The Mobility Needs of the Elderly

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The ability to move about at will, to engage in social and recreational activities when desired, and to reach business and social services when needed—all are key components of the quality of life. Transportation services and facilities are part of a package that allows the elderly to perform these important functions.

Not surprisingly, many studies have noted the importance of transportation to the elderly; in 1971 the first White House Conference on Aging reported that transportation was one of the three greatest needs of the elderly. Since then a number of studies have made the same observation. Nevertheless, myths and misconceptions persist about the transportation patterns and problems of the elderly and how their mobility needs can be met. These myths act, in part, to obscure major deficiencies in assistance to the elderly—from dysfunctional land use patterns to inappropriately targeted human services. These deficiencies can reduce mobility or lower the use of needed services in ways that have little to do with transportation or that require heroic efforts on the part of transport providers.

In addition, the persistence of historical views of the elderly—either no longer valid or totally false—interferes with society's ability to increase access for the elderly to community activities.

The literature, both popular and scholarly, often represents the elderly as living at high densities in older, run-down parts of town and largely dependent on public transportation when not walking. The elderly are often portrayed as alone and lonely, without social support or resources, often lacking contact with kin and friends. When they do not use human or medical services seen as

necessary for their well-being, their behavior is often attributed to lack of transportation.

These views color societal response to the problems of the elderly. For many years commentators called for additional mass transit; today it is common to assume that specialized paratransit services run by the public sector can—and will—meet all the needs of the elderly. Few recognize the importance of supporting or augmenting the existing mechanisms used by the elderly: private cars, taxis, paid and unpaid carpools, volunteers, church groups, and so on.

The data and analysis presented in this paper effectively challenge many myths about the elderly. Although some older persons conform to every stereotype, there are far more who face different, equally problematic, situations. Failure to recognize their needs means a failure to address the mobility problems of the majority of the elderly.

Half of the elderly in this country live in the suburbs, at fairly low densities; 70 percent live in single-family homes. Another large portion of the elderly live in rural areas, where they make up a growing percentage of the total population. Most older persons drive their own cars; almost 100 percent will have driven by the turn of the century. Moreover, whether they drive or not, most of the elderly make an overwhelming percentage of their trips in private vehicles—not on transit or by walking.

Most of the elderly are not deserted by family and friends; they have frequent social contact. Thus, serious efforts should be made to strengthen those networks financially and socially, augmenting them when required. The elderly will not be well served by measures that break down their informal or family support mechanisms or destroy existing community transport options.

In spite of assertions to the contrary, there is strong evidence that the elderly do not use a variety of business and social services because they simply do not want to or cannot afford the activity in question—not because they lack transportation. The elderly who have objections to needed human services or who fail to recognize their usefulness will not begin to use such services simply because access becomes easier. Human service agencies must consider how and why they deliver services to the elderly and fashion more responsive alternatives.

Elderly people who have built a life in low-density areas on the basis of the freedom of the private car will not be well served by options that are designed for high-density communities or that do not recognize that the quality of life for the elderly depends on freedom of choice and flexibility. Planners must offer the elderly the freedom of the car as long as possible, using taxis and other paratransit options to approximate the car's flexibility.

The analyses in this paper suggest that the mobility problems of the elderly require both short-term and a long-term responses in three areas: transportation, land use planning, and human service delivery models. If deficiencies in

land use and human service planning are not addressed, the transport system will be unable to meet the mobility needs of the elderly now and in the future.

DATA SOURCES

The data in the following sections come from three categories of sources; the first is the published literature, which is always cited.

The second is the Nationwide Personal Transportation Study (NPTS), conducted by the Census Bureau for the U.S. Department of Transportation in 1977 and 1983. Although there are published documents from the NPTS, most of the data used here are directly from the computer tapes of the original 1977 and 1983 studies. Thus, NPTS data mentioned without citation were obtained from the tapes and are otherwise unpublished.

The third major data source is the national Health Interview Survey (HIS), which is undertaken yearly by the National Center for Health Statistics (NCHS). In addition to the regular annual survey, special surveys were undertaken in 1977 on car driving and in 1983 on the health of the elderly. Where otherwise not specifically cited, HIS data were obtained from the tapes and are otherwise unpublished.

All of the data used in this paper are cross-sectional, snapshots of what people are doing or experiencing at one given moment. There is always a strong incentive to draw longitudinal messages from such data—to assume that one can tell what happens to people as they age from 40 to 70 because differences between the two groups are apparent today. However, those who are now 40 are different in many ways from those who were 40 during the 1950s; there is no way of knowing whether they will have the same preferences, attitudes, and needs as they age. In fact, there is strong evidence of generational effects—such as the almost universal holding of driver's licenses by 40-year-old women today—that lead to the assumption that their behavior may be quite different when they reach 70.

REPORT ORGANIZATION

This paper has seven major sections. The next section focuses on demographic trends in society, especially the surburbanization of the elderly, and the transportation implications of those trends.

The following three sections examine how the elderly provide their own transportation—in private vehicles, walking and cycling, in taxis and on transit—outlining current use patterns and barriers facing the elderly in each mode.

The use of what has been called "socially provided" transportation—specialized transportation systems, human service agency programs, and volunteer networks—takes up the next section. Although often advanced as the

ultimate solution for the transport problems of the elderly, specialized transportation services face serious problems.

Last, the data and analyses presented here are summarized and a simplified model is described that predicts both the number who will lose their driving skill and the number of trips that will be lost.

DEMOGRAPHIC TRENDS

In 1986, 25.5 million Americans—approximately 11 percent of the U.S. population—were over 65 years of age. The Census Bureau estimates that as much as 18 percent of the population will be elderly by the year 2020, an increase of roughly 56 percent over 1980. Because of these major changes the median age of the entire society will rise from the current figure—just under 30 years—to just under 40 years by 2010.

A variety of social and demographic changes will accompany the aging of the population. On the positive side, people will live longer and in better health. They will more likely have their own homes, adequate incomes, and more material resources than previous generations. On the negative side, the need for specialized care and services will increase for the substantial number of very old people.

The aging of a society raises significant questions about mobility and transportation of the elderly. Strikingly, almost all of the "new" old will drive cars; the majority will live in suburban or relatively low-density urban settings. These people will have made a variety of decisions, and structured their social and economic lives, in response to their lifelong access to the private car.

The following section gives a brief overview of the elderly today and evaluates how current income, housing, and transportation trends will affect the needs of the elderly tomorrow. Overall, the data presented here strongly suggest that the future elderly will have different and more complex needs than the current elderly; society must understand these patterns in order to fashion effective and equitable transportation policies.

Population Patterns

The decade between 1970 and 1980 marked fundamental changes in American society and for the elderly in that society. Between 1970 and 1980, the number of Americans 60 and above increased 23 percent, both raising the percentage of elderly in society as a whole and pushing the median age of the population to 30. There was a far greater number of much older people in 1980 than in 1970, and the Census Bureau stopped using the category "75 and above" as the upper age limit in population breakdowns.

The percentage increase in the elderly population from 1950 to 1976 is shown in Table 1 *(1, 2)*; in those 26 years, the entire elderly population increased 85 percent. The greatest growth was among the very old; those over 85 increased 233 percent. By 2020 those over 85 may well account for almost 15 percent of the elderly population.

TABLE 1 INCREASE IN U.S. ELDERLY POPULATION, 1950–1976 *(1, 2)*

	Percentage by Age Group			
	65+	65–74	75–84	85+
Total population	85	67	104	233
Men	60	51	69	159
Women	108	82	135	286

Substantial changes have also occurred in the economic attributes of older people and their households. From 1959 to 1981 the percentage of elderly people below the poverty level fell substantially, particularly those living in families; in 1981 only 8 percent of men and 16 percent of women over 65 in families lived in poverty.

As might be expected, there are important socioeconomic differences between the elderly living in the suburbs and those in the central cities. In both 1970 and 1980, the former were less likely to live below the poverty level than the latter. Between 1970 and 1980, the percentage of the poor who were elderly dropped in most states, but the change was far more significant for those living in suburban areas.

In general, the change in poverty status in the suburbs reflects two factors. The first is the overall improvement in the standard of living of the elderly; the second is that, from 1970 to 1980, the first cohort of more affluent postwar suburbanites became at least 60.

Unfortunately, although unrelated elderly individuals experienced a substantial drop in poverty rate, over 30 percent of elderly women and 23 percent of elderly men living alone in 1981 were below the poverty level. These data are disturbing, because the Census Bureau predicts a large increase in the number of elderly women living alone by 2020. By 2020, although roughly 91 percent of elderly men will live with others (a figure comparable to today's figures), 41 percent of elderly women will live alone. To make matters worse, the median age at which a woman is expected to experience widowhood will only increase from 64.5 in 1980 to 66.7 by 2010.

On the other hand, those who will turn 65 from now until roughly 2000 will have more children to help and support them than those who are now elderly, mainly because of the Baby Boom after World War II. Moreover, the current

elderly, whether living alone or not, often have strong family and social networks on which they can rely; the 1983 Special HIS study on the elderly found that many see their children frequently. Almost two-thirds of those who live alone see their children weekly; only one-fifth see them less than once a year. Nearly 75 percent of the elderly living alone have children who can reach them in a matter of minutes; almost every elderly person has a child only hours away *(3)*.

Although all these older persons may occasionally or even frequently need assistance, it may not always need to be from some governmental source. Because they have personal resources, government programs should assist and strengthen these rather than break them down or neutralize them.

Housing Patterns and Mobility

There were also striking locational changes from 1950 to 1980 that sharply differentiate the previous generations of elderly from the current one. In the decades since World War II, America has experienced two migrational trends in which the elderly shared: the move out of rural areas into metropolitan areas and the move out of central cities into suburbs within metropolitan or urban areas.

Table 2 shows that in both 1970 and 1980 almost three-fourths of those over 60 lived in urban[1] areas—either in the central city or in the suburbs of those cities. However, in 1970 the majority of the elderly lived in the central city, and less than 40 percent of any elderly age group lived in what could be called suburbs. In contrast, by 1980 a majority of all urban elderly lived in the suburbs, with the youngest old cohorts showing the highest percentages of suburban living.[2]

The "new" suburban elderly are, in fact, the parents of baby-boomers. After the war, aided by federal mortgage assistance programs and the accessibility offered by the car, they moved away from the central city homes of their own parents and bought homes in the suburbs. The parents of the baby-boomers left their parents to age in the central cities; they are now, in their turn, aging in the suburbs. In spite of widespread belief to the contrary, all evidence is that the postwar suburbanites will stay where they are, "graying in place" and changing the character of the suburb—and the nature of their transportation needs.

Figure 1 shows that housing mobility rates have dropped sharply for all age groups since 1960, and probably will continue to do so.[3] Today people are less likely to move as they age. By 1960 almost 80 percent of those 20 to 29 had moved, whereas only 60 percent of that same cohort had done so by 1970

TABLE 2 ELDERLY POPULATION, 1970 AND 1980

Age Group	Percentage by Location				
				Urbanized Area	
	Rural	Urban	Total	Central City	Suburb[a]
60–64					
1970	27.6	72.4	56.8	59.2	40.8
1980	27.0	–	73.0	41.0	59.0
65–69					
1970	27.8	72.2	55.8	61.2	38.8
1980	28.9	–	71.0	42.6	57.4
70–74					
1970	26.8	73.2	56.0	61.8	38.2
1980	29.5	–	70.5	44.0	56.0
75+					
1970	26.5	73.5	54.6	62.0	38.0
1980	–	–	–	–	–
75–79,					
1980	29.0	70.1	–	45.6	54.4
80–84,					
1980	29.0	71.1	–	46.3	53.7
85+,					
1980	29.8	70.2	–	46.2	53.8

NOTE: Generally in 1970, "urbanized area" included the central city and the urban fringe, and "urban" was urbanized area plus places of 10,000 and more plus places of 2,500 to 10,000. In 1980 "rural" meant outside Standard Metropolitan Statistical Areas plus places of 10,000 and more plus places of 2,500 to 10,000; "not in central city" meant urban fringe or suburb.

[a]Suburb = urban fringe.

(when they were 30 to 39) and only 32 percent by 1980. Figure 1 also reveals a second trend—each successive generation since the war has been less likely to move at a comparable age than earlier generations: 43 percent of those who were 40 to 49 in 1960 moved compared with 34 percent of the same cohort in 1980.

A 1978 Census Special Study on the elderly commented (*1*, p. 35):

> [Elderly] migration rates are relatively low both in an "absolute" sense and in comparison with those for younger age groups; with increasing age people migrate less. If the elderly do migrate, they generally go to various retirement areas within the United States, particularly Florida, to rural places or small towns (moving off farms), the country of origin (if foreign-born), or other areas abroad (e.g. Mexico) to retire. More commonly, many remain stuck in rural hinterlands or large urban centers . . . where they spent much of their adult lives.

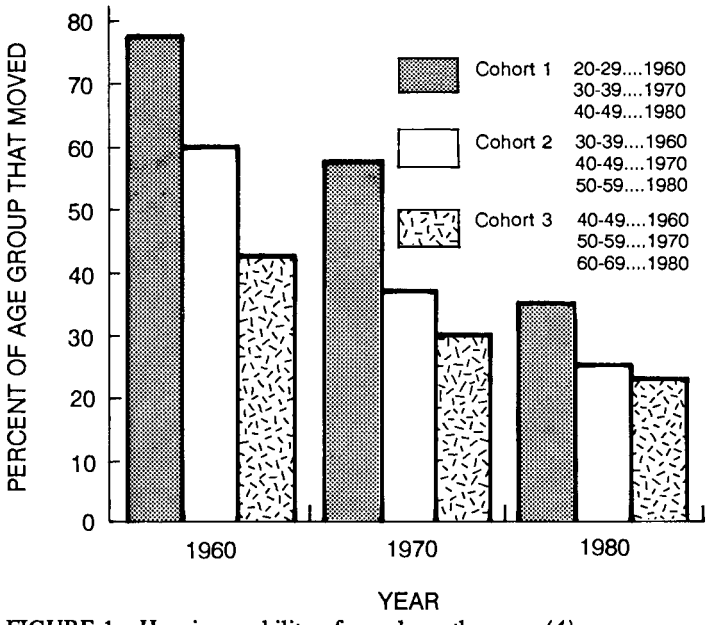

FIGURE 1 Housing mobility of people as they age *(4)*.

Transportation Trends

The impact of increasing suburbanization and increasing income can be clearly seen in the travel patterns of the elderly. Table 3 shows that the elderly rely heavily on the private car, whether or not they drive. Several messages stand out in the data.

First, the elderly have come to rely even more on the car than in the past; in every age group more trips were taken in private vehicles (including vans, recreational vehicles, trucks, and station wagons) in 1983 than in 1977. Second, the elderly actually rely on private vehicles for more of their trips than do those 16 to 60; in fact, the importance of the private car actually declined between 1977 and 1983 for those under 60. Only those over 76 make a smaller percentage of their trips in cars than do those under 60. Third, elderly people in rural areas make more of their trips in cars than those in urban areas and more than younger people in rural areas; close to 90 percent of the trips of all rural elderly under 80 are taken in private vehicles.

Given the freedom offered by the car and the need to travel longer distances in low-density areas, it is not surprising that even those elderly who do not drive rely heavily on the private car. In fact, the elderly rely more on the car—or the taxi, a mode with the convenience of the car—for their highest-priority trips.

TABLE 3 ALL TRIPS TAKEN IN PRIVATE VEHICLES IN URBAN AND RURAL AREAS, 1977 AND 1983

	Percentage by Age Group						
	16–60	61–65	66–70	71–75	76–80	81–85	85+
Urban							
1977	90.0	85.2	79.4	80.1	70.8	63.7	67.4
1983	81.3	87.1	82.2	83.3	81.8	75.7	74.6
Rural							
1977	87.7	93.5	91.4	86.3	83.1	84.8	94.2
1983	85.0	91.6	89.7	87.5	88.7	82.2	80.2

NOTE: Private vehicles = automobiles, trucks, passenger and other vans, station wagons, and recreational vehicles.

SOURCE: Calculated from unpublished data from the 1977 and 1983 Nationwide Personal Transportation Study.

Table 4 shows that most of the medical trips of the elderly are made in the private car—over 80 percent for almost all cohorts. The taxi, however, also assumes an important, and even major, role for some: 6 percent of the medical trips made by those 66 to 70, 8.5 percent of the trips made by those 76 to 80, and 50 percent of the trips made by those 81 to 85 are by taxi.

TABLE 4 MODE USED FOR URBAN MEDICAL TRIPS, 1983

	Percentage by Age Group						
Mode	16–60	61–65	66–70	71–75	76–80	81–85	85+
Private vehicle	90.5	95.3	94.0	82.9	–	49.7	100.0
Walk	0.3	4.7	–	12.7	–	–	–
Transit	4.6	–	–	–	–	–	–
Taxi	0.6	–	6.0	–	8.5	50.3	–
Bike	–	–	–	–	–	–	–
Other	0.7	–	–	–	–	–	–
Unknown	0.4	–	–	4.4	–	–	–

SOURCE: Calculated from unpublished 1983 Nationwide Personal Transportation Study data.

Comparable analyses of unpublished NPTS data show that although private vehicles also form the dominant mode for shopping—over 80 percent for those under 80—a small percentage of such trips are made by walking. Between 12 and 15 percent of all shopping trips by those between 65 and 80 are made by that mode. In fact, the tendency to walk increases significantly with age; more than 50 percent of those 85 and over walk to shopping. Few urban shopping trips by any age group are made using mass transit—less than 5 percent of the trips of groups under 85 and 16 percent of the trips of those over 85.

Unpublished NPTS data also show that the car is the dominant mode of all groups of the elderly for a combination of closely related trip purposes: social, visiting, recreational, vacation, and school or church. The car is used for 80 percent or more of all these trips for those over 65 and becomes more important for those over 80; the highest percentage of automobile use by the elderly over 80 for any purpose is for these combined social trips.

Policy Implications

By the turn of the century the majority of the elderly will live in low-density communities in either the suburbs or rural areas. Over 90 percent of both men and women will have been licensed to drive for 20 years or more, and their whole pattern of life will depend on the accessibility offered by the car and the low-density delivery of public and private services.

The quarter of the population who lives in the central city will be less well off economically, but the suburbanites will suffer a larger absolute drop in mobility when they can no longer drive. The rural elderly, often seriously economically disadvantaged, will also suffer a large absolute drop in mobility when driving is no longer possible. Moreover, even if they can continue to drive, they will have to go further because both public and private services are being withdrawn from rural areas.

Each of these groups of travelers will require different transportation and other resources when they can no longer drive. One simple solution will not serve most of the needs of a society with a larger and larger elderly component.

THE ELDERLY ON THEIR OWN

Private Vehicles

American society depends on the private car; at all ages Americans make more trips in private vehicles than do travelers in any other developed country. The elderly make the majority of their trips in cars whether they drive or not.

There has been an explosion in the use of the automobile since the end of World War II. In 1978 the United States had almost twice the numbers of cars per capita as the next leading contender, Sweden, and 10 times the per-capita rate of Great Britain *(5)*. Although rates of car ownership are not uniform, over 70 percent of U.S. households in central cities and 90 percent in suburbs and rural areas owned cars in 1978.

Traditionally the elderly have not had such high rates of car ownership or use; currently elderly Americans travel roughly one-third as many vehicle miles as those under 65. What is not clear is how much the current differential between those over and under 65 is a result of decreases in mobility that come

inevitably with age—for a variety of reasons yet to be grappled with—and how much is a generational effect, a historical artifact of the lower use and dependency on the car among those who were middle-aged two decades ago.

For example, there has been a significant increase in the number of both men and women with driver's licenses since the 1950s. Figure 2 shows that in the first half of the 1950s only 40 percent of all men over 70 had licenses; in 1984 that percentage had more than doubled to almost 90 percent.

Although women's licensing rates have traditionally lagged behind men's, the percentage increase has been roughly the same; in 1951–1956 only 8 percent of women over 70 were licensed to drive. By 1984, 43 percent of women over 70 had driver's licenses. Today, as Figure 2 shows, 94 percent of all adults 60 to 69 and almost 90 percent of men 70 and over have licenses.

Of equal importance, the traditional gap in licensing rates for men and women has largely disappeared for younger age groups. In 1984, 92 percent of women 30 to 39 drove (although male licensing was almost universal); this means that in the first decade of the 21st century, roughly 90 percent of women 60 to 69 will have been licensed and driving for over 30 years.[4]

In the following sections the use of the private car by elderly drivers and nondrivers is analyzed. The conclusion is that the private car is the dominant mode for today's elderly and will be for the elderly in the future. Those who are today over 40 will make a number of life-style decisions that will affect them three decades from now, decisions based on the accessibility offered by the car that range from where to shop to where friends live and that will not be easy to change after retirement.

However, the analyses also show that it is difficult to gauge the extent to which the elderly of the future will require additional transportation services when they cannot drive and the kind and quality of services required. Although there are currently great disparities in trip making between those elderly with and without licenses, it is not known how much of the difference reflects a genuine need for additional travel. The barriers to greater vehicle use, as well as driving, are composed of a complex mixture of individual and environmental barriers that often reduce the desire to travel more than the ability to do so.

Moreover, many individuals who continue to maintain a license may seriously restrict their driving, perhaps more than is necessary. Thus there is a hidden loss of mobility that is not recognized by those concerned only with licensing criteria.

Current Automobile Patterns

U.S. data show two clear patterns among all elderly, both those who drive and those who do not. First, they travel significantly fewer miles than younger

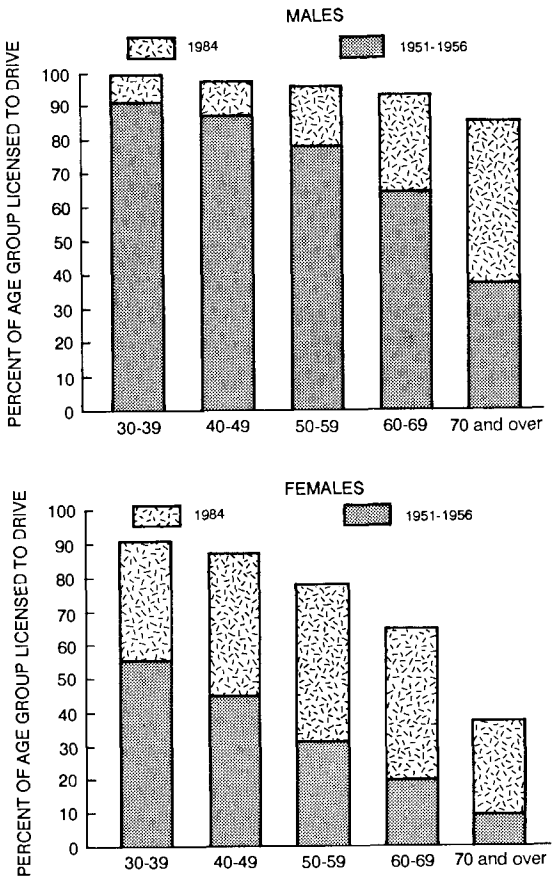

FIGURE 2 Licensed drivers by age and sex, 1951–1956 and 1984 (*6*, Table DL).

persons, but, second, they have come to rely as heavily on the private car. The first pattern can be seen in detail in Figure 3, which shows vehicle miles of travel (VMT) for those in urban areas, whether or not they drive (and including all forms of public and private vehicles).

Three trends are obvious: people of all ages traveled more in 1983 than they did in 1977, at all ages women travel fewer miles than men, and—the most important here—as people age they drive fewer miles. The drop in VMT seems greatest when people reach 60. However, the gap between men and women is much smaller for younger groups, and it may remain smaller for future groups of elderly. Unpublished NPTS data show similar patterns in rural areas.

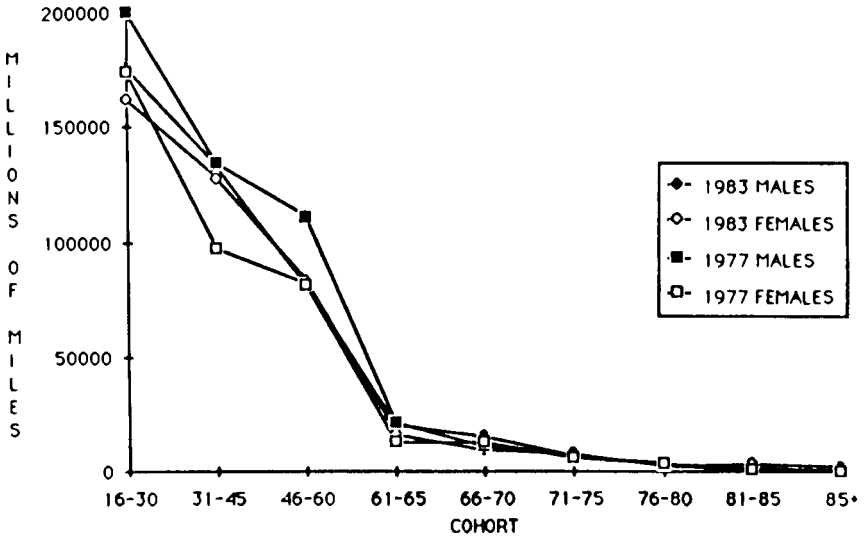

FIGURE 3 Annual urban VMT by age and sex, 1977 and 1983. (Calculated from unpublished Nationwide Personal Transportation Study data.)

Although the elderly travel less distance than younger drivers, this may not represent a corresponding—or any—decrease in the frequency of trip making. A major European study found that when home-to-work travel is eliminated from the pattern for both young and old, the elderly make more reasonably frequent but short trips than younger travelers *(7)*.

U.S. patterns are similar. In Table 5 all work trips were removed from the vehicle trip distribution patterns of drivers and nondrivers to see whether the elderly substitute other trips for work trips. The data suggest that the elderly indeed make more shopping trips than younger employed persons, a finding consistent with common observations. Surprisingly, however, the elderly make fewer visits and other social trips than younger people. They may also attend church less than younger people, although this finding may be an artifact of the inclusion of school activities with church activities for younger people.

In the following sections the travel patterns of elderly drivers and nondrivers are discussed and the kind and frequency of trips made by both groups are evaluated.

Elderly Drivers U.S. data above suggest that all older persons may make shorter, more frequent trips than younger travelers; the data show this to be especially true of elderly drivers versus all others. A 1987 Dutch study found no significant difference in the frequency of driving among age categories for social or shopping trips *(8)*. Kobayashi *(9)* found that, although elderly

TABLE 5 URBAN VEHICLE TRIP PURPOSES WITHOUT WORK TRIPS, 1983

Main Purpose	Percentage by Age Group						
	All Ages	61–65	66–70	71–75	76–80	81–85	85+
To or from work							
Business							
Shopping	26	35	32	33	36	29	19
Personal	23	22	23	22	15	12	7
School or church	11	7	7	10	7	17	11
Medical	2	3	3	4	8	2	7
Vacation	<1	<1	<1	<1	–	<1	–
Visit	15	14	12	10	11	16	17
Pleasure	<1	<1	2	<1	<1	4	15
Other social	20	18	17	18	20	15	26
Other	3	2	5	2	2	2	–
Unknown	<1	–	–	–	–	–	–

SOURCE: Calculated from unpublished 1983 Nationwide Personal Transportation Study data.

Japanese car owners drove less distance, their trip frequency was not much different than that of younger drivers: over half of those over 60 drove every day.

A 1976 study of drivers in Sweden found that older drivers did make fewer trips than younger drivers, but that over 55 percent of male drivers and 49 percent of female drivers used their car every day; an additional 28 percent of both sexes used their car two to three times a week *(10)*.

U.S. data are comparable. NPTS data suggest that the elderly (to the age of 80) make more nonwork trips per capita than younger people. Thus, if work trips are removed from total trip patterns, the elderly travel more frequently than do travelers under 65.

Published NPTS data (*11*, pp. E-17–E-19) suggest that certain kinds of trips, not long in themselves, are made frequently by elderly drivers. Shopping and family and personal business trips each average less than 5 mi, but together they account for over 50 percent of all trips and almost 40 percent of all VMT. Conversely, although medical trips are among the longest taken (discounting vacations and short pleasure trips), they account for only 7 percent of all trips taken and 5 percent of all VMT by those over 65. This suggests that these trips are taken infrequently, as are vacation and pleasure trips.

Nondrivers Although it is clear that most travelers make extensive use of the private car, it is reasonable to assume that nondrivers—those unable or unwilling to drive—may have different, perhaps remarkably different, travel

patterns than those who drive. The data here show that nondrivers make far fewer trips with any mode than do drivers.

Figure 4 shows the annual trip patterns of elderly travelers with and without driver's licenses. It is immediately clear that those without licenses make far fewer trips than those with licenses, although the relative decline with aging is greater for those with licenses. Unpublished 1983 NPTS data reveal that in both urban and rural areas those over 65 with licenses make between 50 and 100 percent more trips in a year than those without licenses. Overall the older the traveler the greater the disparity in trips taken between those with and without licenses. Those over 85 without licenses make roughly 70 percent of their trips in a car compared with 40 percent of those 66 to 70 without licenses. Moreover, the differential is still greater in rural areas (NPTS data include walking, transit, and taxi trips also—modes that have little to do with the presence of a driver's license). In spite of these differences, 1983 NPTS data also show that the car is still the most frequent mode for those without licenses as well as for those with them.

Most elderly travelers without licenses make a significant percentage of their trips by walking—between 20 and 40 percent of all trips. Transit is a distant third choice for most urban travelers; no more than one-fourth of any group's trips is made on transit, and most age groups depend on mass transit

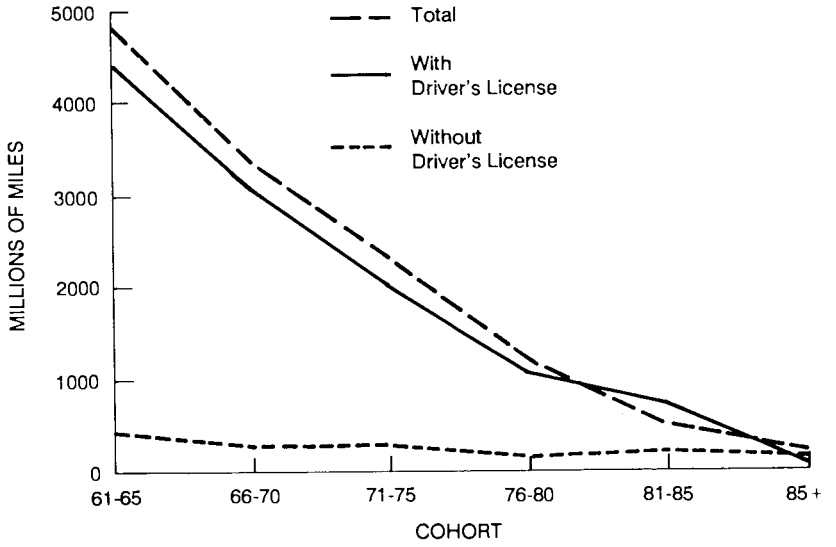

FIGURE 4 Annual urban trips (weighted in millions) by age and presence of driver's license, 1983. (Calculated from unpublished Nationwide Personal Transportation Study data.)

far less. There is also small but significant taxi use by older travelers without licenses.

Although the private vehicle is a major travel mode for all the elderly, those without driver's licenses are nowhere near as mobile as those with licenses. The data suggest that some of those who cannot drive do not have acceptable substitutes for the private car, at least not ones they can afford or physically manage, and their trip destinations may require the flexibility and convenience of the private car, so that transit and walking cannot be easily substituted.

Barriers to Automobile Use

The elderly face a number of barriers to initial or continued automobile travel. First, there are a variety of individual or personal physical problems that might interfere with the ability to travel; to these are added the financial problems of maintaining a car. Second, there are a broad class of environmental problems; among these are the way land uses and the road system are organized, and the kind, quality, and cost of activities offered to the elderly in a community.

There is significant evidence that the elderly often suffer a reduced desire to travel as they age *(12, 13)*; it cannot be assumed that all differences between the young and the old and between the driver and the nondriver are due to lack of access to a car. Those without cars or licenses may face a variety of environmental and personal barriers that translate into reduced desire for all activities long before they translate into the loss of license or ability to drive.

Both environmental and individual barriers have complicated impacts; it is important to understand both the barriers that reduce the older person's desire to travel and those that reduce their ability to travel when they still wish to do so. Such a separation is not easy; the same physical problems that cause the elderly to reduce their driving could rob them of the ability to engage in activities at their destination.

However, the data below have a striking message; physical problems seem to create few of the barriers that keep the elderly from leading a more active life or from driving. It initially appears that environmental problems may pose greater barriers to the elderly, first reducing their desire and then their ability to travel.

Declining Desire to Travel Although it is known that those with driver's licenses make more trips than those without driver's licenses, how many more trips nondrivers (or elderly drivers, for that matter) might wish to make is unknown. Converting the gap between the two groups into needed trips is very difficult, because some of the differential is due to a lost desire for activity and travel.

One method is to analyze the number and kind of additional trips made by the elderly when provided with specialized transportation services. The U.S.

Department of Transportation (DOT) analyzed a number of specialized services for the elderly and found little evidence of additional trip making. For example, the DOT study of a New York system concluded *(14)*, "These data suggest that most persons who made essential trips probably would have found an alternative mode if EASYRIDE did not exist."

In 1978 DOT examined five additional systems and found very similar patterns *(15)*. At each site, only small numbers of people (between 5 and 24 percent) said that they would not make their trip without the special service in question. It was noted that there had been some small impact by the special service on user travel patterns, but it was concluded that, overall:

> There is no definitive evidence from the demonstration projects that any of the transportation service improvements for the elderly and handicapped have had an impact on their overall rates of trip-making.

Data from an Austin study of Medicaid clients *(16)* show this pattern even more clearly. Sixty-eight percent of elderly users reported that the same trip (or a similar one) had been made before the establishment of the subsidized service; most of the remainder had not needed to travel previously. Only 14 percent of the remaining respondents said that their reason for not making the trip was lack of transportation.

Medical researchers studying why the elderly did not use medical services found that transportation was rarely the cause (although it was often assumed to be so by professionals). Evashwick et al. *(17)* concluded that when respondents report transportation difficulties, they are reporting a functional problem and not a barrier to use of either transportation or medical services (*17*, p. 378):

> Despite the fact that transportation is reported as a problem, the high service use by these respondents indicates that transportation does not present an insurmountable barrier to obtaining care.

These data indicate not that these older persons never have transportation problems, but that lack of transportation does not explain their low use of key services or their overall lower rates of activity. Although it is difficult to identify all the problems that create barriers for the elderly, finances and lack of interest in social and other services seem to explain a great deal.

In 1979 a Congressional Budget Office study noted that (*12*, pp. 18, 19) "travel behavior is . . . closely related to income; severely disabled persons with high incomes tended to travel almost as much as able-bodied individuals." The Senate Special Committee on Aging made a similar observation (*13*, p. 12):

> Amount of income appears to be very important in the degree of [transportation] difficulty experienced. Very small amounts of income added to that of persons living at the poverty line appear to result in considerable alleviation of transportation problems. Indeed the most striking aspect . . . is the substantial improvements in transportation which are indicated just at the point of the poverty line. . . . The percentage of those reporting difficulties rarely rises appreciably for either couples or individuals with incomes over the poverty line.

A number of studies have found that the elderly, particularly those who are poor, are not interested in many community activities and services (*18*, p. 271; *19*, p. N-5; *20*, p. 12). The California Department of Social Welfare concluded *(21)*:

> Old people—particularly those who are poor—have been less than enthusiastic. . . . In fact, few community service programs have been successful in reaching any sizeable portion of the aged population. . . . Most older people avoid most service programs for the aged.

Declining Ability to Travel Physical problems only explain some of the drop in travel by both drivers and nondrivers. Table 6 shows that the extent of driving, regardless of disability, lessens with age; at the same time, driving lessens for every cohort of the elderly as activity limitations increase. However, in every case, the decrease in driving is greatest with increasing age and not with increasing disability. For those 60 to 69, for example, the difference between those with no limitations and those unable to conduct a major activity (the most severe limitation) is only 12 percent. The difference between those 60 to 69 with no activity limitations and those over 80 with no limitations is almost 50 percent. In short, age alone is a greater predictor of amount of driving than activity limitations.

TABLE 6 RESPONDENTS WHO DRIVE CARS BY AGE AND CATEGORY OF DISABILITY, 1977

	Percentage by Age Group			
	All Ages	60–69	70–79	80+
Total	81.2	70.3	52.9	25.0
No activity limitations	85.3	74.4	59.8	33.8
Limited but not in major activity	74.7	66.9	45.4	20.5
Limited in major activity	63.2	61.2	41.0	18.3
Unable to conduct major activity	52.7	62.4	47.4	17.3

NOTE: Data include unknown responses.

SOURCE: Calculated from unpublished 1977 national Health Interview Survey data.

Table 7 analyzes further the impact of disability on extent of driving using HIS data. Overall, less than one-third of all elderly who do not drive are prevented from doing so by disabilities; even those over 80 do not explain much of their unwillingness or inability to drive in terms of their health or physical problems.

TABLE 7 CAUSE OF DRIVING BEHAVIOR BY AGE AND ACTIVITY LIMITATION, 1977

Category	Nondrivers in Category (%)	Nondrivers Prevented from Driving by Health or Disability (%)	
		Yes	No
All ages	18.8	19.2	81.8
60–69	29.7	18.7	81.3
No activity limitation	35.6	3.7	96.3
Not limited in major activity	33.1	21.4	78.6
Limited in kind/amount of major activity	38.8	27.4	72.6
Unable to conduct major activity	37.6	57.1	42.9
70–79	47.1	22.8	77.2
No activity limitation	40.2	7.4	92.6
Not limited in major activity	54.6	19.9	80.1
Limited in kind/amount of major activity	59.0	16.1	73.9
Unable to conduct major activity	52.6	57.9	42.1
80+	75.0	34.2	65.8
No activity limitation	66.2	14.8	85.5
Not limited in major activity	79.5	36.4	63.6
Limited in kind/amount of major activity	81.7	33.8	66.2
Unable to conduct major activity	82.7	61.2	38.8

SOURCE: Unpublished data from the 1977 special national Health Interview Survey by the National Center for Health Statistics.

When each group is disaggregated by activity limitation, a greater relationship between disability and driving is seen. However, the impact is very strong only for the most severe level of activity limitation. Less than one-third of the nondriving behavior of all other respondents is explained by their health or disability, regardless of age.

Loss of Driving Skills Actual physical disability may not explain why the elderly do not drive more, but it is a real issue. The data and published studies indicate that declining skills have two impacts on the elderly driver. First, they eventually leave elderly drivers unable to drive safely; some skill losses can be compensated for—through training—and others cannot. Once unable to drive, elderly drivers and members of their household dependent on them may suffer drastic losses in mobility.

Second, elderly drivers, cognizant of their declining skills, may elect to restrict their driving or stop driving entirely. They may, in fact, constrain themselves more than is necessary or fail to take advantage of programs that can compensate for some skill losses. Thus there is a hidden loss of mobility that might be unnecessary and that is effectively obscured from policy makers concerned only with licensing as a criterion.

The aging process is generally held to affect driving by reducing major cognitive functions; these cognitive reductions are often accompanied by both the loss of certain physical functions and the onset of dysfunctional medical conditions. These factors, when combined, affect skilled performance and result in degradation of perceptual ability, especially visual capacity, and slowing of performance and reaction times *(22)*.

What are the measurable impacts of reduced performance skills among the elderly? Numerous studies show similar patterns: the elderly have far fewer accidents per capita than younger drivers and the accident rate declines with age. However, when exposure factors are added, societal accident patterns tend to display the classic U-shaped curve; accident rates are highest per exposure for the youngest and oldest members of society. When involved in an accident, those 65 and over are more likely to be injured or killed than younger persons.

One reason that the elderly have a lower per-capita accident rate is their choice to curtail their own driving significantly in response to problems. Several major U.S. studies found that older drivers restrict their driving more and more as they age, beginning at 60 for men *(23)*. The studies also found that older drivers tend to avoid high-risk driving situations, for example, night and peak-period driving. A 1977 Canadian study concluded that, although medical conditions among elderly drivers did increase driver risk, it was more than offset by their adoption of new, less risky driving patterns *(24)*.

Austrian researchers recently reported that there was no overall quality decrease in the driving behavior of the elderly in comparison with that of younger drivers because older drivers had increased regard for other traffic participants and reduced risk taking and aggressive behavior *(25)*.

Two U.S. researchers, commenting on measures designed to restrict the driving behavior of the elderly, noted (*26*, p. 247):

> It seems likely that restricting the licensing of older drivers to daytime driving and low stress environments will not significantly reduce their accident rates. Older drivers already avoid such situations voluntarily. . . . Thus restricting driving licenses cannot simply be accomplished on the basis of chronological age.

Two Dutch researchers recently noted, however, that the avoidance behavior of the elderly could be dysfunctional and cyclical *(27)*:

> Less frequent road use leads to a loss of functions, thus leading to an extra loss of functions and of routine. The feeling of the elderly that they are no longer able to function in traffic which is tailored to the "average" road user, and fear of their own vulnerability, have the effect that old people become even less frequent road users. A vicious circle supervenes.

Policy Implications

A number of issues have been raised. First, the elderly, both drivers and nondrivers, face an array of barriers both to traveling and to driving. All evidence is that the environmental barriers are more significant than the physical barriers. To address environmental problems, transportation planners must consider how the roadway network acts to discourage elderly drivers, land use planners should consider how both the cost and the location of activities affect the older person's desire to travel to them, and service providers must consider how to restructure the delivery of services designed for the elderly to encourage their use.

Without significant outreach services clearly targeted for those most at risk or in need, and some—perhaps major—alterations in the way these services are delivered to the elderly, it is not realistic to expect transportation to have a significant effect on their use.

In terms of licensing, it is important to remember that there are two separate issues in need of resolution. The first is whether elderly drivers pose a risk to themselves and others and should be either retrained or kept off the road. The second is whether elderly drivers, who pose no greater danger than younger drivers, are in fact suffering significant losses of mobility because they so constrain their own driving.

Walking and Cycling

Walking is not a common travel mode in the United States; although U.S. travelers each cover up to 10 times more vehicle miles per year than their counterparts in other developed countries, they cover less than one-sixth as much distance by walking. Walking is relatively more important to the elderly, especially in other countries. Those over 65 in the United States annually walk an average of 28 mi, compared with almost 300 mi per year in Denmark and 250 mi per year in Germany *(7)*.

Cycling is clearly not a major mode for any age group in the United States and less so for the elderly; in 1980 those 65 and over traveled only 2 mi per capita on bikes. Cycling is, however, a much more important travel mode for the elderly in Europe; in Germany the average older person travels roughly 100 mi a year by bike, and in Holland the average is over 500 mi a year *(7)*. A recent Finnish study found that those over 65 made up to 70 percent of all trips on bikes.

In this section the focus is on walking—how and when those over 65 walk to meet their mobility needs. Overall, the data show that walking is not nearly as important a travel mode for elderly people as was commonly thought; it rarely accounts for more than one-tenth of all trips taken by those 65 to 80. Moreover, the importance of walking has declined—substantially for younger cohorts of the elderly—since 1977.

At the same time, most data analyses probably underestimate the importance of walking for the elderly, because this mode serves more than one purpose. Besides being an individual's sole travel mode, walking can serve as an adjunct to mass transit and as a form of recreation. Current travel data tend to undercount walking as access to other modes and simply do not count recreational walking. Data on walking, therefore, are valuable for understanding specific kinds of trips but less so for evaluating the importance of walking in the life of the elderly or the need for pedestrian improvements.

The following analyses suggest that the elderly have both personal and environmental problems that prevent them from walking more. Only a small percentage of the elderly actually have physical difficulties in walking any distance. Most do not walk more because their communities are not designed for, or conducive to, pedestrian travel—trip lengths are too long, and streets and intersections pose hazards to elderly pedestrians.

In the short run, alternative transportation options must be found for those unable to drive or ride in a car or to walk for needed trips. In the long run some mobility problems, as well as some recreational needs, can be addressed by paying serious attention to structuring some land uses in ways that facilitate walking as a purposeful travel mode and that create a more effective pedestrian environment for all types of walking trips.

Current Walking Patterns

NPTS data show three patterns common to those over 65. First, in 1983 walking was a measurable but not very large component of the total travel pattern of most elderly travelers, accounting for less than 12 percent of all trips for those under 80 in either urban or rural areas. Only travelers over 80 made more than one-fifth of all trips by walking.

Second, walking as a percentage of all trips taken decreased, sometimes markedly, from 1977 to 1983. The older the traveler in urban areas the more noticeable was the drop in the importance of walking in the total travel picture. The percentage of trips taken by walking decreased from almost 25 percent to only 12 percent for those 76 to 80 and dropped from almost 29 percent to 17 percent for those over 85.

Third, although not a major travel mode, walking does increase in importance as people age for all but the oldest. However, as with all of the cross-

sectional data described in this paper, it is not known whether this increase is a function of age or of generational differences. The decline in the importance of walking between 1977 and 1983 suggests the latter; that is, younger cohorts, unused to walking for many trips, do not begin to do so simply because they have aged.

Table 8 gives trip purposes for 1983 walking trips in urban areas by age and sex. The three major purposes named were shopping, personal business, and social visits, although the relative distribution of these trips changed with age and sex. It is clear that as travelers age they use walking to serve fewer and fewer kinds of trips; by 76 most travelers are walking for significantly fewer kinds of trips than younger cohorts.

Barriers to Walking

Do the elderly want to walk more but are prevented from doing so? The data below suggest, but do not prove, that personal handicaps do not explain why the elderly do not walk more—the impediments appear to be the result of effective barriers in the built environment.

Individual Barriers HIS data show that in 1983 less than 10 percent of the elderly 65 to 74 reported that they could not walk ¼ mi; the differences between the sexes were not great. The differences between age groups of the elderly were not great either: 7.9 percent of men 60 to 64 reported being unable to walk a quarter of a mile compared with only slightly more, 8.7 percent, of men 70 to 74 *(28)*.

Additional HIS data show that reported difficulties in walking, getting around outside, and shopping rise significantly after 80; almost 40 percent of all respondents over 85 had difficulty in walking, whereas over 30 percent had difficulty with the other two tasks. Women over 80 were more likely to experience difficulty than men; the greatest differential was in shopping—almost 42 percent of women over 85 had difficulty compared with 27 percent of men *(29)*.

There are two striking points in these data. First, there is a large number of elderly people who report no difficulty with walking or related tasks—from 50 to 70 percent of respondents over 65. Moreover, at most only 10 percent of any age group over 65 report being completely unable to walk, shop, or get around outside. Second, of the 20 to 40 percent who reported walking or shopping problems, most were in fact faithful walkers who were more likely to take a majority of trips by walking than were those who reported no problems.

Overall, the data on self-reported walking difficulties do not explain why the majority of elderly do not take more walking trips. Environmental factors, such as pedestrian safety problems and land use patterns, may give more of an explanation.

Environmental Barriers: Pedestrian Safety It is thought that the elderly significantly reduce their driving in response to their recognition of loss of driving skills. It is also possible that the elderly significantly reduce their walking in response to real and imagined safety and security problems along urban streets.

Accident rates for elderly pedestrians resemble those of elderly drivers; the older person is less likely to have an accident on a per-capita basis but more likely on a risk-exposure basis. When involved in accidents, the elderly are more likely than younger persons to receive serious or fatal injuries.

There are a number of common patterns in studies of these pedestrian accidents: elderly pedestrians are often hit in crosswalks or when crossing intersections, they are generally hit on the far side of the street, they are usually observing the law and not behaving dangerously, they often do not see the vehicle that hit them, and when they do see a vehicle, they usually believe that the driver has seen them and will take evasive action.

The lack of forewarning of an accident on the part of the elderly is a common research finding. A 1972 British study found that 70 percent of elderly pedestrians involved in accidents in a 6-month period did not see the vehicle before it hit them. Although the elderly were more likely than other pedestrians to look before crossing, they were also less likely to see the striking vehicle (*30*, p. 332).

Given the number of accidents occurring in crosswalks, experts have questioned the role of traffic signal timing in accidents involving elderly pedestrians (*31*, p. 15). Because older persons usually walk more slowly than younger ones, current signal times may contribute to such pedestrian accidents and create understandable hesitation on the part of the elderly to walk in signalized as well as unsignalized areas.

The Australian Office of Road Safety recently commented (*31*, p. 15):

> Older people generally *know* the right thing to do. But their ability to cope with the unexpected—especially if their minds are on something else—is reduced by their inability to take quick evasive action.

Moreover, the elderly are often victims of bad drivers whose unsafe driving behavior or illegal parking forces pedestrians into dangerous maneuvers. A recent British study cited by the Australian Office of Road Safety (*31*, p. 13) found

> that in almost all cases of potential conflicts between vehicles and pedestrians, it is the pedestrian who takes evasive action. Moreover, drivers frequently fail to take evasive action until it is almost certainly too late to avoid a collision.

In addition to worrying about safety, elderly pedestrians may have to be concerned about their personal security as well, especially if they are walking

TABLE 8 URBAN WALKING TRIP PURPOSES, 1983

	Percentage by Age and Sex													
	16–60		61–65		66–70		71–75		76–80		81–85		85+	
Main Trip Purpose	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Work	14.2	9.5	17.2	6.2	–	3.1	–	10.5	–	–	–	–	–	–
Business	2.6	1.5	–	–	6.3	–	–	2.3	–	–	–	–	–	–
Shopping	14.0	16.4	12.1	38.1	37.0	28.7	41.4	39.8	39.2	54.4	24.4	59.8	100.0	57.9
Personal business	14.1	12.5	41.4	14.8	9.4	13.7	8.1	9.4	12.2	27.2	26.8	25.5	–	–
School/church	19.4	29.3	–	6.9	–	9.7	–	5.3	–	–	48.8	–	–	42.4
Medical	0.3	0.4	–	1.7	–	–	8.1	2.3	6.8	–	–	–	–	–
Recreation	–	0.5	–	–	–	–	–	–	–	–	–	–	–	–
Visit	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other social	34.4	16.7	22.2	25.4	47.4	23.7	42.3	30.4	41.9	19.7	–	14.7	–	–
Other and unknown	–	–	–	10.0	–	–	–	–	–	–	–	–	–	–

NOTE: Totals may not add to 100 because of rounding errors.

SOURCE: Calculated from unpublished 1983 Nationwide Personal Transportation Study data.

to transit services. The street is the site of a large portion of bus transit crimes; a 1982 study found that 60 percent of all known bus crimes occurred at bus stops *(32)*. A larger study in Los Angeles in 1983 found that 54 percent of all bus-related crimes occurred outside elsewhere than on buses when victims were either walking to or waiting at bus stops *(33)*.

Elderly travelers who choose to walk must take that mode very seriously and learn to avoid all but the most harmless situations, altering, and perhaps lengthening, travel patterns to avoid difficult intersections. They must understand that they will find little support or help in the traffic environment.

Surely such concerns negatively affect the willingness of the elderly to walk to meet their needs or for social or recreational purposes. Fear of personal safety must also play some role; a 1984 study in Southampton, England, found that 22 percent of elderly women felt unsafe walking along streets during the day, and the percentage rose to 50 percent at night *(34)*.

Environmental Barriers: Land Use Patterns There can be little doubt that the low-density development of many of the U.S. suburbs where the elderly reside contributes to the declining use of walking as a trip mode. As pointed out earlier, Europeans over 65, who generally live in denser cities, walk between 200 and 300 mi a year *(7)*.

Most of the elderly could not easily change their current vehicle trips into walking trips, because the widely scattered places to which they travel cannot easily be accommodated by other modes. In Table 9 the mileage of the older person's average 1983 vehicle trips for various purposes is converted into the time each trip would actually take if the elderly walked or took transit instead

TABLE 9 AVERAGE ONE-WAY TRIP TIME BY MODE OTHER THAN CAR (*11*, p. E-18)

	Time (min) by Mode and Age					
	Car		Walking		Public Transit	
Main Trip Purpose	60–64	65+	60–64	65+	60–64	65+
Work	11	10	128	116	31	29
Work-related	23	16	268	184	55	41
Shopping	8	8	90	88	25	25
Family/personal	17	7	198	86	43	24
Doctor/dentist	37	14	436	158	83	36
School/church	6	8	74	90	22	25
Vacation	151	48	1,764	562	304	104
Visit friends	17	16	202	182	44	40
Social/recreational	16	14	190	166	42	38
Other	53	9	616	108	113	28

NOTE: Computed assuming automobile speed of 35 mph, walking speed of 3 mph, and average transit speed of 18 mph plus 10 min walking and waiting time per trip.

of riding in a car. Not one trip that the elderly currently make in a car can be made by walking in less than 1 hr, one way, not even those to current church activities or friends. Table 9 also shows that mass transit could effectively be substituted for some current automobile trips, although there are few existing trips that can be made in under 1/2 hr, and then only if transit services actually existed within four blocks of where the person lived.

Moreover, transit use can be limited by the need to walk to and from bus stops. As noted in a West German study, cited by the Australian Office of Road Safety (*31*, p. 12), "the inherent safety of public transport modes may be cancelled out unless pedestrian protection receives a high priority."

Given current urban land use patterns, the elderly can only walk to meet their needs by making drastic alterations in their most fundamental decisions about medical care, social and religious contacts, and personal business. Even then, some of those needs could not be served by walking, because medical and human services are not equally distributed across communities.

Policy Implications

The elderly are victims of traffic environments that were not designed with the pedestrian in mind, particularly not the elderly pedestrian. They are faced with a network of roads designed to maximize convenience for the automobile driver: traffic signals are set much too fast for their effective use and roads are too wide to cross in one signal cycle.

Moreover, although elderly drivers are causing a great deal of public concern, elderly pedestrians, whose problems are often caused by careless younger drivers, do not receive the same attention.

Given the dispersed and still dispersing nature of the American city, many elderly simply cannot walk to meet their current needs. It is unrealistic to expect that cities will—or should—be drastically reconfigured, but it is important to question the basis for the location of needed business and social services in a community. Furthermore, both site-specific and general urban design decisions about all public and private developments in suburban areas should be based on recognition of the problems facing elderly pedestrians and should attempt to incorporate appropriate modifications into the planning process.

Suggested modifications include requiring sidewalks in new neighborhoods as well as retrofitting existing neighborhoods with sidewalks, separating pedestrian travel from automobile travel where appropriate, lengthening signal cycles in areas with high concentrations of the elderly, building islands in the middle of streets which allow the elderly to cross in two cycles, and providing useful street furniture.

Mass Transit and Taxis

Previous analyses show that the elderly use both transit and taxis infrequently, even when they lack other options. It is crucial to examine exactly why the elderly do not use these resources more and to determine whether it is possible to make them more useful for elderly travelers now and in the future.

Taxi and transit ridership, as with other modes, is constrained by both individual and environmental barriers. Data in this section show that taxi ridership by the elderly is largely constrained by financial concerns; most barriers could be reduced by effectively lowering the cost of this service.

However, neither personal financial nor physical barriers account for the low use of transit by the elderly; removing such barriers will make transit better only for those who already use it. It is the environmental barriers that need to be addressed: transit systems should reorient traditional routes, restructure service, and attend to the safety and security concerns of the elderly.

Such responses may permit the elimination of many barriers to taxi and transit use without development of extremely expensive alternatives, which could be saved for those who cannot use public transit or traditional taxis under any circumstances—the feeble and handicapped elderly.

Current Taxi and Transit Patterns

Three taxi and transit trends stand out in the unpublished NPTS data from 1977 and 1983. First, transit and taxis account for a relatively small percentage of the total trips taken by all age groups. Less than 1 percent of all trips by those over 65 are made in a taxi; less than 6 percent of urban trips by the elderly are made using transit. Moreover, both modes were less important to all groups of the elderly in 1983 than they were in 1977. Second, elderly users are slightly more likely to use transit than those under 60 but slightly less likely to use taxis. Third, both taxi use and transit use as a percentage of total travel increase as people age, although there are anomalies.

Unpublished 1983 NPTS data also show that work trips accounted for the largest percentage of all transit trips for those 65 to 70. Less than 0.1 percent of those over 60 used transit to visit doctors or dentists.

These trends again raise the problem of using cross-sectional data. Older cohorts of the elderly, particularly those who do not drive, may use transit now because they were transit riders when they were younger. This does not mean that nontransit users under 65 will suddenly become transit users when they age. Given the demographic trends and the automobile-licensing figures discussed in previous sections, transit use may continue to drop among future generations of elderly.

Conversely, younger drivers, used to the flexibility of the car, may find the taxi a more compatible option when they age. Even now, in contrast to

aggregate national trends just mentioned, elderly travelers in low-density communities and those in which there has never been high transit ridership frequently use taxis. A 1980 study for the Administration on Aging (AoA) *(35)* found that in six small urban and rural areas, between 10 and 30 percent of elderly people used traditional (i.e., full fare) taxi service regularly or occasionally. Wachs *(36)* found that well over one-fourth of the taxi business in the County of Los Angeles consisted of elderly passengers. Rosenbloom, in a 1974 unpublished study, found that between 40 and 60 percent of daytime taxi passengers in a large suburban area of Los Angeles were elderly.

Barriers to Taxi and Transit Use

Financial Barriers A major study done in 1976 of the travel needs of the elderly and disabled by the Urban Mass Transportation Administration (UMTA) found that the principal barrier to taxi use was affordability. Although a small number of elderly respondents had trouble getting in and out of the vehicle or getting a taxi to respond to phone calls, the study concluded that subsidized taxis would overcome between 37 and 60 percent of all barriers to taxi use for both the elderly and nonelderly handicapped traveler (*37*, pp. 14–15).

Conversely, financial barriers to transit use are relatively small, although it is common to assume that economic issues create significant transit problems for the elderly. For example, a 1977 Los Angeles study found that over 50 percent of public officials believed that cost was a major part of the transportation problem of the elderly *(38)*.

Yet the elderly rarely report cost as a major problem; less than one-fourth of all respondents in the Los Angeles study reported transit difficulties based on cost. The study concluded that (*38*, p. 66) "it is obvious that reducing fares alone will not satisfy all the problems experienced by elderly bus riders."

The belief that low fares can increase ridership is not only ineffective, it can be dangerous. Requiring transit systems to offer very low fares reduces their willingness to make any of the service changes really required to meet the needs of the elderly. Wachs has noted (*36*, pp. 20, 21):

> Low fares for serving elderly passengers might even discourage transit companies from making special efforts to improve services which are tailored to meeting the needs of the elderly. . . . If a transit company must charge its elderly riders only half the normal fare, it faces the prospect only of increasing deficits if it spends money to program improvements which will bring additional elderly riders. . . . [R]educed fares . . . clearly discourage transit managers from being creative in trying to serve larger markets of elderly patrons.

Physical Barriers to Transit Use Several studies have estimated that between 20 and 50 percent of the elderly (both drivers and nondrivers) have

physical or mental disabilities that might interfere with their use of transit *(12)*. These studies usually infer a causal relationship between the presence of these handicaps and low transit use.

For example, in the 1976 UMTA study cited earlier *(37)* 7.5 million people were identified as "transportation handicapped" because they had such physical problems as the inability to walk 1/4 mi or up three steps or to stand for a brief period; 47 percent of these were elderly—approximately 23 percent of the 1976 elderly population.

However, there are two major difficulties with studies that infer a direct relationship between handicaps and transit problems. First, a large number of those identified as facing transit barriers drive cars, for example, over 40 percent of those identified by the UMTA study as transportation handicapped. Second, inferring that the presence of a disability creates a barrier to using transit implies that the removal of that barrier will increase transit use. However, there is little empirical support for this widely held view.

For example, Table 10 gives unpublished 1977 HIS data on the effect of activity limitations on transit use. Consistent with NPTS data, the majority of the elderly did not use transit, but very few of the nonusers reported that this was because they faced physical or psychological barriers. Less than 11 percent of elderly nonusers under 80 reported that they would need assistance to use transit; the percentage rose to one-fourth of those over 80.

TABLE 10 USE OF TRANSIT AND NEED FOR HELP IN TRANSIT USE, 1977

	Percentage by Use of Transit and Need for Help[b]					
	Uses Transit			Does Not Use Transit		
Age Group[a]	Total	Needs Help	Does Not Need Help	Total	Would Need Help	Would Not Need Help
All ages (20+)	35.0	7.9	92.1	65.0	0.6	99.4
60–69	39.8	11.3	88.7	61.2	6.3	93.7
70–79	44.5	23.8	76.2	55.5	10.3	89.7
80+	52.8	54.5	45.5	47.2	22.9	77.1

SOURCE: Unpublished data from the 1977 special national Health Interview Survey.

[a]With and without disabilities.
[b]Excludes unknown responses.

What is more striking about the data in Table 10 is that far more of those who used transit reported needing, and apparently obtaining, assistance in their use of transit—over 50 percent of those over 80 and almost one-fourth of those 70 to 79.

The data in Table 10 do not take into account differences in disabilities among the elderly, which might change these findings. Unpublished 1977 HIS

data show a weak positive relationship between the degree of activity limitation and the need for transit assistance. Less than one-third of those under 80 who had severe physical limitations (i.e., were unable to perform major activities as defined by the NCHS) reported difficulty with transit, and between 11 and 18 percent of those drove their own cars. Only those over 80 showed the expected relationship between severe activity limitation and the need for transit assistance; half of those respondents reported the need for help (but almost 6 percent of those needing help still drove).

These data suggest that there are more disabled people among those who use transit than among those who do not. There is no strong reason to attribute a great deal of the low transit ridership by the elderly to the presence of physical barriers within the transit system. Clearly, addressing these barriers would make transit better for existing transit riders, but it would do little to increase the mobility of those not currently riding.

Policy Implications

Environmental barriers to transit use are obviously significant. Traditional line-haul transit services—designed to serve work trips and often focused on historic downtowns—do not meet the needs of most elderly travelers. These systems are less likely to do so in the future when more of the elderly (a) live at fairly low densities and make extensive suburban-suburban trips and (b) are used to the convenience and flexibility offered by the private car.

There are three classes of options to meet the mobility needs of a population increasingly unable to use conventional transit and taxis even when other options are lacking. First, traditional transit service can be identified as inappropriate for most of the elderly; instead public agencies and transit operators can organize and provide alternative, or paratransit, services for all travelers.

Second, public agencies can directly subsidize some or all elderly travelers in their use of conventional taxis. Given the convenience of the taxi, and its presence in thousands of communities lacking conventional transit systems, this is an important option.

Third, transit operators can reorient some of their services and routes to meet the needs of the elderly; in so doing they may well serve the needs of other nondriving members of society, such as the young and the disabled. Public transit systems, alone or in conjunction with other agencies, can provide a variety of services geared to growing suburban concentrations of elderly as well as to those still living at higher density in central cities.

First, transit systems could reorient some routes to better match the origin and destination patterns of the elderly. This option may be appropriate for recurring activities and large trip attractors, such as shopping malls, hospitals,

senior centers, adult day care facilities, and so on. For example, for many years the Parks Department in Austin, Texas, paid the local transit system to run fixed-route service for attendees at a senior activity center; funding cuts forced cancellation of the otherwise successful program. A regional human service agency in Southern California identified concentrations of their elderly and handicapped clients traveling to daily programs and designed fixed-route service to match their origins and destinations.

Second, community-based systems with either flexible routes or a combination of fixed and demand-responsive services could be instituted. Such systems are common in Canada and Europe and have been tried with some success in the United States. Many neighborhoods in London and Paris have small community-based transit systems designed largely for the elderly, which also feed the larger rail and bus networks.

These new services will not be cheap, and they will continue to require significant subsidies, which, however, may be no more than the current ones required by peak-period fixed-route services. For example, communities like Memphis, San Diego, and Tucson have each contracted with private operators to provide flexibly routed or demand-responsive services in low-density areas; in all cases these cities have reduced the actual or expected subsidy required by traditional services in the area (*39*, pp. 181–214). In all these cities, the elderly are the largest group of riders.

None of these options is entirely satisfactory; each can only be part of a package designed to meet the needs of elderly travelers. In the short term such responses may serve a number of people; in the long term the package of responses must include land use and community planning changes that reduce the need for travel and promote other modes such as walking and cycling.

SOCIALLY PROVIDED TRANSPORTATION

Society provides a wide range of services and facilities to meet the needs of elderly travelers who cannot drive, use transit, or pay for taxis. For convenience, they can be grouped into four categories:

1. Those provided by private individuals informally through church and volunteer networks;
2. Those provided by agency staff and human service workers, generally informally, often in staff cars;
3. Those provided more formally by public or nonprofit human service agencies; and
4. Those provided formally by public transit systems.

Far more is known about the last two categories than about the first two. Human service agencies and transit operate both fixed-route and demand-

responsive services and a range of options in between. Many special systems also run charter services and specialize in group trips and outings. Overall, these services are more flexible than conventional transit even when routed or scheduled. They are often called specialized transportation or paratransit, because, in the best case, they approximate the convenience of the private car or taxi while still serving a transportation function.

There are as many myths about specialized transportation or paratransit for the elderly as there are about the other travel needs of older persons. Specialized transportation for the elderly now has the cachet—and the presumed curative powers—once reserved for mass transit.

It is important to understand that specialized transportation is far more limited and limiting in actual operation than it is in theory. It is expensive and difficult to operate well; moreover, the elderly do not seem to find such services more than a marginal addition to their existing transportation resources.

The data show, first, that few people find these services useful or satisfactory for many of their needs; even the most handicapped individual rarely takes many trips using specialized transportation. Second, elderly travelers show a pronounced desire for flexibility and choice in meeting their travel needs; specialized services usually form only part of a package of responses put together by these travelers or their families. Third, such systems are extremely expensive. Their high cost makes them an impractical way to meet the needs of the 18 percent of the population who will be 65 or older at the turn of the century.

In the short term, such services can meet the needs of handicapped travelers who have no other options. In the long term, other planning and land use options should also be considered to minimize the need for the handicapped elderly to travel long distances to take care of their human service and social needs.

In the following sections, federal programs and policies that support these more organized responses to the needs of the elderly are discussed; the kinds of services provided by human service agencies and transit systems are highlighted. Finally, the messages that can be found in the ridership patterns of such systems are considered.

Programs and Policies

Many federal, state, and local programs support specialized transportation for the elderly as well as for other disadvantaged travelers. In 1977 the General Accounting Office estimated that 114 federal programs expended money on transport services to disadvantaged and vulnerable client groups; the U.S. Department of Health and Human Services (HHS) is responsible for half of these programs, and DOT is responsible for only three.

Governmental policy and supporting programs have had two focuses—the regular transit system and services provided by human service agencies. DOT has been largely responsible for programs provided by transit systems, over time requiring that transit systems have special fares for the elderly and handicapped, that buses be accessible to the handicapped, and, most recently, that transit agencies make special provisions for the handicapped, including the handicapped elderly.

DOT has also played a major role in the development of paratransit services at the local level. Many transit systems provide specialized or paratransit services in response to DOT regulations. Also, the DOT program under Section 16(b)(2) of the Urban Mass Transportation Act of 1964, as amended, grants vehicles to private nonprofit providers to operate human service systems.

HHS agencies, as well as other federal agencies, also support a myriad of services and systems at the local level. The major funding programs in each federal agency and their estimated 1987 appropriations are listed in Table 11.

HHS Programs

Policy Mandates HHS, within which the AoA is located, spends a considerable portion of its annual budget on transportation services for eligible clients of its many programs. Because of the fragmented nature of these programs at the local level, and because transportation costs are often not itemized separately at either the federal or the local level, it is difficult to calculate the amount spent for transportation; in 1985 an HHS administrator estimated that the department spent $800 million on transport services (*41*, p. 231).

The 1985 HHS figure, although striking, is debatable, because a 1980 study done for the AoA estimated that Title III of the Older Americans Act alone spent between $500 million and $800 million annually for transportation services *(35)*.

Local Responses Most of the programs and agencies shown in Table 11 do not provide services specifically for the elderly. The exception is Title III, which funds services for any person 60 or over; Title III programs are not need or income tested. All the other programs have eligibility criteria that screen out elderly travelers unless they have the requisite physical, racial or ethnic, financial, or geographic handicap.

HHS-funded agencies provide transportation services locally by

- Reimbursing clients, volunteers, or staff for travel—so-called user-side subsidies;
- Contracting with or purchasing service from existing public, private, or nonprofit providers; or

TABLE 11 SEVEN MAJOR DOT-HHS PROGRAMS THAT DIRECTLY OR INDIRECTLY FUND TRANSPORTATION SERVICES *(40)*

Federal Program or Administrative Agency	Estimated 1987 Appropriation[a]	Beneficiaries
DOT Programs		
Section 9: Urban Mass Transportation Capital and Operating Assistance formula grants, Urban Mass Transportation Administration	$2,224,989,000 (formula grants)	Individuals residing in urbanized areas benefit from these grants to public and private operators of mass transportation services (some diversion to rural areas possible)
Section 16(b) (2): Urban Mass Transportation Capital Improvement grants, Urban Mass Transportation Administration	$35,000,000 (project grants)	Elderly and handicapped individuals receive transportation services through funded nonprofit organizations or private operators contracting with the nonprofit organizations
Section 18: Public Transportation for Nonurbanized Areas, Urban Mass Transportation Administration	$75,011,000 (formula grants)	Individuals residing in rural or small urban areas receive transportation services from public transportation providers funded with these grants or private operators contracting with the public providers
HHS Programs		
Title XIX: Medical Assistance Program (Medicaid), Health Care Financing Administration	$26,700,000,000 (formula grants)	Individuals meeting income and resource requirements and requiring medical services receive transportation services to medical facilities
Title III, Parts A & B: Special Programs for the Aging (grants for supportive services and senior centers), Office of Human Development Services, Administration on Aging	$270,000,000 (formula grants)	Persons 60 and over, especially those with the greatest social and economic needs, receive transportation services to and from senior multipurpose centers, medical services, shopping, and other locations
Title III, Part C: (congregate nutrition services), Office of Human Development Services, Administration on Aging	$348,000,000 (formula grants)	Persons 60 and over and their spouses, especially those with the greatest social and economic needs, receive transportation services to and from nutrition sites
Social services block grant, Office of Human Development Services	$2,700,000,000 (formula grants)	Depending on the services provided by the grant, eligible individuals receive transportation to support program services

[a]Total amount appropriated, which includes the amount spent for transportation.

- Directly providing transportation services by buying vehicles and operating their own systems.

Although HHS programs vary in the extent to which they allow funded agencies to chose among these three major options, there is considerable evidence that many agencies ultimately do operate their own systems. For example, in 1985 Title III-B of the Older Americans Act funded 4,000 individual transportation systems. In 1985 HHS reported to Congress that approximately half of their transport expenditures went for direct provision; the remaining funds were evenly divided between user-side subsidies and purchase of service *(41)*.

AoA-sponsored systems are typical of those choosing direct service provision; the number of local systems grew from an estimated 1,000 in 1974 to 3,200 in 1980 *(35)* to over 4,000 in 1985. This profusion of HHS-funded services has been severely criticized because it confuses eligible recipients, creates narrow categories of eligibility for any given service, and leads to expensive inefficiency.

There is a very wide range of costs for individual trips delivered by these systems—from $4 to $31, although system-reported costs are suspect. Systems that carry only the ambulatory elderly tend to have the lowest costs, ranging from $5 to $14 for a one-way trip, because they serve limited destinations like congregate meal sites and because they do not include the time required to assist nonambulatory riders.

A 1987 survey of 10 states found that only 7 could itemize the transportation component of their aging-program (Title III) expenditures. Only 2 states of the 10 surveyed—Pennsylvania and North Carolina (where the computation was done by the state department of transportation)—knew what an average client trip cost. The range is impressive: an average one-way trip cost $5.30 in North Carolina and $15.41 in Pennsylvania *(42)*.

DOT Programs

Policy Mandates DOT funds services to the elderly in two key ways. First, there are two special programs that often serve special groups like the elderly: the Section 16(b)(2) program (discussed above) and the Section 18 program of the same act, which spends $76 million annually for nonurbanized areas. Second, through its funding of capital and operating expenses at the local level, DOT assists transit operators in reducing fares and in providing specialized services for elderly and handicapped travelers who have difficulty with fixed-route transit. Section 9 of the Urban Transportation Assistance Act of 1970 is the major federal funding source for urban transit systems. In urban areas, Section 9 funds, and sometimes local funds, are used to provide the specialized transportation services for the elderly and handicapped that are required or encouraged by federal legislation.

Active federal concern with how local transit systems treat elderly and other disadvantaged travelers began in 1970 with the so-called Biaggi Amendments to the Urban Mass Transportation Administration Act of 1964, which required federally aided transit systems to make "special efforts" for the elderly and handicapped. These special efforts included requirements that elderly and handicapped citizens be involved in regional transportation planning efforts and that aided transit systems actually provide special services targeted toward these citizens.

In 1974 Congress specifically decreed that all elderly and handicapped citizens of a community receiving federal operating assistance were to receive half-fare reductions when they traveled in the off-peak period.

In order to pursue "special efforts," DOT suggested, but did not require, that local transit companies spend an amount equal to 5 percent of all money received under Section 5 of the Urban Mass Transportation Act of 1964, the predecessor to Section 9, on services for the elderly and handicapped. Recent DOT regulations relax the formal requirements on local transit systems but still require attention to the special needs of the elderly and handicapped.

Local Responses In response to these DOT requirements many cities began active programs for their elderly and handicapped riders; responses include user-side subsidies, contracting with a public or private provider, or directly operating services. Like HHS-funded agencies, most transit agencies also directly deliver transport services to the elderly, although contracting options have become a larger component of system operations. Teal *(43)* found that approximately one-third of all transit agencies contracted with the private sector to deliver specialized transportation services.

It is not unusual for an agency to separate services for the ambulatory and the nonambulatory. In some communities, the public agency contracts for one type of special service, usually for ambulatory travelers, and itself provides service for those in wheelchairs; Austin and San Antonio in Texas are examples. Some communities both contract for and directly provide all types of special services (Minneapolis and St. Paul, Minnesota).

The majority of transit systems restrict either ridership or financial subsidy to those elderly persons who have some permanent physical handicap that prevents them from using fixed-route transit. Simply reaching a certain age, lacking access to transit, or being unable to drive does not qualify an elderly person for such services in communities such as Chicago, Dallas, Houston, Miami, Milwaukee, Minneapolis–St. Paul, Philadelphia, San Diego, or Toronto *(44)*.

Data from almost 70 systems for which comprehensive information was available, collected over 10 years and adjusted to 1986 dollars and reconstructed to include accounting, monitoring, and administrative expenses, give the following costs per trip for specialized transportation services:

	Private Delivery ($)	*Public Delivery ($)*
Ambulatory, congregate	4.20–11.00	3.80–6.90
Ambulatory, independent	6.30–11.00	12.00–18.00
Nonambulatory, congregate	9.90–17.90	11.50–29.00
Nonambulatory, independent	11.10–27.10	14.00–31.40
User-side	1.71–8.40	n.a.

A 1987 study found that a number of major systems were incurring comparable costs; the transit systems in Boston and Miami averaged over $20 apiece for nonambulatory client trips, and six major cities were spending well in excess of $10 for such trips *(44)*.

Costs for ambulatory clients were also comparable, although in systems that contracted with taxi operators for some or all services, costs were lower. Houston, Dallas, and Milwaukee, all of which use taxis, averaged less than $7 per one-way client trip. The cities with the highest average trip costs in the survey for ambulatory riders were Boston ($25.75) and Toronto (US$16.77), where the transit system directly provided almost all service *(44)*.

Taxis are often cost-effective contract operators for transit systems, but it is important to note that most transit systems that use them in this manner change the nature of the services offered by the traditional taxi operator in ways that reduce their utility to the elderly. They impose scheduling and trip restrictions on users and often force group riding. Only user-side subsidy programs allow elderly travelers most of the choice and convenience of the conventional taxi.

HHS and DOT Coordination

Because both DOT and HHS sponsor so many services for elderly (and other) travelers, there have been attempts to coordinate among HHS programs and between HHS and DOT programs at both the national policy and local operational level.

At the national level in 1978, in the amendments to the Older Americans Act of 1965, Congress mandated that all services delivered to the elderly, including transportation, be provided in a coordinated and comprehensive manner. At roughly the same time DOT began to stress the brokerage concept as a mechanism to aid in coordinating the myriad of local service providers. Later, DOT augmented that approach with even more emphasis on privatization, as a complement to coordination.

In October 1986, Otis Bowen, Secretary of HHS, and Elizabeth Dole, Secretary of DOT, signed a joint agreement on the coordination of the transportation services funded by the two agencies. Among other activities, this agreement established a coordinating council at the federal level to conduct research and monitor coordination at the local level.

At the local level, HHS-funded agencies have increasingly worked with one another and with the local transit operator. Many large systems run and organized by area administrations on aging currently contract with other human service providers or are active participants in coordinated services organized by local transit authorities; Houston and Pittsburgh are two examples.

In other communities, smaller human service agencies routinely contract for services from either the transit operator's special system or other human service agencies. Several dozen agencies buy services for either individual client or group trips from the transit systems in Portland, Oregon; Lancaster, Pennsylvania; San Francisco and Sacramento, California; and Seattle, Washington.

Several states have also taken an active role in encouraging or requiring coordination of resources or services at the local level. Florida, Iowa, Maine, and North Carolina have mandatory coordination requirements. Each has established substate regions with a designated transportation provider, the only eligible recipient for DOT and most HHS transportation funds. All local agencies receiving key federal or state funds must either purchase service from this provider or prove that they can do it more cheaply.

Current Specialized Transportation Patterns

In analyzing the travel behavior of those elderly or other disadvantaged travelers who use specialized transportation, it is necessary to rely on ridership data from such systems; there is little information comparable with the NPTS data discussed earlier.

Using system-specific data creates several problems. First, the systems for which there are data do not constitute a random or even a representative sample; it is conceivable that the most atypical systems are the most studied. Second, most systems serve a variety of travelers; it is not always possible to differentiate the elderly ones from the others. Third, because of the restrictions imposed by these systems, it is difficult to tell whether the data reveal what people want to do or what the system has forced them to do. Last, it is important not to generalize from the ridership patterns of these systems to the universe of elderly; system riders are a very disadvantaged group. Most are elderly and poor, and suffer from multiple handicaps. The data in the following discussion show that between 50 and 90 percent of special system ridership is elderly and one-third to two-thirds have incomes below the poverty level.

Nevertheless, most elderly do not ride special systems and do not suffer from multiple handicaps. For example, special 1983 HIS data on the elderly

show that those under 75 were more likely to use special services than those over 75; at most no more than 16 percent of the elderly ever used such services and most never used them *(45)*.

Table 12 presents data from the 1983 special HIS survey, which disaggregates specialized transportation and other service use by degree of activity limitation; these are the only nonsystem data available. Those living alone are more likely to use special services, as are those who are moderately to severely disabled.

The combination of those two variables yields the highest number of users; 15.4 percent of those with moderate to severe activity limitations who also

TABLE 12 USE OF SPECIAL SERVICES FOR THE ELDERLY BY THE ELDERLY, 1983 *(45)*

	Percentage by Living Status and Activity Limitation					
	Lives Alone			Lives With Others		
Special Service	All	Moderately to Severely Limited	Not Limited to Slightly Limited	All	Moderately to Severely Limited	Not Limited to Slightly Limited
Senior center	20.3	18.8	20.8	12.4	7.5	13.1
Senior center meals	11.9	11.6	12.0	6.4	4.4	6.7
Specialized transportation	10.5	15.4	8.4	2.4	2.7	2.2
Home-delivered meals	3.8	10.3	1.7	1.2	2.4	0.7
Homemaker services	3.0	10.4	0.5	0.9	1.7	0.5
Home health services	4.2	13.2	1.4	3.1	8.6	1.2

NOTE: "Moderately limited" means that one is limited in the kind or amount of one's major activity. "Severely limited" means that one is unable to perform one's major activity. "Slightly limited" means that one is limited in outside activity only.

live alone use specialized transportation. However, all other groups of elderly users are far less likely to use transportation, or any services, designed for the elderly. In contrast, note that conventional transit use was higher among similar groups.

Other studies show similar patterns. A 1981 review of 202 systems providing specialized transportation for the disadvantaged found that users tended to be elderly, without driver's licenses, without continuing access to a car, living alone, and with generally very low incomes *(14)*.

Nevertheless, studies show that elderly users and nonusers of specialized services are also alike in several important ways. In 1980 an UMTA-sponsored study analyzed why some eligible users did not take advantage of

specialized transportation services in four cities. They found that users and nonusers made on average the same number of trips per month *(46)*. The major difference between the two groups was that work trips constituted 10 percent or so of nonusers' trips; if work trips are removed from the analysis, the trip patterns are almost identical within each city. For both groups shopping was the major type of trip, followed by those for leisure and recreation. Medical trips were a distant third; in no city were more than 20 percent of trips taken for doctor's visits or therapy *(46)*.

Elderly riders surveyed in five AoA-funded systems were making an even larger percentage of all their trips for shopping—ranging from 46 to 62 percent. Recreation trips were the second most common—accounting for between 12 and 26 percent. Club and religious activities accounted for between 5 and 15 percent of all trips, whereas medical visits accounted for the lowest number *(47)*.

A 1979 study of all Medicaid recipients in Austin, Texas, found that elderly respondents had other travel resources besides subsidized services for some of their trips. In spite of having multiple handicaps and being eligible for special Medicaid transit, elderly respondents reported using that subsidized service for only half of their medical trips. Almost 30 percent of all medical trips were made in a car and almost 5 percent by regular city bus (in spite of the fact that ability to use mass transit technically made them ineligible for special services) (*16*, p. 111).

These analyses suggest three things. First, the elderly who use special services are usually nondrivers, but the distribution of their trip patterns resembles that of drivers. Users of special services make fewer trips than those that drive, but if they can, they try to retain flexibility and choice. If they do not have the freedom of those who drive, they find other ways to widen their transportation options.

Second, it is clear that although users of special services are often disadvantaged, some are drivers and most have access to cars. It is wrong to conceive of specialized transportation users as simply those with no other options.

Third, these data suggest that specialized systems may have to respond to the needs of drivers who do not always wish to drive. Apparently those who can drive occasionally use subsidized services, perhaps for a social event, perhaps to relieve themselves of the aggravation or cost of driving for any given trip.

Barriers to Specialized Transportation Use

Special services meet the needs of very few of the elderly; moreover, they appear to meet only some of the needs of those whom they do serve. The reasons for this situation are complex: as with other modes, these are both environmental and individual.

The environmental barriers to specialized transportation use are significant for many elderly travelers. First, most systems have rigid eligibility criteria: elderly users must have some physical or financial handicap. Such standards have both direct and indirect effects.

Directly, they select out elderly travelers who cannot drive but who are not living below the poverty level or facing serious physical ailments. This leaves a large number of elderly ineligible for service who still cannot travel without assistance from others. Moreover, many elderly travelers face different problems at different times of day or during different seasons but most eligibility criteria do not take into account seasonal or occasional problems such as driving at night or using transit during winter.

Indirectly, such standards act as deterrents because they create confusion among the elderly (and their advocates) about who is eligible for service and when. Some otherwise eligible travelers are no doubt discouraged by incorrect information about their eligibility *(16)*.

The second major environmental reason why more of the elderly do not use specialized transportation services is that, once they are personally eligible for service, users find that, because of additional service and trip restrictions, the services do not match their needs. Many systems do not operate at night or on weekends. Some systems, particularly those with younger handicapped riders, give preference to work or school trips or to medical travel.

Third, most systems also restrict trips indirectly by having a very high number of prescheduled or reserved trips. Large sections of the day are blocked out during which these systems rarely have the capacity to accommodate the elderly traveler who wants a ride for social or recreational reasons—the kind of trip for which it is difficult to schedule a reservation.

A fourth major reason why the elderly do not use specialized transportation is its unreliability. Although there are often compelling reasons for such service problems, it makes little difference to the elderly person who will be late to an important appointment or to the traveler who is anxiously waiting to be picked up before the doctor's office closes.

Last, there is a major personal reason why the elderly do not use special services more; no matter how disadvantaged, elderly people want to keep their freedom and flexibility. Few people want to exchange the restriction of depending on friends and relatives for that of depending on a special service that requires significant advance reservation and questions the inherent value of each trip.

Moreover, it seems clear that even very disabled elderly people want to keep a variety of options, varying their mode choice with how they feel, the climate, and the availability of other options. No one wants to depend solely on one mode; several studies described earlier found that even those "objectively" judged unable to use conventional transit occasionally used the regular bus.

Policy Implications

It is dangerous to assume that specialized transport systems hold all, or even some, of the answers to the transportation problems of the elderly. Many current systems are at capacity and effectively limit demand by barring riders, restricting trip purposes, blocking out large windows of time for prescheduled trips, and even more simple mechanisms like not answering their phones. (A major system estimates that 40 percent of calls are never answered and an additional 30 percent are not answered in less than 6 min.)

Assuming that the important needs of the elderly can be met by any one service is simplistic; assuming that all their needs will be meet by specialized systems is to doom the majority of the elderly to limited and often inferior service and for only those trips to which the provider has given priority.

Other alternative or paratransit responses are possible. One has been suggested earlier; public agencies could make better use of taxi and other private operators who already exist in many communities. Transit systems and human service agencies can do so first by supporting user-side subsidies and second by contracting with taxi operators for additional special services.

User-side subsidies, although not common, have a great deal to recommend them. A 1984 study of the public specialized transportation system in a large Midwestern city found that the agency could have saved between 15 and 30 percent if it had simply paid existing private taxi companies full fare for individual taxi trips rather than itself organizing and serving those trips through a special public agency *(48)*.

SUMMARY AND POLICY IMPLICATIONS

Summary

Today two-thirds of the elderly live in the suburbs or in rural areas and over 90 percent of men and 40 percent of women are licensed to drive. The car is the dominant travel mode for all these travelers; even the most disadvantaged elderly make the majority of their trips by car.

The car is rapidly becoming even more important; from just 1977 to 1983 this mode increased in importance in the total travel pattern of the elderly, whereas walking and transit became even less important. Because of the accessibility offered by the car, the average older person travels more miles today than just a few years ago.

These trends will intensify into the next century. Almost one-fifth of the U.S. population will be over 65 by the turn of the century; almost three-fourths of the elderly will live in low-density areas and depend on the private car for the majority of their trips.

Given the inevitability that the elderly will lose their driving skills, it is important to consider how well the other modes can be made to serve their

travel needs when they can no longer drive. Unfortunately, even today the elderly do not walk or ride transit as much as their counterparts a few years ago, and only a fraction use specialized transportation services.

The elderly face a variety of personal and environmental barriers to their use of any mode: the data show that those who complain about transit or walking are those most likely to be walking or using transit. Physical handicaps explain only a small percentage of the lack of use, and these constraints seem small compared with the environmental ones.

Environmental barriers have complicated effects, often reducing the elderly's desire to travel before or while they reduce the ability to do so. Removing an obvious barrier to travel in a transit system or even providing door-to-door special service may not overcome the resistance of elderly people to utilizing the community and medical services they do not use today.

The most significant environmental barrier to transit and walking is clearly the spread-out nature of most American communities. The average elderly car driver could not easily convert an automobile trip into one or another mode; the average car trip to church, to the doctor's office, or just to visit friends could not be made one-way in less than an hour by walking or in less than 30 min by transit (even if transit were readily available).

The most significant environmental barrier to specialized transport use is the limitations in both services and choices. Even the most disadvantaged traveler rarely uses such systems for many trips because there are serious restrictions and operational problems. The costs of such services should give the policy analyst pause: they range from $5 to $30 for a one-way trip.

A driving-loss model was built for this study. It calculates the number of trips the public sector may need to provide at the turn of the century if it must bridge some or all of the transportation/travel gap between those who are still driving and those who have lost (or never had) the ability to drive. The numbers are staggering and stress that policy makers must actively consider a repertoire of options to meet the mobility needs of the elderly of the future.

The driving-loss model, which uses travel data presented in earlier sections, is shown in Figure 5. The model projects the year 2000 population by area (suburban, central city, and rural), groups the population by activity limitation, and projects the number of travelers in each group who will be unable to drive in 2000 (either because they have lost the skill or because they never drove).

Table 13 converts the number of elderly nondrivers in the year 2000 into the trips lost by each nondriver. The difference between the number of trips taken by drivers and nondrivers with comparable activity limitations is initially considered to be the number of trips lost by nondrivers simply because they cannot drive.

If the government felt obliged to provide all the missing trips, and could do so at $7.00 a trip, a low-end average for current specialized transport systems,

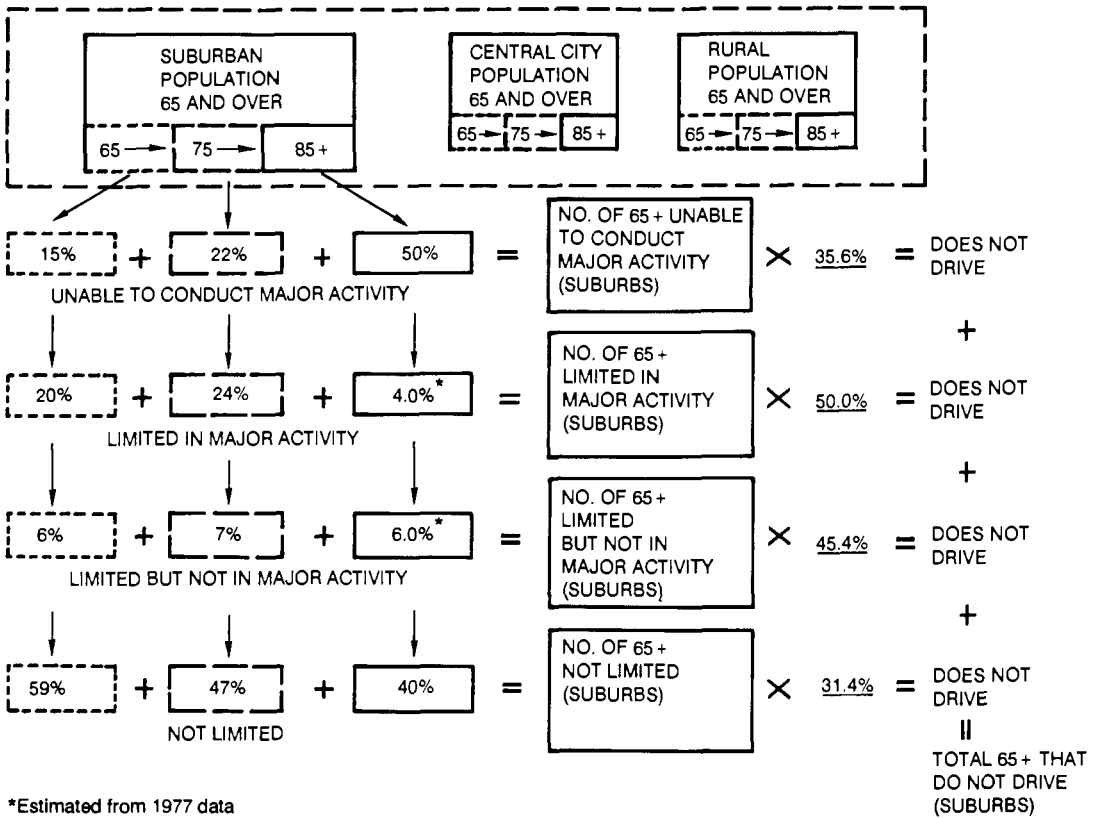

FIGURE 5 Activity-limitation model derived from cohort-specific activity limitation rates and age-specific HIS data [unpublished and described in *Developments in Aging: 1983* (*50*)].

the total annual cost would be in excess of $174 trillion. It might be worthwhile to note that this figure is more than 10,000 times greater than the current AoA budget.

Even if society assumed responsibility only for the travel needs of those with severe physical limitations, 5.2 trillion trips would have to be provided each year. If only 1 of 10 of the trips needed by those severely physically limited were served, this would still amount to hundreds of billions of dollars a year.

TABLE 13 LATENT DEMAND FOR TRANSPORTATION SERVICES OF POPULATION 65 AND OVER IN 2000

	No. of Nondrivers	Trips per Capita per Year	Total Annual Trips
Urban		1,734.4	
Activity limitation			
Unable to conduct major activity	821,730		1,425,208,582
Limited in major activity	986,592		1,711,145,388
Limited but not in major activity	297,116		515,317,417
Unlimited	1,753,335		3,040,984,073
Suburban		1,734.4	
Activity limitation			
Unable to conduct major activity	1,211,704		2,101,578,756
Limited in major activity	1,454,805		2,523,214,312
Limited but not in major activity	438,120		759,874,835
Unlimited	2,585,426		4,484,162,956
Rural		1,679.3	
Activity limitation			
Unable to conduct major activity	1,058,500		1,777,538,568
Limited in major activity	1,270,864		2,134,162,587
Limited but not in major activity	382,725		642,710,544
Unlimited	2,258,533		3,792,754,649
Total no. of trips not taken because of lack of transportation			24,908,652,616

NOTE: Table is based on high population projections for 2000.

SOURCE: Calculated from the driving-loss model and derived from cohort-specific activity limitation rates and non-age-specific HIS data *(49, 50)*, and mid-series population estimates *(51)*. Also based on unpublished 1983 Nationwide Personal Transportation Study data.

It is clear that no one transportation option can meet even some more reasonable subset of these numbers. In fact, without extensive attention to the other societal decisions that affect the elderly's need to travel, it can easily be predicted that the travel problems of the elderly will become far more serious.

Policy Implications

Addressing the mobility problems of the elderly requires both short-term and long-term responses in three areas: transportation, land use planning, and human service delivery models. If deficiencies in land use and human service planning are not addressed, the transport system will be unable to meet all the mobility needs of the elderly in either the short or the long term. It is not only wrong but dangerous to place the burden for all of society's failures on the transport network.

Transportation planners, in conjunction with other planners, must fashion a variety of solutions appropriate to the clients and the community. Four major recommendations stand out. Transportation planners must

1. Offer the elderly a variety of transportation options, each geared to their needs and desires as well as to the increasingly limited funds available to meet their needs;
2. Consider how and whether current options can be improved or made more responsive to the needs of the elderly before offering alternatives;
3. Ensure that socially devised solutions support and rely on private and family options, in recognition of the web of potential support systems in which the elderly live, which could be strengthened both financially and socially (in part because the cost of duplicating them would be so extraordinary); and
4. Always recognize the importance of the automobile to the elderly, how pervasive it is in their lives, and the great potential of this mode and the advantages it offers when social solutions to the needs of the elderly are devised.

Among the most useful actions in support of these recommendations are

- Enhancing the pedestrian environment in both the short and the long term,
- Supporting volunteer and family networks,
- Training and retraining automobile drivers,
- Facilitating paid and unpaid carpool networks, and
- Developing community-based mass transit and appropriate paratransit systems (for those unable to use other modes when modified).

To support these actions, land use and community planners must

- Identify current and future concentrations of the elderly and services and facilities of particular interest to them,
- Target long-range service plans and capital expenditures (e.g., libraries, parks) on those elderly concentrations,

- Incorporate pedestrian-enhancing features into subdivision and zoning regulations, and
- Reduce the need for travel by facilitating small-scale mixed development in residential areas.

Human service planners must

- Develop effective outreach programs,
- Physically locate groups of needed services together near concentrations of clients,
- Match long-range land purchase and capital development programs to future concentrations of elderly, and
- Aim programs more clearly at clients who really need—and want—them.

The sheer size of the problem of transporting all those without cars and the complexity of fashioning appropriate responses for urban, suburban, and rural users will necessitate the use of all the resources currently available to the elderly as well as the development of additional resources.

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NOTES

1. The Census Bureau changed terminology in 1980: in Table 2 the data for 1970 were termed "urban" and in 1980 they were termed "urbanized area."
2. These figures actually significantly understate suburban living in high-growth areas and in the West, South, and Southwest in general. The Census Bureau defines "central city" as all areas within the corporate limits of a city, thus including all land in such spread-out cities as Tucson, Jacksonville, and Oklahoma City. Conversely, the figures may overstate suburban living in the built-up areas of the Northeast where high-density communities adjacent to what has been defined as the central city are considered suburbs. This "overcounting" is less common.

3. The Census Bureau defines as "mobile" those who have changed residence once or more during the 5 previous years. Cohorts are groups of people born in the same time period; thus, a cohort can only grow through in-migration and can only decrease through death or out-migration.
4. Possession of a license does not equal travel, of course; as the data make clear, there is still a sizeable gap between the miles driven by men and by women in all age groups in the United States.

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