblog.com/2013/07/26/toyota-testing-winglet-segway-japan/>>
 26. The Australian Bureau of Statistics, 2013, *Australian social trends*, viewed October 25, 2015, <<http://www.abs.gov.au/socialtrends>>
 27. Department for Transport Energy and Infrastructure, 2013, *Moving right along: obligations and opportunities for older drivers*, viewed November 12, 2015, <http://www.dpti.sa.gov.au/__data/assets/pdf_file/0020/52436/Road_Safety_Older_Drivers.pdf>
 28. Hayashi Y, Fumei G and Takuya T, 2014, Promoting sustainable mobility in metropolitan regions based on the concept of quality of life, *Paper presented at TUM Conference*.