

A SURVEY OF TRAVEL PATTERNS OF THE ELDERLY

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Abstract:

The Shire of Sherbrooke is located in the foothills of the Dandenong Ranges some fifty kilometres east of Melbourne. By nature of its terrain, the area is ill-suited to conventional public transport. At the same time, however, there is a large population of elderly residents who may have need of public transport services. In an effort to obtain some substantive data on the travel patterns and needs of this elderly population, a class of postgraduate students from the Department of Civil Engineering at Monash University designed, conducted and analysed a home interview survey with 72 elderly households in April 1979. This paper describes the survey and presents the results of the analysis. In general, it is shown that such elderly persons travel less than a typical family household, and that a special sub-group of these elderly residents would make use of a personalised public transport service if provided.

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INTRODUCTION

As the objectives in urban transport planning have changed over the last decade, greater emphasis has been placed on assessing the transport needs of various minority groups within the community. Such minority groups, who are often assumed to be transport-disadvantaged, include the elderly, the school children, the unemployed, housewives with young children and the physically handicapped. Collectively these groups have often been referred to as YOPHS (young, old, poor, housewives and sick) and whilst each group has been the subject of individual studies, it is perhaps the elderly and the handicapped (the old and sick) who have received most attention.

Such attention to the transport problems of the elderly and handicapped is perhaps exemplified by legislation passed by the United States Congress which stated "... the national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services" (U.S. Congress, 1974). Whilst this statement places an undue emphasis on mobility, rather than on accessibility, and has since committed the U.S. Federal Government to vast expenditure on re-equipping conventional mass transportation facilities to accommodate the elderly and, more particularly, the handicapped, it nevertheless demonstrates the intent of transport policy for these groups.

Wachs (1979) advances four reasons for the emergence, and likely continuance, of such transport programs for the elderly; economic, political, psycho-social and ethical-philosophical factors. The economic factor is based on the belief that providing a financial subsidy for transport to the elderly would greatly benefit them. The political factor is perhaps self-obvious and simply reflects the greater political activity of many minority groups, including the elderly. The psycho-social factor results from the gradual breakdown, over the last few decades, of the extended family. Thus instead of the members of an extended family caring for the elderly members of that family, this responsibility is now passed over to various forms of government. The provision of various forms of public transport for the elderly is a substitute for a younger member of the family providing the transport directly. The psycho-social factor may also be viewed in terms of an insurance policy whereby providing services for today's elderly "insures" that such services will also be provided in the future, when today's "provider" becomes tomorrow's "elderly". The ethical-philosophical factor takes a slightly more altruistic view and regards the provision of services to the elderly as being a just reward for past service rendered to the community by the elderly.

Whatever the reasons are for the community's concern with the welfare of the elderly, it is likely that the activity witnessed in the United States in the past ten years will spread to Australia and that special programs for the provision of transport services for the elderly will become

more common in future years. The study reported in this paper arose out of a local community's concern for the transport problems of their elderly residents.

Sherbrooke Shire

The Shire of Sherbrooke is located in the foothills of the Dandenong Mountains some fifty kilometres to the east of Melbourne, and consists largely of hilly terrain (see Figure 1). The development of the area in terms of residential settlement has been in two distinct periods. The first settlement phase occurred some fifty years ago and involved people who chose the hills primarily on the basis of the unique physical environment available. The second period of development has occurred in the last fifteen years as a result of the continuing urban sprawl that has accompanied Melbourne's growth.

The area encompassed by the Shire is, by nature of its terrain, ill-suited to conventional public transport. At the same time, however, it was felt that the Shire had a high proportion of people in need of public transport (e.g. elderly people who moved into the area during its initial development period, and young families who have moved there more recently as a result of lower than average land prices).

Despite this general feeling, however, there was a lack of substantive data which would support the contention of transport disadvantage. An initial study of transport needs in the Sherbrooke Shire had been performed (S.C.R.A.G., 1978) and had identified a series of problems in relation to public transport. However, the conclusions reached were somewhat tentative because of a lack of detailed data. A more comprehensive study of accessibility in the region had also been performed (Grant, 1979) but this study did not specifically consider the accessibility and transport problems of the elderly. Until such information was obtained on the transport needs and travel patterns of the elderly, it was expected that little definite support for transport innovation in the area was likely to be forthcoming.

At the time that this problem was being considered by the residents and Council of the Shire of Sherbrooke, the author (who lives in the Sherbrooke area) was teaching a course on "Survey Methods and Data Collection" to twenty-four post-graduate students at Monash University. It therefore seemed to be opportune to offer the services of the class to carry out a survey of the travel patterns of the elderly in the Shire. This had two major advantages; firstly, the Shire could perform a relatively complex survey in a professional manner at low cost and, secondly, the graduate students could obtain valuable practical experience in a realistic atmosphere.

After discussions with the community representatives, and a public meeting in Sherbrooke, the following broad objectives were set for the survey:

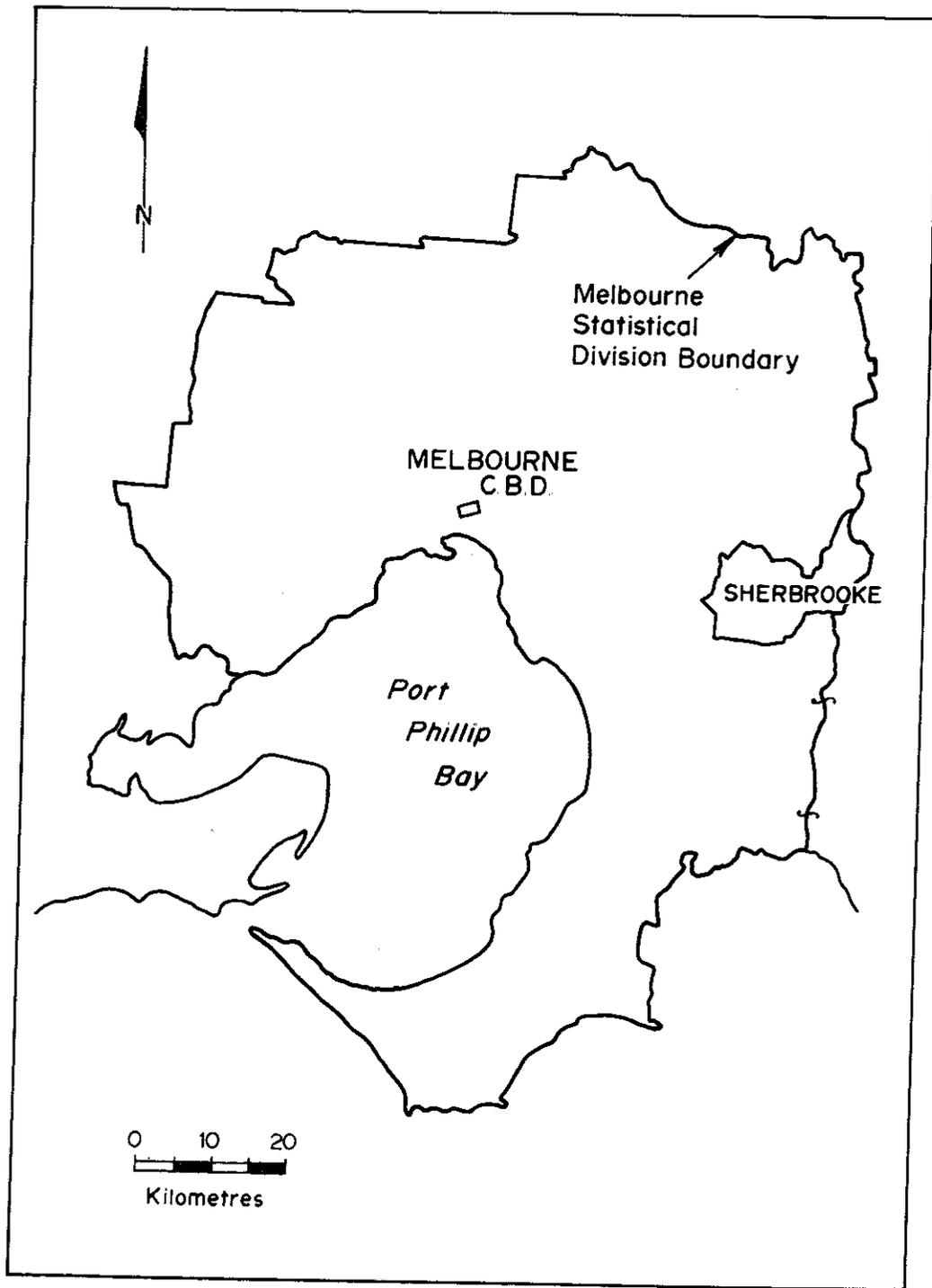


FIGURE 1 LOCATION OF SHERBROOKE SHIRE

- (i) To ascertain the travel patterns and transport needs of elderly residents in the Shire of Sherbrooke.
- (ii) To test their reaction to the provision of an off-peak, shared-ride, discount-fare taxi system.

SURVEY METHODOLOGY

Before discussing the actual survey methodology employed, it is essential that the survey effort be placed in context in terms of manpower and time constraints. A total of twenty-four graduate students were involved in the survey. These students were all studying part-time for a Master's degree in Transport Engineering. Whilst few had any previous experience in the design and conduct of surveys, they all had several years experience in various aspects of Transport and Traffic Engineering and Planning. Because each of them held a full-time job during the day, the time necessary to design and conduct the survey had to be found in the evenings and at weekends.

On top of this general time constraint, an overall time constraint was imposed by the timetable of the course on survey methods. Thus, agreement to the class performing the survey was given on 15th March, 1979 and the survey course was scheduled to end at the start of June. This gave a period of approximately 10 weeks for the survey to be designed, conducted, analyzed and reported. To their credit, this timetable was adhered to by the students. These constraints however imposed three conditions on the conduct of the survey. Firstly, there was no time available for a true pilot study of the survey technique; secondly, the tight schedule necessitated that interviews be conducted in the week after Easter; thirdly, the combination of limited time and a large number of students required that the overall survey task be split into a number of separate parts which proceeded concurrently. This resulted, to a degree, in a lack of continuity between the various elements of the survey procedure. The full implications of these three conditions will emerge later in the paper.

The stages necessary in any sample survey may be listed as:

- (i) Preliminary Planning.
- (ii) Selection of Population and Sample Frame.
- (iii) Selection of Sample.
- (iv) Design of Questionnaire.
- (v) Pilot Survey.
- (vi) Conduct of Survey.
- (vii) Coding and Editing.
- (viii) Analysis.
- (ix) Presentation of Results.
- (x) Tidying-up.

The following description will attempt to highlight the major points in the design and conduct of the Sherbrooke Shire survey in terms of the above stages. Preliminary planning

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involved meetings with the client (the residents and Council of Sherbrooke Shire) and the setting of survey objectives as noted earlier. The overall organization of the survey effort, the selection of survey method (home interview survey), the setting of time deadlines and the allocation of tasks were also covered in this stage.

The population for the survey was initially defined as the elderly residents of Sherbrooke Shire. However, in searching for a sample frame which would adequately represent this population, several difficulties were encountered. Firstly, there was no comprehensive list of such elderly residents readily available. Secondly, there was not the time available to consider approaching various authorities who held partial lists with the objective of compiling a more complete single list. Thirdly, even if time had been available for this task, confidentiality requirements imposed by some authorities would have limited the overall success of this approach. Consequently, a number of compromises had to be made in the selection of sample frame. In trading off comprehensiveness against ready availability, the sample frame was selected to be the list of residents who received property rate concessions from Sherbrooke Shire Council for the period 1st October, 1978 to 30th September, 1979, as at 1st December 1978. Such concessions are available, on application, to residents receiving pensions.

Several deficiencies are readily apparent in this sample frame as an accurate list of elderly residents in the Shire, namely:

- (i) Council rate concessions do not differentiate between the various pensions available through social services e.g. age, war, widows, invalid.
- (ii) Rate concessions are assessed and granted only on application to the Shire. Non-applicants are therefore omitted from the sample frame.
- (iii) Although the sample frame should give a reasonable list of low-income, elderly residents who own a property in the Shire, it may exclude many who are residents but not ratepayers e.g. those renting property. This may be a serious omission, since renters may be more economically disadvantaged than property owners.

In total, there were 1029 households listed on the rate concession list. From this it was necessary to select a sample for interview. The sample size was determined exogenously on the grounds that each student would be required to personally conduct three interviews. This resulted in a sample size of 72 households and appeared to be a reasonable compromise between survey accuracy and student effort. Since it was expected that not all households in the sample frame would qualify for inclusion in the population (i.e. some would be invalid or widow pension households) backup samples were required in addition to the original 72 households. Each interviewer was issued with

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a Primary list of three households and a Secondary list of four households to be used, in order, if an interview could not be completed with a household on the Primary list.

Each household in the sample (on both Primary and Secondary lists) was sent an introductory letter explaining the purpose of the survey and was advised to expect an interviewer to call at a time to be arranged. Interviewers then attempted to make telephone contact to arrange a mutually convenient interview time. These preliminary introductions proved most effective in ensuring that interviewers were later welcomed into the home for the interview. The letters and telephone calls were also supplemented by articles in the local newspaper describing the forthcoming survey, and thank-you letters were sent to households after the interviews had been conducted.

The questionnaire to be used in the interview contained five major components:

- (i) Screening question: Since many in the sample may not have been old-age pensioners, it was necessary to ascertain this at the beginning of the interview (if this had not already been determined from a telephone contact). The question simply asked whether anyone in the household was aged 60 or over. If so, the interview proceeded with them; if not, the interview was terminated and a household was selected from the Secondary list.
- (ii) Open-ended Questions: To put interviewers at ease, the interview opened with a open question about general likes and dislikes of the area. An open question was also used at the end of the interview to enable the interviewer to conclude the interview informally.
- (iii) Socio-Economic Data: To enable later identification of segments of the population with transport problems, several questions were asked seeking details about all members of the household.
- (iv) Present travel patterns: Interviewees were asked to give details of the major trips made by them during a week, including the origin and destination, the trip purpose, the mode used and the frequency and timing of the trip. The format of this question was not considered to be entirely suitable because it asked for major trips usually made during a week, rather than trips made during the previous week. This was made necessary, however, by the timing of the interview in the week following Easter. Asking for the previous week's trips would have resulted in an unrepresentative record of trips. It was therefore decided to ask about major trips during a week, in the full knowledge that many minor trips may not be reported.
- (v) Reaction to proposed taxi system: To obtain an indication of the interviewees possible response to such a system, they were asked to indicate their likely use of such a system. To ensure that relatively realistic answers were obtained for

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this question, respondents were asked to provide details of the extra trips they would make by this taxi system in terms of trip purpose, destination and trip frequency. These details were initially obtained assuming a free system; the question was then asked as to which of these extra trips would still be made if a fare was charged. The fare which they would be willing to pay was then recorded. It was anticipated that as well as obtaining reaction to the proposed system, these questions would also serve as useful indicators to identify transport-disadvantaged segments of the population.

The interviews were carried out between Thursday 19th April and Sunday 22nd April 1979, with each student conducting three interviews. Surprisingly few problems were experienced by the interviewers who were received most warmly by the interviewees. The major problem encountered during the interview was concerned with vagueness in some of the written questions (this was a function of the limited time available for questionnaire design and the lack of a pilot survey). However, since the interviewers had themselves been directly connected with the design of the questionnaire, they were generally able to provide satisfactory explanations of the questions to the respondents. A number of other specific improvements to the questionnaire were identified as a result of the conduct of the survey.

The data obtained from the 72 completed interviews were then coded after some manual analysis to simplify responses. Data were then transcribed onto computer punching sheets by each interviewer using a pre-determined coding frame. Data were then transferred onto punched cards, with each interview being represented by three 80-column cards. Editing of the data was performed during the coding process. As well, computer listing of the data allowed for further editing and correction of punching mistakes. The data were then edited further and final analysis conducted using the SPSS package of programs (Nie *et al.*, 1975).

SURVEY RESULTS

Survey Response

Before considering the results of the survey, first consider the response obtained from the survey.

The major reason for not completing an interview was that the household could not be found or contacted. Some households could not be found physically due to the nature of the street and lot-numbering systems in the area. Other households could not be contacted after repeated call-backs (at least three). The major expected cause of concern (i.e. households not having an old-age pensioner) was the next most frequent cause of non-response. Other factors, including

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outright refusals, were relatively minor in number.

TABLE 1: SURVEY RESPONSE DETAILS

Response	Number
Completed Interview	72
Could not find, contact or unavailable	20
No one in household over 60 years of age	12
Refusal	5
Wrong person at address or moved away	4
House vacant	2
Respondent sick or in hospital	2
Respondent deceased	2

To check the representativeness of the sample of interviewees obtained, some comparisons were made with information obtained for the Shire of Sherbrooke from the 1976 Census.

TABLE 2: AGE AND SEX COMPARISONS WITH 1976 CENSUS

Age	1979 Survey	1976 Census
	Percent	Percent
60-64	12.5	30.0
65-69	22.2	25.5
70-74	27.8	19.6
75+	37.5	25.0
<u>Sex</u>		
Male	41.7	43.1
Female	58.3	56.9

It can be seen that the over-representation of females in the population of persons over 60 years of age is well matched in the survey sample. However it appears that the survey sample may be slightly older, on average, than the overall Sherbrooke population of persons over 60 (even after allowing for a natural aging of the population between 1976 and 1979). Nonetheless, the survey sample appears to be a reasonable representation of the general elderly population in Sherbrooke.

Socio-Economic Characteristics

In addition to the age and sex characteristics noted

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above, a number of other socio-economic characteristics of the sample are of interest.

TABLE 3: SOCIO-ECONOMIC CHARACTERISTICS

Characteristic	Percentage of Households
<hr/>	
No. of persons in H/H	
1	34.7
2	56.9
3	5.6
4	2.8
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No. of persons over 60	
1	48.6
2	51.4
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Phone connected	93.1
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Outside help received	22.2
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Member of Social Club	52.8
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The low number of households with more than two persons in the household would appear to support the contention of Wachs (1979) regarding the breakdown of extended families. However, as well as the six households in which younger people live with two people over 60, there are another 10 households in which a person less than 60 lives with another who is older than sixty. Whether this person under sixty is a much younger child or merely a spouse who is slightly less than sixty cannot, however, be ascertained from the table. However it can be stated that between 34.7% and 48.6% of households contained a single elderly person.

The percentage of households with a phone was very high at 93% and is substantially above the metropolitan wide average for all households. The high proportion with phones augurs well for the introduction of any transport system for the elderly which requires the use of a phone to make bookings.

The proportion of households receiving outside help for household tasks was 22%. Of these households, 70% of the interviewees were over 75 years of age. The most frequent source of help was from the Sherbrooke Council. A surprising 53% of interviewees were members of a social club, indicating that perhaps they at least had somewhere to go if they had transport available.

Mobility Characteristics

Two aspects of mobility are of particular importance in connection with elderly persons. Firstly, it is important to

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know of any physical restrictions which they face in moving about outside their house. As Wachs (1979) notes, 47 percent of all people having handicaps related to transport in the U.S. are aged 65 or above. Secondly, it is important to know of the availability of cars to elderly people, especially in an area such as Sherbrooke where public transport availability is very poor.

The first aspect was investigated by asking interviewees whether they, or their spouse, suffered from any restrictions on their movement outside the house.

TABLE 4: PHYSICAL RESISTRICTIONS ON TRAVEL

Type of Restriction	Percentage of People
Unable to leave home	0
Need walk assistance	4
Need special vehicle	1
Car passenger only	15
Not car passenger	5
No restriction	75

It can be seen that a high proportion experienced no restrictions and that only 5% would be unable to use a taxi system if provided. Conversely, 15% would not be able to use a bus service if provided.

A major restriction on present travel patterns in an area like Sherbrooke is the availability of a car. This aspect of mobility was investigated by enquiring about the availability of a car to the household and the possession of a current drivers licence by an elderly member of the household. The results are summarized below.

TABLE 5: CAR AVAILABILITY

	No Elderly Driver in Household	Elderly Driver in Household	Total
No car available	36%	3	39
Car available	6%	55	61
Total	42	58	100%

It can be seen that 55% of the households had both a car available and a licenced driver to drive that car. The proportion of households without a vehicle available is roughly four times the overall average for Sherbrooke and more than twice the Melbourne

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metropolitan average (Grant, 1979). This points to a potential degree of transport-disadvantage for this group.

Present Travel Patterns

A more positive measure of transport-disadvantage may be provided by examining the actual pattern of trip-making currently undertaken by those in the sample. A summary of the trips reported by the primary interviewee in each household is given in Table 6.

Several points of interest emerge from this table. Firstly, the average number of round trips per person per week is 4.02 (or 0.57 round trips per day). This figure may be compared with several other surveys of travel by the elderly which have been conducted in various localities. Thus, Morris (1980) reports a study for the Victorian provincial city of Ballarat which showed a trip rate for retired persons of 0.99 round trips per day. Wachs (1979) gives results of a survey in Los Angeles which showed an average of 0.73 round trips per day. By subdividing the population of elderly persons in Los Angeles, Wachs also shows that the average trip rate may vary from a low of 0.43 to a high of 1.02 round trips/day for groups with different levels of mobility. Hopkin, Robson and Town (1978) in a study of travel by the elderly in Guildford (U.K.) report an average of 0.92 return trips per day.

It is difficult, however, to make direct comparisons of these trip rates for several reasons. First, the areas in which the surveys were conducted are substantially different ranging from a semi-rural area on the outskirts of a large city (Sherbrooke), to a country town (Ballarat), to a very large motorized urban area (Los Angeles) to a typical English town with population of 57,000 (Guildford). The effects of town size, degree of motorization and level of public transport service all have an obvious effect on elderly person trip rate.

Secondly, the data collection methods were substantially different. The Sherbrooke study was a special study of elderly travel in which trips, and trip frequencies, were recorded for a typical week. The Ballarat and Los Angeles data were collected as part of area-wide home interview surveys of travel (on weekdays only) in the region. The Guildford study was a special study of elderly travel, but trip information was collected only for those trips made on the day immediately prior to the interview. The average trip rate was obtained by taking a weighted average of the results obtained for each day of the week.

In view of the difficulties stated above, it is therefore difficult to conclude that the Sherbrooke trip rate of 0.57 round trips per day is lower than that for other areas. It does, however, appear to be lower than that which might be expected of the population in general, mainly as a result of the very low number of work trips made by elderly persons. Because of the reservations about the method of recording trips,

TABLE 6: PRESENT TRAVEL PATTERNS

MODE PURPOSE	CAR DRIVER		CAR PASSENGER		OTHER ^a		TOTAL TRIPS ^b	
	WEEKLY TRIPS/ PERSON	% MAKING TRIP	WEEKLY TRIPS/ PERSON	% MAKING TRIP	WEEKLY TRIPS/ PERSON	% MAKING TRIP	WEEKLY TRIPS/ PERSON	% OF TOTAL TRIPS
Recreational/ Social	0.64	36.1	0.31	30.6	0.47	30.6	1.43	35.5
Medical	0.10	13.9	0.03	6.9	0.08	13.9	0.21	5.2
Shopping	0.92	43.1	0.34	19.4	0.94	38.9	2.19	54.5
Work	0.08	2.8	-	-	-	-	0.08	2.1
Other	0.08	2.8	-	-	0.03	2.8	0.11	2.8
Total	1.82		0.68		1.52		4.02	100
% of Total Trips	45.2		17.0		37.8		100	

Notes: (a) Other modes include public transport and walk trips. Of the "other" total, 77% were walk trips.

(b) Trip is defined as a round trip i.e. home-activity-home.

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further work is currently under way to measure trip rates for elderly persons in Sherbrooke using weekly travel diaries.

The use of various modes of travel by the elderly confirms the initial impression that the level of public transport service in the area is poor. Trips by car account for 62% of all trips, with 29% by foot and only 9% by public transport. These figures accord well with the data for Ballarat where 63% of trips are by car and 24% by foot. This dominance of travel by private car is perhaps surprising in view of the low car availability highlighted earlier. It may reflect a large difference in trip rates between households with and without a car. Alternatively it may simply be a result of the data collection methods used. The Ballarat data was collected as part of an area-wide transportation study, and these surveys in general tend to neglect many short distance walk trips. Ignoring such trips may be acceptable from a strategic transport planning viewpoint, but in studying elderly travel patterns they may be of vital importance. The Sherbrooke study, by asking respondents to recall major trips during a typical week, may have also missed out on many walk trips which the respondent thought would not have been of interest to the interviewer.

The purpose of trips undertaken by the elderly is shown to be dominated by trips for shopping and social purposes, with these two purposes accounting for 90% of all trips. The small proportion of trips for medical purposes perhaps understates the importance of this trip type, since it is likely that this trip purpose would dominate situations in which the lack of transport services is most critically felt.

Desired Extra Trips

In an attempt to gauge the potential demand for an innovative transport system, the question was asked of respondents as to what extra trips would be made if a free taxi service were available. This question, in fact, served a double purpose since it was seen as being a way of more precisely identifying that section of the population who might truly be classified as transport-disadvantaged. This expectation was based on a previous study in New Zealand (Heylen Research Centre, 1974) in which the "socially needy", with respect to transport, were defined as persons who missed a desired trip during the preceding week due to lack of transport. By asking for trips which would have been made if a transport system had been available, it was hoped to identify this "socially needy" group.

The general results with respect to desired extra trips are shown in Table 7. It was found that 43% of the respondents would make extra trips by the free taxi if it were provided. Those respondents desiring extra trips would make an average of 2.05 extra round trips per week. The distribution of these trips among the various trip purposes is shown in Table 7 and is seen to be in general accord with the present pattern of trip purposes, with the possible exception of medical trips which make up only 5% of present trips, but account for 9% of desired extra trips.

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TABLE 7: DESIRED EXTRA TRIPS

TRIP PURPOSE	% OF RESPONDENTS MAKING EXTRA TRIP	EXTRA WEEKLY ROUND TRIPS PER RESPONDENT MAKING EXTRA TRIP OF THAT TYPE	% OF TOTAL EXTRA WEEKLY TRIPS
Recreational/ Social	25.0	1.46	41.3
Medical	9.7	0.84	9.3
Shopping	25.0	1.63	46.2
Work	-	-	-
Other	2.8	0.99	3.2
Total	43.1	2.05	100.0

In an attempt to more clearly identify those respondents who desire to make extra trips, Table 8 compares a number of characteristics for respondents desiring extra trips and those who do not desire to make extra trips.

TABLE 8: CHARACTERISTICS OF RESPONDENTS DESIRING EXTRA TRIPS

CHARACTERISTIC	EXTRA-TRIP MAKERS	NON EXTRA-TRIP MAKERS	COMPARISON
Total Number	31	41	
Current weekly trip route	3.8	4.3	N.S. @ 95%
% with trips made by another	29.0	19.5	N.S. @ 95%
Age	71.9	72.2	N.S. @ 95%
Period of Residence (years)	19.5	17.7	N.S. @ 95%
% female	71.0	48.8	Sig. @ 95%
% single person household	48.4	24.4	Sig. @ 95%
% with no car available	51.6	29.3	Sig. @ 95%
% with no licenced driver	54.8	31.7	Sig. @ 95%
% living in steep terrain	45.2	22.0	Sig. @ 95%

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The most obvious assumption one might make about those desiring extra trips is that they are presently making fewer trips than others in the (elderly) population. To a certain extent, this is borne out by the data (3.8 trips/week compared to 4.3 trips/week). However, this difference is not significant at the 95% level of significance and is certainly nowhere near the extra number of trips (2.05) desired by each respondent desiring extra trips. Thus while a deficiency in current trip-making appears to have some connection with the desire to make extra trips it is not a significant factor. In fact, the deficiency in current trip-making may already have been counter-balanced by the greater number of trips being made for respondents by other persons outside the household. Thus while respondents not desiring extra trips have trips made by others in only 19.5% of the households, those desiring extra trips have trips made by others on their behalf on 29% of occasions. Thus the effective number of trips by or on behalf of the household may be very similar already. Characteristics such as age and period of residence in the area appear to have no significance in explaining the desire to make extra trips.

It does appear, however, that the sex of the respondent is a significant factor. A significantly higher proportion of respondents desiring extra trips are female (compared with respondents not desiring extra trips). Whether this factor is a reason for desiring more trips is, however, open to question. Most probably it is due to the observed correlation between sex and another factor which was found to be significant; that is, the proportion of respondents living alone. Forty-eight percent of respondents desiring extra trips live alone compared with only half that number living alone in the group of respondents not desiring extra trips. This factor appears to be a more logical causal factor in that people living alone have a greater desire to make trips in order to mix with other people (even if it only be the person who is taking them on the trip).

Another pair of factors which appear to be significantly different between the two groups are car availability and possession of a drivers licence. As noted earlier, these two factors are highly related and both are lower for the elderly population than for the general Sherbrooke population. However even within the elderly population, there appear to be two distinct sub-groups as defined by those desiring extra trips and those not desiring extra trips. Thus, more elderly households with a car available appear more satisfied with their present ability to make trips than those without a car available.

The final factor which appears to be significantly different between the two groups is the nature of the local environment in which they live. In particular, the topography of the local area (defined either as steep, hilly or flat by the interviewer before the interview) appears to be a significant factor in determining the desire to make extra trips. Thus, the proportion of households situated in steep terrain was significantly higher for households desiring extra trips (45%) than for households not desiring extra trips (22%). This appears plausible in that households situated in steep terrain would be more easily deterred from making walking

trips than those households in less steep terrain. They would therefore welcome the chance to have those trips made in a taxi. Such a finding is in accord with that reported by Hopkin *et al.* (1978) who state that the feature most likely to be perceived by the elderly as an obstacle to walking is the steepness of the route traversed. Such suppression of walk trips may not have shown up in the overall trip rate, however, because of the stated uncertainties concerning the recording of walk trips.

It appears from the above discussion of Table 8 that those respondents desiring to make extra trips can be reasonably well identified. A number of further questions were directed at those respondents to determine the way in which they would be prepared to use the taxi system if it was provided for them. In response, 87% of this sub-group of respondents stated that they would be willing to share the taxi with another person from outside their own household. Further, 81% stated that they would be prepared to pay to use the taxi. Although they could not be expected to pay the full fare, they stated that they would be willing to pay an average of 90 cents per round trip per person. Depending on the length of the trip and the number of people in the taxi, this contribution from the elderly passenger could be considered to be quite reasonable.

CONCLUSIONS

This paper has presented the results of a survey of travel patterns of the elderly in the Shire of Sherbrooke on the outskirts of Melbourne. The sample chosen for the survey appears to be a reasonable representation of elderly residents of the area but any conclusions drawn must bear in mind the fact that the sample frame selected consisted of old age pensioners who owned their own home and hence paid rates in the Shire. The effect of excluding elderly residents who rent houses in the Shire is an unknown, but potentially important, consideration.

The survey showed that most elderly households had a telephone connected and that approximately half of the households had a car available for their use. Only 5% of the respondents had travel severely restricted by physical disabilities. In examining current travel patterns, it was found that the respondents made an average of four round trips per week, the major trip purposes being for shopping and social reasons.

It was found that 43% of the sample desired to make extra trips if a suitable transport system were available. On average, those wanting to make extra trips wanted to make approximately two extra round trips per week. Analysis revealed that the group who wanted to make extra trips differed from the group not wanting to make extra trips in that they had:

- (i) a higher proportion of females;
- (ii) a higher proportion of people living alone;
- (iii) less access to a private car;
- (iv) fewer licenced drivers;
- (v) a greater tendency to live in steeper terrain.

Those who wanted to make extra trips were generally prepared to share a taxi provided for these extra trips and to

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pay an average fare of 90 cents for a round trip.

Although many of the transport problems experienced by these elderly people appear to be related to the non-availability of a car, those with cars were not without problems. In particular, many respondents stated that although they had the use of a car they tended to restrict their use of it to the daylight hours. This was because of failing vision and also because of the personal security fears which they felt in driving along dark mountain roads at night. Secondly, many elderly people with cars stated that although they did not feel that they had any transport problems at the moment, they could foresee transport problems for themselves when they could no longer use their cars in the future.

The present study has highlighted several factors in dealing with the transport problems of the elderly. Firstly, the conduct of the survey has been a most effective way of generating and fusing community and professional interest in the problem. Secondly, the use of a real-life problem has been a critical factor in the educational success of the survey. Thirdly, with respect to the technical aspects of the survey, it was agreed that those aspects of the survey procedure which require more attention are the selection of an adequate sample frame and the method of recording trip details. In particular, it is important to ensure that all trips, including local walking trips, are recorded if a true picture of transport-disadvantage is to be obtained. Ideally, an activity diary should be used in preference to a travel diary since it is the lack of participation in activities which is a more accurate reflection of disadvantage.

Fourthly, it is felt that information on the extra trips which a respondent would like to make is a most useful measure of transport-disadvantage which enables the differentiation of differently affected sub-groups within the elderly population.

Finally, however, the over-riding impression gained by all of those involved in the conduct of this survey was that many of the problems faced by the elderly in this sample will never be overcome by an improved transport system. Rather, the problems are more a reflection of the general social conditions in which the elderly find themselves. Until more people, both professionals and the general community, take a more personal role in understanding and helping the elderly, and other minority groups, their problems will continue to exist in much the same form.

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