Ageing and Transport: Mobility Issues – A case study for Adelaide

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Abstract: Ageing of the population is one of the major structural changes facing Australia over the next two or three decades. New strategies for engaging with older people and providing better services are needed. Statistics across Australia highlight a steady increase in the percentage of population over retirement age. Despite the pace at which South Australia is ageing, there is still no overall plan for providing for transport needs of older people. The overall objective of the study was to conduct an audit of older people's transport needs and requirements, taking account of future demographic changes. The study used data collected in the primary survey conducted during March 2007. The survey sought travel details from people aged 65 and above for a particular day (4am to 4am next day). This survey has also sought the opinions of older people in Adelaide with regard to their mobility and especially public transport needs. This paper presents initial results from a survey travel patterns of the elderly in Adelaide metropolitan area. The present study has highlighted several factors dealing with public transport (especially buses) for the elderly. Among them, steep steps on the older buses, drivers not waiting for them to be seated before they drive off, poor frequency of buses during off peak hours and weekends, and not having designated and priority seating in the buses were ranked high in their list of suggestions.

Background
Ageing of the population is one of the major structural changes facing Australia over the next two or three decades. New strategies for engaging with older people and providing better services are needed. Statistics across Australia highlight a steady increase in the percentage of population over retirement age. The need to meet the transport requirements of a growing population of older Australians is vital to the success of the Government's commitment to sustainable mobility. It is also vital for people's own ability to retain a high quality of life as their income, health and mobility levels change. Transport provides an essential link to friends, family and the wider community - a vital lifeline to maintaining independence. (UK Department for Transport, 1999). It is well known that a lack of mobility can prevent older people from participating in social activities and lead to low morale, depression and loneliness.

While the objectives in urban transport planning have changed over the last decades, emphasis has long been placed on assessing the transport needs of various minority groups that include elderly people (Richardson, 1980). Understanding travel characteristics of the elderly is essential for responding to their mobility and traffic safety needs (Benekohal et al. 1981). In this context, this study aims to understand the transport difficulties experienced by older people in the Adelaide metropolitan area at the present time.

Study Area and Sampling Frame
The study area was restricted to the Adelaide Statistical Division (ASD). The sampling frame consisted of randomly selected residents aged 65 and over from each postcode in the ASD, taken from those elderly residents registered with the South Australian Council on the Ageing (COTA). COTA is the peak organisation for older South Australians. Membership of COTA is open to people over 50 years of age. COTA has both individual and organisational members jointly providing a membership base of around 85,000 older South Australians. (Council on the Ageing 2007). A quota was used in selecting the sampling frame to ensure that there was even representation in the sampling from each of the postcodes in the ASD.

The questionnaire, which was self-administered, had two parts. The first part sought information on all the members of household and their characteristics. The second part probed travel patterns, attitudes and opinions concerning travel of the aged person/s in the household. Questions were derived initially from a literature review and refined using pilot surveys within our Transport Systems Centre and its contacts, and discussions with other experts. A total of 475 surveys were mailed to randomly chosen older people registered with COTA. Out of these forms 400 forms were mailed to those who had individual registration with COTA and 75 forms were mailed to older residents that had household registration with COTA. Forms were distributed by stamping resident's travel day on the survey form. This is done to obtain travel pattern information for all days of the week; meaning approximately 68 forms were stamped Monday and another 68 forms were stamped Tuesday and so on. A prepaid return envelope was included as well as one covering letter from the Transport System Centre explaining the significance and objectives of the
survey and another from the Executive Director of COTA soliciting cooperation from the members of the council.

Survey Response
A total of 97 older people responded to the mail survey. Out of these 12 forms were either not completed or had inadequate response and hence were rejected. Finally data from 85 forms (approximate sample size of 18 per cent) were geo-coded (to nearest street intersection to the dwelling) into ArcGIS. The respondents for the survey appear to be reasonable spatial representation of elderly residents of the study area. Figure 1 shows the locations of the surveyed households.

![Figure 1 Study area and the geocoded address of the respondents](image)

Survey findings
Household characteristics
The study shows that a large percentage (54 per cent) of the respondents lived in single member households. This percentage seems to be higher when compared to earlier studies (10 Year Plan for Aged Services, 1995).

Income
The wellbeing of aged people is dependent to a great extent on their access to an adequate, regular and reliable income following retirement. It is clear from the survey results that many of the respondents were largely reliant on government pensions and benefits. When asked to indicate the total before tax income for them, (excluding 20 per cent of respondents that declined to disclose their income) more than 41 per cent of the respondents stated their household income is $300 per week; which shows that majority of them were effectively reliant on the income they receive from the aged pension.

Trip movement characteristics
The study also shows that a significant percentage (82 per cent) of the respondents owned at least one car and many of them (76 per cent) had a driver’s licence. Trip movement is similar to the trip chaining process which has become the preferred way to look at the series of trips made by people on a daily basis. There are many definitions for a trip chain. To aid researchers and to set the stage for a common definition of a trip chain, the US Federal Highway Administration (FHWA) of United States has developed an operational definition of a ‘trip chain’ as a consequence of trips bounded by stops of 30 minutes or less. A stop of 31 minutes or more defines the terminus of a chain of trips and that chain of trips is considered a tour (McGuckin and Nakamoto, 2004). However for this study trip movement is defined as movement of person between two stops, irrespective of their stop time. This definition is in line with Primerano et al (2007). The movement may be from home to activity or activity to activity that includes catching a bus or
train. This travel is an inventory of older residents of household’s individual movement from one stop (address) to another stop (address). In the trip information part of the form, each trip movement is recorded with mode, purpose at destination address and the number of people on the trip movement, the departure and arrival times, trip duration, the household vehicle used and other pertinent information about the movement.

The survey results indicated that older drivers used their cars on a regular basis. The survey represented sample from all days of the week (Figure 2). This figure suggests that the Saturday might be the most popular day for older people’s travel needs. It seems that older people tend to avoid days with more traffic on the roads. This is also seen in the low figures for Friday travel.

Figure 3 suggests that significant number of seniors (49 per cent) perform three or more trip movements a day i.e. that includes return to home trip movement. Their travel movements main purposes include shopping (29 per cent), other (26 per cent), visiting (11 per cent), eat or drink (8 per cent), recreation (8 per cent) and medical (7 per cent) (Figure 4). However the other purposes include trip movements for accompanying someone, library visits, buying petrol, buying medicine, collecting medical reports, visits to gym, morning walks, and other voluntary activities.

Current trends suggest that an overwhelming majority of the seniors are dependent on their personal car for mobility, most often (more than 50 per cent of trips made) as a driver. Survey respondents aged 80
years and above also reported that they were using their car for their daily needs. This trend suggest that when their licence is taken away from them, they continue to have the desire and the need to travel outside their home to receive services such as buying food and maintain their social and religious activities. Thus seniors’ mobility is essential to their personal health and social wellbeing; however those seniors who are living alone will be deprived of their mobility if there is no alternative form of transport when they no longer drive. In this context the role of public transport and subsidised taxi vouchers may play an important role in fulfilling senior’s mobility needs.

The survey findings indicated that most of the respondents preferred morning off peak hours for their travel needs (Figure 5). They tended to avoid morning and evening peak hours as they did not feel safe to drive in those times. They also tried to avoid ‘after school hours’. Figure 5 clearly demonstrates that they avoid night driving. The main reasons they attributed for avoiding driving at different times were: i) night time due to glare ii) peak hours due to impatient younger drivers and iii) parking problems especially in the city centre and Glenelg. This information should be useful for public transport planners when they plan the time tables for public transport.

Figure 5 Trip movement start time

Figure 6 Participants disability type

Figure 6 above shows that a significant (43 per cent) number of seniors reported some kind of disability. However a reasonably high percentage (30 per cent) of them reported no disability and an equally
significant number (25 per cent) did not respond to this question. Moreover, around 50 per cent did not report any difficulties in using the bus mode. So, if good service alternative transport (whether it is public transport or community buses etc) were offered to them, then there is a high likelihood that these people could be attracted to these alternative modes of transport.

**Trip Movement paths**
To understand older people’s travel desire, paths for each travel movement for all the respondents to the survey are traced from its origin to destination. The origin of the first trip movement is the respondent’s house which is geo-coded to nearest street intersection to the dwelling and their destination is geo-coded to its suburb centroid. Figures 7 to 14 show the paths for each respondent’s trip movement from one to eight. Figure 15 shows all the trip movements. They indicate many trip movements are cross suburban. It is understandable that these movements were largely made by car, as in most instances there were no direct bus services and travel by bus would require travel first to the city centre and then board another bus to the destination – this involve significant detour. Hence there is a need to provide ‘cross-suburban’ bus services using arterial roads to efficiently and reliably link key areas, providing access to train, tram and O bahn stations, shopping centres and community facilities.

![Figure 7 Trip movement no. 1 - paths](image1)
![Figure 8 Trip movement no. 2 - paths](image2)
![Figure 9 Trip movement no. 3 - paths](image3)

![Figure 10 Trip movement no. 4 – path](image4)
![Figure 11 Trip movement no. 5 - paths](image5)
![Figure 12 Trip movement no. 6 - paths](image6)
Gender Issues

More strikingly, there are important differences between the sexes; more men reported that they are living in a household with two or more people. Nearly 66 per cent of surveyed men reported that they were living in a household with two are more members whereas only 33 per cent of females reported that they lived in households with two or more members. These findings reveal that older men are more likely to be living with a spouse than are comparable women. When older men ceased driving, there is more likely that they are driven by someone in the household. However older women face more challenges as most of them live alone. Hence it is likely that more women may face greater deprivation after driving cessation.

Similarly more number of females live in households with no private vehicle access (20%) when compared to the men (6%). On average males reported $468 as their weekly income where as females reported an average household income of $415 per week. Though their reported income is less than male's income, as the majority of them live in single member household, they may be financially better off when compared to the males. With regards to trip movements, females make more movements than males. On average males make 2.9 trip movements per day whereas females make 3.2 trip movements a day. Another interesting observation is that, though average age of females (74.6 years) is less than men's age (77.5 years), fewer females (78 per cent) had driving licence when compared to the men (87 per cent). This is probably a generational factor given the present age group, with 'universal' licence holding by all adults not occurring until the advent of the baby boomers. Hence an adequate public transport network is a critical factor for older females in mitigating the expected loss of independence and mobility for this group.

<table>
<thead>
<tr>
<th>Trip Movement number</th>
<th>Number of all mode Trip Movements</th>
<th>Average Distance by all (km)</th>
<th>Average Male Age</th>
<th>Average distance by males (km)</th>
<th>Average Female Age</th>
<th>Average distance by females (km)</th>
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<tbody>
<tr>
<td>1</td>
<td>69</td>
<td>4.5</td>
<td>77.2</td>
<td>3.4</td>
<td>75.3</td>
<td>6.5</td>
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<td>2</td>
<td>58</td>
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<td>6.8</td>
<td>75.3</td>
<td>5.8</td>
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<tr>
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<td>38</td>
<td>5.0</td>
<td>75.2</td>
<td>8.1</td>
<td>74.4</td>
<td>4.4</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>5.1</td>
<td>76.1</td>
<td>7.1</td>
<td>72.6</td>
<td>4.4</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>6.7</td>
<td>76.6</td>
<td>12.4</td>
<td>71.4</td>
<td>6.2</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
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<td>78.5</td>
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<td>7</td>
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<td>2.3</td>
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<td>7.1</td>
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<tr>
<td>8</td>
<td>5</td>
<td>7.8</td>
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<td>*</td>
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<td>5.64 km</td>
<td>6.54 km</td>
<td>6.20 km</td>
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</table>

* Insignificant sample size and hence not reported

Table 1 above shows that there is a relationship between the age and the number of trip movements per day. The mobility (the number of trip movements per day) decreases as the people become older. Though
males’ trip movement distance is slightly longer (6.54 km) when compared to females’ trip movement distance (6.20 km), the total trip movement distance per day for females is longer. On an average females trip movement distance per day is 19.8 km per day where as male’s trip movement distance is about 18.9 km a day.

Figures 16 and Figure 17 below again demonstrate that both older males and females make many cross suburban trip movements. Another observation is that in the eastern suburbs females are more mobile.

**Opinion about Gophers**
In the next part of the survey form, a number of questions were presented to elicit respondents’ opinions on various transport issues. One of the issues on which opinion was sought was about Gophers (Motorised Scooters).

The majority (70 per cent) of respondents that answered this query were satisfied (or neutral) with the speed and the degree of convenience offered by gophers. Currently many (76 per cent) of the respondents did not own a gopher; however significant numbers of people might consider buying one in the future. When they were asked their intention to buy a Gopher only 36 per cent of them replied negative and 38 per cent of them were not sure. Since many of them are happy with gophers, there is a high degree of probability that the number of people who belong to this category (‘Not Sure’) may purchase.

**Bus usage problems**
The next series of questions sought opinions regarding the problems faced by them while using buses. The first question related to bus stops. Figure 18 shows that the majority of respondents who answered this question were either happy or neutral with the current situation regarding the location of their nearest bus stop. This is also supported by the survey findings (Figure 19) that a majority of the respondents stated that their nearest bus stop was less than ten minutes walking distance. Similarly, Figures 20 and 21 suggest that they were not unduly concerned with either bus fares (i.e. concession fares) or the condition of bus stop shelters.
The two main issues of concern were i) poor coverage during weekends and ii) poor coverage during outside normal hours. Figures 22 and 23 below amply support this argument. The outside normal hours that respondents were mainly concerned about were the morning off-peak hours i.e. from 9 am to 3.30 pm. This information is again important for public transport operators and planners.
Other Transport issues

The other transport issues on which opinion was sought from older people related to road furniture, parking, and taxi concessions and subsidised car pooling. For each issue, they were asked to state their opinion as 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree. Based on the responses below (Figures 24 to 29), the following issues can be ranked (based on the scores for agree and strongly agree category) in this order of priority.

1. Need taxi Concessions for people aged above 70 years age.
2. Need designated parking spaces (‘designated Senior parking bays’) – especially in the City and Glenelg
3. Footpaths urgently need upgrading – this is again important as more and more people start using gophers
4. Green ‘walk’ time in traffic lights to be lengthened
5. Street lighting is poor and inadequate
6. Need subsidised car pooling i.e. local councils to provide car pool service to take them for their shopping, medical and recreational needs

![Figure 24 Opinion on footpaths](image)

![Figure 25 Opinion on ‘green walk’ times](image)

![Figure 26 Opinion on Seniors’ parking](image)

![Figure 27 Opinion on Taxi concessions](image)
Street lighting is poor and inadequate

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1=Strongly disagree</th>
<th>2=Disagree</th>
<th>3=Neutral</th>
<th>4=Agree</th>
<th>5=Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>16%</td>
<td>32%</td>
<td>20%</td>
<td>13%</td>
<td>19%</td>
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</table>

Figure 28 Opinion on street lighting

Need Subsidised car pooling

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1=Strongly disagree</th>
<th>2=Disagree</th>
<th>3=Neutral</th>
<th>4=Agree</th>
<th>5=Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>19%</td>
<td>40%</td>
<td>11%</td>
<td>3%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Figure 29 Opinion on subsidised car pooling

Opinion on improving the level of service of buses

The public transport system in Adelaide is not designed around the changing population. Given the premise that the expenses associated with buying a car and running a car will continue to rise, then alternative modes of transport, including public transport, may become more attractive to older drivers. The survey results have shown that majority of the elderly continue driving their own cars. However a majority of them have no ailments that would prevent them using public transport. Those elderly people who are frail and no longer able to drive will become increasingly dependent on public transport, and hence this service must be improved and made more accessible. The survey results suggest that the elderly are not using public transport due to its poor service or the inappropriateness of the current services. The table below ranks (in the order of priority as indicated by survey respondents) the problems reported in using the available bus services. These issues need to be addressed with high priority.

1) More tilting buses are required as it is difficult to get in and out of the old buses
2) Drivers should wait until the older people take their seat before taking off
3) Increase the service frequency, especially in off peak hours and on week ends
4) Priority seating (or elderly designated seats) should be provided on buses. Younger people, especially students, do not offer their seats to older people
5) Buses should stop closer to footpaths
6) Easier ways of purchasing the tickets (for example use vending machines)
7) Need smaller more frequent eco-friendly council buses for shopping, recreation and medical purposes
8) Placement of stop buzzers in the buses can be lower
9) Run the buses according to the time table
10) Bus drivers should be more courteous
11) Provide more bus stops closer together

Out of all the above issues many respondents emphasised the first four issues more often. Even amongst these, the first two issues bothered them immensely i.e. their first common complaint is that they cannot get in and out of the buses easily due to steep steps and hence the tilting buses are high in their priority while the next most common complaint is that drivers do not wait until they are seated.

Conclusion

An ageing population offers as many opportunities as it does challenges for South Australia. This paper presents initial results from a survey travel patterns of the elderly in Adelaide metropolitan area. The survey showed that significant proportion (62 per cent) elderly residents depend on the aged pension for their living. The main findings show that if older people have access to a car they will use it for most of their travel needs. Many elderly people with cars do not believe that they need a gopher at present, but they could consider purchasing one in the future. When asked their opinion about gopher safety and convenience, the majority were satisfied with them. So there is good chance that when they become frail and no longer able to drive they may start buying gophers. Among other suggestions, older Adelaidians felt the need for taxi concessions for those aged 70 and over, and the provision of designated parking for
the elderly. The present study has highlighted several factors dealing with public transport (especially buses) for the elderly. Among them, steep steps in the old buses, drivers not waiting for them to be seated before they drive off, poor frequency of buses during off peak hours and weekends, and not having designated and priority seating in the buses were ranked high in their list of suggestions. It is essential that keeping transport mobility patterns in view, special programs for the provision of transport services for the elderly are of high priority. With the rapid progress in new technology, there are new and better opportunities for providing genuinely accessible transport and travel information to benefit older and disabled people that will also raise standards for other users.

There is a clear case for improving the level of service offered to older passengers. Priority areas include:

- Plan bus routes servicing local shopping centres, community facilities and transit stations
- Plan bus routes across suburbs
- Provide real-time passenger information both at bus stops and through web
- Pay attention to vehicle design
- Improve bus frequencies both during off peak period and week ends
- Bus and train operators should provide all staff with customer care training.

The authors are also of the view that many of the telematic developments in public transport, such as real time information on buses and at bus stops and advanced traveller information through the web will benefit all users by providing an improved service. Older pedestrians could be helped at pedestrian crossings by technology that detects slow moving pedestrians. There have been some trials of such technologies in the UK. (UK Department for Transport, 1999). The final conclusion is that unless those professionals planning and running public transport and the general community take a more active role in understanding and helping the elderly, their problems will continue to exist and will not go away.

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References
Benekohal, R F; Michaels, R M; Shim, E; Resende, PTV (1981), Transportation Research Record 1438, TRB, Washington DC.