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TRANSPORT AND AGEING OF THE POPULATION

ROUND TABLE

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ECONOMIC RESEARCH CENTRE

REPORT OF THE
HUNDRED AND TWELFTH ROUND TABLE
ON TRANSPORT ECONOMICS

held in Paris on 19th-20th November 1998
On the following topic:

TRANSPORT AND AGEING OF THE POPULATION

EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT (ECMT)

The European Conference of Ministers of Transport (ECMT) is an inter-governmental organisation established by a Protocol signed in Brussels on 17 October 1953. It is a forum in which Ministers responsible for transport, and more specifically the inland transport sector, can co-operate on policy. Within this forum, Ministers can openly discuss current problems and agree upon joint approaches aimed at improving the utilisation and at ensuring the rational development of European transport systems of international importance.

At present, the ECMT's role primarily consists of:

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- helping also to build a bridge between the European Union and the rest of the continent at a political level.

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For administrative purposes the ECMT's Secretariat is attached to the Organisation for Economic Co-operation and Development (OECD).

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This report was drawn up by the Chairperson after the Round Table and was not therefore submitted for discussion.

SUMMARY

Tucson, March 2000

1. INTRODUCTION

The ageing of the population is a worldwide phenomenon whose dimensions are fairly well-known -- everyone who will be over 65 in the middle of the next century has already been born! Barring horrible disasters it is easy to predict the number of older people who will exist in the industrialized world in the next five decades. And in most developed countries the numbers are sobering -- roughly one in four people will be senior citizens well before 2050.

But as a 1996 OECD report noted:

> *Less well understood are the fundamental changes that are also taking place...The extent of ageing and life-course changes...and their implications for policy, are only beginning to be understood. Some of these changes raise concern. However the basic news is good. Increased longevity, good health and independence are key values in their own right. They are also a reflection of the underlying strength of social and economic issues in OECD countries...[but] there will be difficult transitional problems before that good news is fully realized*[1].

This paper compares North American experiences to European ones in order to assist European policymakers to better understand both the transitional and the long-term transportation policy and planning implications of an ageing society. This is not an easy task – since we know so much more about the present than the future, it is tempting to assume that the future will be a simple extension of current trends. But this is a dangerous assumption.

This paper adopts an alternative way to evaluate the full dimensions of the sometimes profound societal forces which will shape the transportation patterns of the elderly in the next half century, based on the approach discussed by Randi Hjorthol and Fridulv Sagberg in this volume. They suggest a three-part analytical structure for identifying and then evaluating the complex forces which have created the travel needs of older people today. This paper uses those three factors to illuminate the future:

- ***Age effects*** those that come as the result of the physical ageing process;

- ***Cohort effects*** **--** those that result when sub-sets (or cohorts) of the population share a common experience over a period of time, an experience not shared by other population cohorts which came before or after; and

- ***Period effects*** **--** those which impact everyone in the population at the same time. Most public policies and natural disasters fall into this category.

At the same time, this paper recognizes that all these effects and, in particular, ***cohort*** and ***period*** effects, can overlap or have a synergetic impact. Older people today, for example, are healthier -- that is, experience different ***age effects*** -- than those who were 65+ a few decades ago. And this is a result of a complicated set of ***cohort*** and ***period effects*** -- better nutrition, more health education, higher incomes, etc. Thus it may be difficult to unambiguously categorize any event or trend.

In this paper, Chapter 2 first explores the demographic trends which unite Europe and North America. The paper then examines the changing travel patterns of older people in various industrial countries. Chapters 3 and 4 focus on the likely impact of ***age*** and then ***cohort effects*** on the travel patterns and needs of older people in the future. Chapter 4 also reviews ***period effects***, key economic and social trends and government policies which will also shape the travel patterns of people as they age. Finally, in Chapter 5, the paper suggests new policy directions which might better respond to the ageing of society.

2. BACKGROUND: COMPARING TRENDS IN EUROPE AND NORTH AMERICA

Comparing North American trends, and particularly US ones, to European patterns is, in itself, a difficult job. As Jean-Pierre Orfeuil and Piet Bovy noted in their 1993 European Science Foundation study:

> *European travel patterns are different from those of North America and Japan. The main differences may be explained by geography (density and distribution of settlements), culture (Europe being in an intermediate position between the holistic approach of Japan and the individualistic culture of the American pioneers) and the domestic economic context (pricing policies, infrastructure investment) which in turn mirror the culture*[2].

While acknowledging these very real differences and the need to make comparisons only very cautiously between Europe and North America, the following section examines demographic trends and patterns common to the two continents and, indeed, the industrialised world.

2.1. Demographic trends

2.1.1. Overall patterns

The elderly are the fastest growing component of the population in most developed countries; as Philip Oxley shows, the number of people 65+ will increase over 34 per cent in 17 European countries between 1995 and 2020 -- while the increase in the total population will be less than 2 per cent (and negative in Germany, Italy and Spain!). As a result, as Fiorella Marcellini and her associates demonstrate, there will be over 80 million people 65+ in the European Union in 2020. The same trends are equally visible in the USA. For the entire 20th century, the rate of growth of Americans over 65 greatly exceeded the growth rate of the population as a whole. In fact, the elderly population was 11 times larger in 1996 than it was in 1900. More stunningly, the US Census Bureau predicts that the *number* of senior Americans will more than ***double*** between 1996 and 2050 -- from to 34 million to 78 million[3].

With the growing number of older people come substantial shifts in the *structure* of the population. As in most European countries, the American elderly now comprise a significant percentage of the total population. However, because the US is a "younger" country in relative terms, the elderly are a smaller proportion of the population than in Europe, although still significant. These structural differences and changes are shown in Figure IA for Denmark and Figure IB for the USA. The structures shown are called *population pyramids* because, originally, most countries had many more children than old people; thus their population structures once resembled *pyramids* -- big on the bottom and very small at the top. However, the growth in the number of elderly people has changed the entire distribution of the population in most developed countries.

Both figures show that the ageing of society is the result of the movement of the "baby boomer" cohort through the population. From 1997 (when members of that large post-WW II cohort were roughly 35-50) to 2050, a greater and greater percentage of the population will become elderly, substantially distorting the "pyramid". By 2050, roughly one in five Americans will be aged 65+. The changes are even stronger in Denmark where the traditional pyramid will end up standing on its head! That is, over half the Danish population will be over 55 by the middle of the next century.

The causes of these changes are the same in Europe and North America and indeed around the industrialised world–and they have important consequences of their own. First, older people are living longer–due to education and medical improvements; Philip Oxley discusses these trends in his paper in this volume. In 1998, the average life expectancy was over 77 years of age in all European countries (79.2 in Sweden); the comparable figure was 76.1 in the USA and 79.2 in Canada[4]. Second, those of child-bearing age are having fewer children; Fiorella Marcellini and her colleagues discuss these trends in their paper in this volume. In fact, several countries in Europe have roughly identical birth and death rates per one thousand population–Italy (whose death rate is higher than its birth rate), Portugal and Spain.

2.1.2. Diversity within the older population

The social, economic and health status of older people has been improving around the world, particularly in industrialised countries. Older people are better educated and better housed than comparable elders just a few decades ago. They are more likely to be well-off economically and less likely to be poor than in the past. In the US, the median income for elderly people more than doubled between 1957 and 1992 and the poverty rate was halved. In most developed countries, older people own a disproportionate share of the wealth (although those shares vary widely among countries). Overall, older people are doing better today than ever before.

At the same time, there are substantial differences between and among groups of older people -- in health, housing, medical and economic status and needs. There are significant groups of older people who live in poverty, ill-health and inadequate housing. Even elderly people who start from a position of privilege or well-being may face difficulties as they grow older or with a life change; the most profound impacts are felt by women who are widowed–they can move quickly into poverty or near-poverty. And as older people continue to age, their physical and medical condition may worsen; people once mobile may become dependent on others, people who once met their own needs independently may now need assistance, people who could once live alone now may need to move into special facilities.

There are two major trends which create both important differences among older people and barriers to responding to their needs. First, many of those over 65 will increasingly be very old–over 80-85. The oldest-old are the fastest growing segment of most developed countries' population; in the USA, the number of those over 85 grew 300 per cent between 1960 and 1996 -- to 3.8 million people, comprising 1 per cent of the entire USA population[5]. By the middle of the next century, 1 in 20 Americans will be over 85[6]. Because European countries are in general older, the number of the very old is much higher; in Denmark 4.0 per cent of the entire population was over 80 in 1999. In fact, over 3.5 per cent of the entire population was over 80 in Austria, Belgium, France, Germany, Italy and Norway in 1999[7].

But not only are the elderly increasingly very old, they are increasingly women–this is the "feminisation of later life/ageing", as described by Fiorella Marcellini and her colleagues. In 1997 over 61 per cent of all people over 70 and almost 70 per cent of those over 80 in the developed countries were women[8]. Werner Brög and his colleagues indicate that, in 1995, 64 per cent of those over 65 in Germany were women. A 1997 US Bureau of the Census report commented:

> *Women are the majority of the older population in virtually all nations and face different circumstances and challenges than men as they age. Older women are more likely to be widowed, to live alone and to live in poverty. Older women tend to have lower educational attainment, less formal labour force experience and more family caregiving responsibilities than do older men*[9].

Women currently live longer than men -- a result of the so-called *female advantage* in ageing (which begins around the age of 35). In 1998 in most European countries and in the USA and Canada, there were roughly 0.7 men over 65 for every one woman over 65. As Table I shows, in 1997 a majority of the population over 60 in France, Italy, Spain, the UK and the USA were women; the same will be true roughly three decades in the future. Men will enjoy a slightly longer life expectancy in the future and some analysts feel that the advantage may narrow–but so far there is no clear evidence that it has. In France, Germany and Japan, for example, gains in female longevity continue to outpace men's[10].

> *The growth of the oldest old has many important implications for social planning, since these individuals are more likely to be in poorer health and require more services than the younger old. Given the preponderance of women among the oldest old (higher than 70 per cent in Germany and the Ukraine), many of the needs of the oldest old are actually the needs of women*[11].

Table I also raises another important issue–many of the women in the elderly population will live alone. Figure II clearly illustrates the gender differences in living arrangements in four developed countries; in all four, women over 65 were more than twice as likely to live alone. Werner Brög and his colleagues show that in Germany in 1991, over two-thirds of women over 75 lived alone (in one-person households) compared to 24 per cent of comparable men. Conversely, in 1993 in the USA, elderly men (not living in institutions) were almost twice as likely to be married and living with their spouses than comparable women–75 per cent *vs*. 41 per cent.

Older women living alone are substantially more likely to be living in poverty or inadequate housing in both Europe and North America[12]. In 1997 almost 14 per cent of women but only 7 per cent of men over 65 lived below the poverty level in the USA[13]. In 1990, 58 per cent of women over 75 living alone, but only 42 per cent of comparable men, had incomes under $10 000, while 40 per

cent of women over 85 living alone were poor compared to 27 per cent of comparable men. As a result, although women comprised 58 per cent of those over 65, they accounted for almost 75 per cent of the poor elderly in the USA in 1992.

A recent OECD study commented that "old age is no longer a period beset by money worries and ill-health *except for pockets of poverty, mostly affecting elderly people with no spouse and no "earned" pension*[14]*"* (emphasis added). That group is almost entirely elderly women alone!

2.1.3. Summary

In both Europe and North America the population is growing older; the number of people over retirement age is increasing rapidly while the number of those very old is growing even faster. A substantial portion of the elderly population are women and many live alone; a significant sub-set of those women live in or near poverty. The absolute growth of the elderly, coupled with falling birth rates, means that a greater and greater percentage of the population in all developed countries will be over 65 in each coming decade. Developing effective transport policies responsive to an ageing society requires a recognition of the needs of different groups within the older population at any given time.

2.2. Travel patterns

This section compares the travel patterns of older people in the USA and in Europe. Since the USA is far more car-dependent or "motorised" than Europe, some analysts contend that USA transportation trends and patterns have little meaning for European policymakers. However, it is more likely that European travel trends are moving in exactly the same direction as those in North America -- what is open to debate is: a) the magnitude and speed of such changes; and b) how responsive they are to governmental policies and pricing strategies -- not just those in the transport arena but also in the housing, social service and medical sectors. An examination of USA trends may be quite useful in helping policymakers understand where to focus their attention.

2.2.1. Licensing rates

Rates of driver licensing are very high in the USA although those older than 65 are less likely to be licensed than younger people. But Figure III shows that in 1997 almost 92 per cent of all men and almost 67 per cent of all women over 65 had a driver licence. And licensing is close to universal among those who will become 65 in the next 15 years; by 2012 almost every USA male and more than nine out of ten women will enter their retirement years as drivers. Table II shows licensing rates by cohorts of the elderly; it is striking that almost three out of four men over 85 are licensed drivers. Obviously women over 75 are less likely to be licensed but all indications are that women who will retire in the next few decades will be drivers. And older drivers now account for a significant and growing, share of all drivers; those over 65 currently account for over 14 per cent of all licensed drivers in the USA.

European trends are similar -- although the elderly are less likely to be licensed than younger people, that situation is changing. Licensing rates have increased rapidly as younger drivers age and generally faster among women than among men. Philip Oxley reports UK data showing that between 1985 and 1994/6 licensing went up for every cohort of elderly driver; for example, in 1985, roughly 70 per cent of men aged 65-69 had a full licence but that figure had grown to almost 82 per cent

by 1994. In both the USA and Europe, there is a continuing licence gap between men and women, although it is diminishing. Randi Hjorthol finds the gap in licence rates closing in Norway. The gender gap also decreased in the UK in the last decade but was still quite large; licensing went up far more rapidly among women than men but in 1994-96, only 36 per cent of women aged 65-69 had licences (less than half the rate among comparable UK men).

Randi Hjorthol reminds us that licensing rates are *not* equivalent to access to the car, particularly for women; this may be more pronounced in Europe where households with cars are far more likely to have only one vehicle (and there may be more households with licensed drivers but no vehicle). In the US, over 86 per cent of all households with one or more elderly people had at least one car and over two-thirds had two or more cars. However in the UK, as Professor Oxley indicates, 67 per cent of households with two retired adults had one car and only 7 per cent had two cars -- so US licensing rates may be more equivalent to access than they are in Europe. At the same time, Professor Oxley's predictions are that, by 2031, nine out of ten UK households with two retired people would have one car and one-fourth would have two cars.

2.2.2. Travel patterns

Older Americans make fewer trips and travel fewer miles than younger people; in this their patterns resemble those of their European counterparts. As Table III shows, people over 65 make, on average, 3.4 trips per day (of any length) and travel, on average, 24.4 miles per day (in any mode). As with younger travellers, there are important differences between men and women; women make fewer trips and travel fewer miles. However, American women younger than 65 always make more trips than comparable men so the fact that older men travel more is likely due to the greater number of very old women in the aggregate 65 cohort. But whatever their age, women always travel fewer miles than comparable men.

USA trip rates appear to be significantly higher than European ones, although there may be important differences in the definition of "a trip". When Philip Oxley's annual data (his Table 4) are converted to daily rates, British men aged 65-69 made 2.0 trips per day while comparable women made 1.4 trips per day in 1993-95 -- however, these rates exclude all trips under one mile (1.6 km). Fiorella Marcellini also reports substantially lower trip rates for Italian elders (her Table 8); for example, she finds that Italians aged 65-69 made 1.65 domestic trips per person–roughly a third less than the comparable German elder and roughly two-thirds less than the comparable American.

Table IV breaks down USA trip rates by age cohort over 65. Werner Brög and his colleagues report (his Table 9a) substantially lower trip rates for comparable German cohorts; for example, Germans aged 65-69 make 2.5 trips per day compared to 4.0 by Americans. The biggest differences between the Germans and the Americans are among the oldest travellers; Americans aged 80-84 report 2.7 trips daily while Germans of that age report only 1.4 trips per day.

There are very large differences in distance travelled between Americans and Europeans as well. Werner Brög reports (his Table 15a) that in 1997 the average German aged 65-69 travelled 5.4 km per trip -- compared to almost 50 km by the comparable American! There were giant travel gaps even among the very oldest travellers; in 1997, a German aged 85+ travelled on average 3.5 km while the comparable American elder travelled 14.6 km.

Table V shows that American seniors not only make more and longer trips than comparable Europeans -- they make more and longer trips than comparable Americans did just a few years ago. Between 1983-95, older Americans increased their travel activity however measured; they drove 98 per cent more, they made 77 per cent more vehicle trips and they spent almost 40 per cent more time driving than they had in 1983. The growth in distance travelled was substantially less, but still significant. The trips made by Americans over 65 in private vehicles increased 13 per cent and all their trips increased 11 per cent in length between 1983 and 1995.

Figure IV shows that, while the trip rate of all older Americans was rapidly increasing, it was climbing more rapidly among women. Between 1983 and 1995, women over 65 made 100 per cent more trips while older men made "only" 77 per cent more daily trips. Conversely, American men actually increased the gap in miles/km travelled between the sexes even as both lengthened trip distance, as Figure V shows. In 1995, older men travelled 114 per cent more miles each day than comparable men had in 1983 although women's distance increased "only" 88 per cent. In fact, both indicators -- trips and mileage -- have grown faster among the elderly than among any other cohort of American traveller. Of course, these are cross-sectional data -- we are not looking at the same people. Older people are not suddenly deciding to travel more; instead younger travellers, with a more active lifestyle, are ageing and retaining the travel elements of their active lifestyle as they grow older.

There is evidence that some growth in travel is also seen among European elders–even if they do not travel as much as Americans. Werner Brög and colleagues report a slight increase in tripmaking for German elders between 1982 and 1997. However, Randi Hjorthol and her colleagues find that their sample of older travellers made the same number of trips in 1991-92 as they had in 1984-85, i.e. 2.4. On the other hand, she found that older people of both sexes travelled further in 1991-92 than they had in the earlier survey.

What is striking about the USA trip data is not that older Americans make fewer trips than younger people and travel less distance, but that the gap between these travellers is *so small*. Missing from the travel patterns of older people is the work trip -- which generally adds 10 one-way trips per week or 1.4 trips per day. Note, however, that it is only when Americans reach 85 that we see a difference of 1.4 trips per day between their patterns and those aged 60-64 (who are mostly in the labour force)! In fact, older people make as many or more *non-work* trips than younger people -- they replace the work trip with other trips, although these trips are shorter. This kind of lifestyle choice has profound implications for policymakers -- older people are very active and stay that way until quite late in their lives.

2.2.3. Mode choice

Older Americans are less dependent on the car for their travel than younger people, a pattern also seen in Europe. But Table VI shows that, unlike Europe, the difference between older and younger Americans is extremely small. The major difference between the two groups is that older people are more likely to be the passenger in that car than the driver -- but not by large margins. Over two-thirds of both age groups are the driver when they travel by car. Conversely, older Americans are much more likely to use public transport or walk than younger people, but these two modes together do not account for more than one in twelve of their trips.

Table VII presents similar data by cohort of the elderly. Here the importance of the private car in the lives of older Americans is made even clearer. There is no cohort of the elderly which takes fewer than 8 out of 10 trips in a car (and all but the oldest make 9 out of 10 trips by car). At the same

time, as people age they are more likely to be the passenger in the car and not the driver–but no cohort of the elderly drives themselves for less than half of all their trips–even those older than 85! For all cohorts the second most important travel mode is walking–and not public transportation. In fact, there are only small differences in the use of public transport by cohorts of the elderly; no elderly American makes more than 2.3 per cent of all trips by bus, train or tram.

Figure VII shows that there has been a steadily increasing dependence on the private car among older Americans. In the 12-year period 1983-95, the dependence on the private car jumped over 16 percentage points among those aged 80-84 and over 11 percentage points among those aged 75-79. There were substantial jumps even among those already very auto-dependent; those aged 70-74 took roughly 87 per cent of all trips by car in 1983 but over 92 per cent by 1995.

Philip Oxley finds similar patterns in the United Kingdom, although the magnitude of car dependence is less. Almost 70 per cent of all trips over one mile made by UK elders 65-69 are made in a car (75 per cent of the men's and 62 per cent of the women's trips); over 91 per cent of the men and 31 per cent of the women in that cohort are *driving* the car. Although he reports that the likelihood of being a passenger in the car increases with age, even among those over 80, where 55.2 per cent of all trips over 1 mile are made in a car, 70 per cent of the men are driving that car.

Although older people travel less and are less dependent on the private car than younger people, it seems unwise to conclude that older people switch to environmentally friendly modes at retirement. It is more likely that older cohorts of the people now elderly are *different* from those who will be elderly in the future–in the past, many women were not licensed and most people did not live their lives organized around the car. But every trend shows that older people continue to use the car as they reach retirement if they used it before. Whether the European elderly will become as dependant on the private car as the American elderly is an open question.

It appears that most of the growth in travel by older Americans is directly or indirectly related to how well the car suits an active lifestyle (either supporting or causing it). Trip rates increased far slower among those without a licence or access to a car. This suggests that if and as European elders 1) become more "motorised" -- that is, licensed and having access to or ownership of a car -- and 2) accustomed to a lifestyle based in part on the personal convenience and flexibility the car offers (whatever its societal costs), they may substantially increase their trip rates and distances as well.

Although many older Europeans have not come to depend on the car as much as a) comparable Americans or b) younger residents of their own country, this may only be the result of a time lag. All evidence is that younger Europeans have substantially increased their reliance on private vehicles-and they may well carry this habit into their retirement years. For example, Randi Hjorthol and her colleague found that in Norway people sustain their increased use of the car as they age.

3. *AGE EFFECTS:* THE IMPLICATIONS OF GROWING OLDER

3.1. Overall patterns

As people age, they are increasingly at risk for a variety of discomforting, disabling and even deadly conditions and diseases. Figure VI shows that disability rises significantly with age in the USA; those over 80 are almost twice as likely as those aged 55-64 to have some type of disability or to have a serious but not severe disability. This is consistent with UK data presented by Professor Oxley in this volume; almost 80 per cent of those over 85 in the UK have a disability compared to less than 30 per cent of those aged 65-69. The disabilities which come with age combine to reduce people's ability to move about, their willingness to travel and their skills at using available transport modes, from cars to buses.

However, all evidence is that most older people in the future will be in much better condition than today's elderly. Many conditions will strike people much later than they did a few decades ago; people who become 70 in the next decade are less likely to face certain medical conditions at that age than someone today aged 70[15]. Although many conditions which beset older people today *will eventually* strike the elderly, there is significant evidence that there will be a "compression of morbidity", i.e. that the age at which disabilities initially occur will increase faster than gains in longevity, so that people will have fewer years of total disability[16]. Philip Oxley presents OECD data showing that in most countries the amount of time during which people are disabled before they die has shortened considerably. Recent USA studies draw the same conclusions[17].

At the same time, a long line of studies show no change at all in the age of onset of many common problems–for example, cataracts, loss of hearing and visual acuity, arthritis and other neuro-skeletal problems[18]. Moreover, many otherwise healthy older people will develop conditions that can impinge on their mobility: reduction in working memory capacity, decreased physical flexibility in the neck and upper body, increased sensitivity to glare, poor night vision, reduced contrast sensitivity, a loss of information processing skills and speed and slowed response time[19] [20] [21] [22]. Lacking the ability to make out the letters on a distant sign (i.e. reduced contrast sensitivity), for example, can equally pose problems for a transport user, a cyclist, a pedestrian, or a motorist. At the same time, these problems may have different implications for different modes; those unable to walk far or climb aboard a transit vehicle may be able to drive and *vice versa*.

In addition, older people are more likely to use medication which can negatively affect their balance, vision or ability to perform a variety of manoeuvres -- from walking to driving[23] [24] [25]. Moreover, the elderly are more susceptible to over-medication and multiple drug interactions. These can all create difficulties for active older people using any mode of travel; it is far worse for those more disabled.

It is important to understand that older people in the future will want and expect an active and independent life full of meaningful activities. But it is equally important to understand that almost all older people in the future will face some medical conditions which will tend to worsen with increasing age. It will not always be easy to know how these conditions affect their ability to get around or meet their transportation needs.

3.2. The transportation implications

The ***age effects*** just discussed will create individual problems for older people who need to travel and societal problems for the rest of us. A number of studies show that older people have problems as both pedestrians and drivers with many traffic situations because of declining skills or increasing disability. A 1998 US Federal Highway Administration report noted:

> *...a long standing recognition that driving situations involving complex speed-distance judgements under time constraints...are more problematic for older drivers and pedestrians than for their younger counterparts*[26].

A 1992 study found that older people themselves reported that the following activities were more difficult as they became older: reading street signs in town, crossing an intersection, responding to traffic signals, making a left turn at an intersection, finding the beginning of the left turn lane and following pavement markings[27]. Although these difficulties are not unique to older people, the US Federal Highway Administration commented... "the various functional deficits associated with ageing result in exaggerated levels of difficulty for this user group[28]".

Because of the reduction in a range of skills associated with ageing, older people may have difficulty in moving about their homes, in walking outside for recreation or to meet their needs, in gaining access to, within and/or onto public transportation stations and vehicles and/or in driving. For example, older people have more pedestrian accidents than anyone except children and when walking they are especially at risk of being hit by vehicles at intersections. When involved in any kind of accident (including falling on the street), older people are far more likely to be seriously injured or to die.

Unfortunately, policymakers and the public have tended to focus most of their attention on the impact of ***age effects*** on driving, sometimes ignoring the problems faced by ageing cyclists, pedestrians and transport users. After all, transport users must be able to walk in order to access most transport services and they must have the ability to get on and move about a transit vehicle once there. Of course, there is some justification for focusing on older drivers: while they have fewer accidents *per capita* than almost any other group of driver, they do, at the same time, have more accidents per exposure or trip made[29] -- and unsafe driving may have safety implications for more than just the elderly traveller.

The fact that older drivers are actually safer on a per capita basis is an important fact which leads us to question: will older drivers in the future be safer drivers on an individual basis? It is generally thought that the difference between current *per capita* and *per exposure* rates is due to self-regulation by older drivers–they do not drive at night or in heavy traffic or in bad weather, etc. But are they driving *less* or driving *differently*–and how much of each? There is a vast difference between an older person reducing the number of trips s/he makes each day, on the one hand, and driving more carefully or at different times of day or avoiding left turns, etc., on the other. To predict the long-term implications of self-regulatory behavior, it is important to understand the difference.

If self-regulation really means that older people drive *less*, will more active elders in the future reduce their total tripmaking, forgoing desired activities? A 1998 focus group study of older drivers at the University of Michigan noted:

Healthy older drivers, in particular, described busy, active lives that required the use of a car on an almost daily basis...Only a few older drivers had made adjustments to their housing situation to accommodate the eventual inability to drive. Many, including nearly all the male participants, had not even thought about the eventual need to reduce or stop driving...[30]

There is a large and growing body of research literature which shows that older drivers, particularly men, are increasingly resisting the total cessation of driving, sometimes long after they objectively should stop. An often-cited 1995 study at the Yale Medical School found that the cessation of driving among elderly people was significantly related to substantial declines in activity levels and substantial increases in depression, even holding all demographic, psychosocial and medical factors constant[31]. Even though women today are more likely to give up driving when they detect problems, it is entirely possible that women in the future will be as resistant as comparable men.

3.3. The policy challenges

Thus ***age effects*** create several policy dilemmas for governments; the least exciting but perhaps most challenging is the need to improve or address the safety of elderly pedestrians and transport users. The more politically salient issues are: 1) discovering reliable ways to measure driving ability and safety, 2) learning effective ways to retrain older drivers or teach them methods to overcome skill deficits, and 3) developing equitable and cost-effective ways to get *unsafe* older drivers off the road (without impacting those whose driving is not impaired).

Policy analysts have long been concerned with the joint goal of identifying poor drivers *and* figuring out how to convince them to either stop driving or doing something to become better drivers. However, we are often thwarted by the lack of accurate and effective measures or tests which predict poor driving performance. For example:

Labouratory studies have shown that ageing is accompanied by significant declines in visual functioning. Although it is likely that these changes alter the ability of older persons to perform tasks in daily life such as driving, for a variety of reasons, ***the extent to which they do so is not directly predictable from lab findings***[32] (emphasis added).

But even if we can effectively identify unsafe drivers, we know very little about whether they can be taught to drive more safely or if we must force them to stop driving altogether. Classroom and other programmes have been available to older people for decades as ways to increase their driving skills. However, it is remarkable how little the effectiveness of such programmes has been studied. (If they do actually make older people *safer* drivers, it is not clear whether they do so by encouraging them to drive *differently* or to drive *less*. If the latter, such behaviour can significantly impinge on the lifestyle and mobility of the older people involved, and often on their family members.)

Finally, even if we knew which older drivers must be taken off the road, it is difficult to encourage or force unsafe older drivers to stop driving unless we can offer them alternatives which allow them to maintain their quality of life. While the US and other countries are in the process of developing better ways to ensure that unsafe drivers stop driving, most seem to implicitly assume that continuing to drive is irrational behaviour given the known risks. Yet if older drivers lack realistic options to maintain their access and mobility, continuing to drive may be a very rational response, even if a dangerous one.

4. *COHORT AND PERIOD EFFECTS:* THE SOCIETAL TRENDS THAT WILL INFLUENCE THE FUTURE

The travel patterns of elderly people today reflect, in part, the experiences they had when younger, experiences not always shared by those who will be 65 in the next three decades. People who were born in 1930 are far less likely to have had a licence for most of their lives than people born in 1950. Women born in 1930 are far *less* likely to have had a driver's licence or a job outside the home than someone born in 1950 -- and they are far *more* likely to have children than someone born in 1960. Different societal forces and trends have structured the way these groups did or will approach their senior years, the activities in which they engage, the places they want to go and the frequency and mode of their travel.

This chapter will examine three profound trends which have significance for travel patterns of older people now and in the future: 1) a ***period effect:*** the automobility of society -- the growing dependence on the private car to conduct more and more daily activities; 2) a ***cohort*** and perhaps ***period effect:*** the substantial labour force involvement of women; and 3) a ***period effect:*** the changing nature of the family.

4.1. Automobility

While European society is not as motorised as North America, European travellers only look like they are not reliant on the car when compared to American experiences. When current patterns are compared to those of just two or three decades ago, it is clear that most of Europe has become substantially more dependent on the private car and increasingly less reliant on other forms of travel. In spite of pricing strategies and public policies designed to encourage alternative modes and discourage the use of the car, its use has grown substantially throughout Europe, and increasingly among those who are ageing.

A 1998 comprehensive study of West Germany found that, between 1950 and 1992, private vehicle use went up 1 348 per cent, while public transport use only went up 104 per cent (less than the total population increase). Moreover, in those four decades the car's share of all motorized travel (that is, not including walking and cycling) went from 35.5 per cent to 83.6 per cent, while public transport's share of those trips dropped from 64.5 per cent to 16.4 per cent. Between 1975 and 1991, public transport use in London decreased 15 per cent while car use increased 9 per cent (measured as a percentage of all trips)[33]. There has also been substantial growth in the car's share of all trips in Poland, Hungary, Czechoslovakia and Germany -- matched by substantial declines in public transport's share of all tripmaking.

Philip Oxley reports (his Table 5) that in 1994 over 80 per cent of all travel on national roads in the European countries was by private car; moreover, there were only two countries in Europe which did not increase the percentage of all travel by car from 1984 to 1994. Conversely, almost every country in Europe saw a significant decrease in the percentage of all kilometres travelled in all public modes combined (buses, coaches, rail). Not all these figures indicate an absolute drop in the use of alternative modes, rather they indicate that the relative importance of the car has increased and that linked to the growing use of the car is increased travel.

John Pucher's study of Eastern European countries after the fall of communism is sobering; in all of those countries, transport ridership plummeted in just 12-18 months, even though public transport services were offered at high levels for relatively low fares while petrol and cars were expensive. He comments, sadly, it must be noted:

> *For better or worse, the public's demand for car travel seems almost boundless. Its comfort, privacy, flexibility, convenience and speed represent irresistible advantages for most people. Except for academics, environmentalists and urban planners, there does not seem to be much opposition to increased car use in Central and Eastern Europe. Most of the public that continues to use public transport does so not necessarily out of preference but because they cannot afford to buy an automobile. As soon as they can afford an automobile, most Czechs, Poles and Hungarians -- just like their German neighbours -- will buy and use it extensively, in spite of all its known deleterious impacts on the environment, traffic congestion, safety and energy use. Whether analysts like it or not, the car revolution in Central and Eastern Europe is inevitable*[34].

Overall, most people entering their retirement years across Europe in the next two decades will be drivers, used to the convenience and flexibility offered by the private car (and perhaps unused to dealing with the often perplexing problems posed by public transport or other alternatives to the car). It's hard to see how society will be able to ensure their quality of life after they must stop driving-since all evidence suggests that many older people will want to travel outside their homes and engage in community activities even when they cannot drive safely.

Fueling these trends is the substantial increase in licensing among women. Alan Pisarski noted that in the USA "for every one per cent shift from nondriver to driver in the female population, total travel jumps almost 10 billion miles per year[35]." And this shift is inextricably tied to increasing female labour force participation[36].

4.2. Women's labour force participation

A major international trend is the substantial growth in the labour force involvement of women and particularly women with children. Women account for the largest share of labour force growth in developed countries in the last few decades; in fact women's participation rates are rising while men's are falling. In 1990, over 65 per cent of all women aged 45-54 were employed in 13 of the OECD countries; in the Nordic countries over 80 per cent of all women had salaried employment. In 1990, roughly comparable percentages of all women aged 45-54 were employed outside the home in both Japan and New Zealand -- 70 per cent[37]. In 1995, roughly 60 per cent of all Australian women aged 20-65 worked outside the home but the percentages varied substantially by cohort. Almost 70 per cent of Australian women aged 20-44 were in the paid labour force (compared to less than 30 per cent of those older than 50).

In the USA in 1997, roughly 60 per cent of all women worked -- including 51 per cent of those aged 55-64 and 9 per cent of those over 65. While divorced women were the most likely to be in the paid labour force (74.5 per cent), most women, married or not, worked -- more than six out of ten married women as well as women who had never married were employed in 1997. Half of all women in the labour force had children -- but 75 per cent worked full time. Between 1996 and 2006, women are expected to account for almost 60 per cent of total labour force growth in the USA[38].

The growth of female employment interacts with other cohort and age effects; while families are changing, middle-aged daughters and daughters-in-law continue to be major caretakers of older people. Those currently middle-aged have been termed "the sandwich generation" because they find themselves working outside the home, raising their children and caring for their older relatives all at the same time. A US Census study commented:

> *The increases in life expectancy experienced in most countries have enhanced the likelihood that middle-aged adults will find themselves caring for older parents. When the sandwich generation has to care for parents who are aged 80 and older, the demands of caregiving are likely to increase as parents in this age group often have more pressing needs than their younger counterparts*[39].

Overall, older people may receive less care than they might like or need because their families are already so over-committed.

Another implication of these trends is that there will be a substantial increase in the number of female *retirees* -- women with their own retirement income. Even in the mid-1970s, slightly over half of all American women over 65 considered themselves to be retired rather than homemakers. But because so many of these women are poorly paid, their retirement income will generally be less than that received by otherwise comparable men; moreover, many of those women will be alone and living entirely on their own personal pensions. Precisely because of that, a number of older women continue to work after the age at which they would like to retire because they have insufficient retirement benefits. In fact in 1994 in the USA, only 38 per cent of women retirees received pension benefits and only 21 per cent received health coverage that could be continued for life.

> *Because of their relatively low incomes, female retirees must be considered a potential risk group in regard to retirement adjustment. Women may require special preretirement information in regard to their post-retirement income situation and will also need education in money management to deal effectively with loss of income after retirement*[40].

The substantial increases in female employment will have perhaps contradictory influences on the activity and travel choices these women will make in the future when older. Because of their presence in the labour force, many female retirees may develop more active and involved lifestyles than women who spent most of their lives as housewives; they may well wish to continue these active lifestyles after they retire. But although employed for much or all of their adult lives, many women will still have substantially lower retirement incomes and accumulated resources than comparable men. And as the section below shows, many older women may have no spouse to share expenses with and no children to provide them with needed assistance.

If anything, women's increasing labour force experience may create a larger gap between the activities they wish to engage in and their ability to do so than that faced by otherwise comparable older women today. In the future, such retired women may do without the goods and services they require because they cannot physically or financially travel to meet their needs. Or, they may act more like men do today -- driving to maintain their lifestyle even when they find driving difficult or dangerous.

4.3. Changes in households and families

Major societal changes in household and family structure may have profound transportation implications in the future as family members age–older people will be less likely to have adult children and more likely to live apart from the children they do have. Moreover, many women living alone will not be widows but rather those divorced for many years or those who have never married. Since most societies currently place substantial pressures on family members to provide needed services, including transportation, many older people in the future may be forced to drastically reduce their lifestyle if/when they cannot drive.

Among the most pronounced change is declining family size. Families and households are becoming smaller in all developed countries, in part because fertility rates have been dropping for decades. Between 1980 and 1997, the entire world's fertility rate declined from 4.1 children to 2.9. Many countries now have total fertility rates near or below the population level of 2.1[41]. This means that older people and particularly women, have fewer children to assist them as they age. There are also a large and growing number of women who have never had children; 12 per cent of older women in Finland and 17 per cent of "baby boom" women in the USA were childless in 1997.

One result seen in all OECD countries is substantial increases in the percentage of older people living alone. In Australia, a "young country" compared to Europe and even North America:

> *The growth of the aged population has been largely responsible for the growth in the number of people who do not live in a family situation, since families in Australia tend to live separately from their aged parents. This brings with it the potential problem of an increasing proportion of the population, especially women, living alone but who are, or who will be, in the need of assistance*[42].

These trends have both profound personal and societal implications. As marriage rates drop and divorce rates increase among older women, fewer and fewer will have spouses, independent of current gender differences in life expectancy. Today, for many older people the main care-giver is their spouse -- and this is true in both developed and developing countries. A 1995 study in Spain found that 74 per cent of older men who needed personal assistance (in eating or bathing, for example) received that care from their wives -- but only 33 per cent of women received needed care from their husbands[43]. A recent study noted that "while most elderly men have a spouse for assistance, especially when health fails, most elderly women do not[44]."

In addition there has been a substantial decline in "coresidence," that is older people living with their children[45]. In the last three decades, all of the OECD countries experienced substantial declines in the percentage of older people who lived with either their spouse or their children. Between 1960 and 1990 the number of people over 65 living alone increased from roughly 24 per cent in Finland and in Austria to 35 per cent. In Finland in 1950, over 55 per cent of seniors lived with their children but only 14 per cent did so by 1987. In Denmark in 1990, almost 53 per cent of old people lived alone -- the highest percentage in the OECD countries[46].

Of course, while adult children may well assist older parents who do not live with them, the help provided by children, while substantial in some countries, has been decreasing rapidly with falling family size and other trends. One aggregate measure is the *parent support ratio*, or the number of people 80+ per 100 people aged 50- 64; the lower the ratio, the more younger people and thus assistance available to older people. However, in 1998, the parent support ratio was 20 in most

developed countries, more than double the average for less developed nations. The ratio was 24 in France, 28 in Sweden and 22 in the USA. But these ratios will increase substantially in the coming decades–to 34 in Sweden, 30 in France and 24 in the USA in 2025[47]. This signals less and less support for the growing number of older people who need it.

These trends also create overall societal problems. Given the growing number and proportion of older people in the population, there is a relative *shortage* of younger *employed* people to pay for the services which older people will need as they age. The ratio of non-working populations, like the young and the old, to the working age population is called a *dependency ratio* and it is rising in all industrial countries -- moving in a direction which should cause concern. Between 1960 and 2030, the dependency ratio of just older people to those in the working age population in many countries will more than double; in France it will rise from 18.8 to 39.1 while in Canada it will increase to 39.1 from 13.0. That is, in both countries there will be roughly four dependent older people for every six of working age. The comparable US figure will be only a little lower[48].

> *In another ten years' time...[a] potentially serious problem will emerge as the baby boomers begin to retire. The number of retirees will rise faster than in the past and they continue to rise quickly for many years. By contrast, the numbers of people in the economically active cohorts will start to shrink in many countries and...the proportion of the population that is employed will also shrink...Unfortunately in the public pension systems currently in force in the OECD countries, it is generally the taxes of people in work which pay the pensions of those who are retired... . This potential fiscal problem is a symptom of the real and inevitable challenge posed by ageing, how to ensure that pensioners enjoy adequate living standards without placing large burdens on the working generations*[49].

Although there are wide variations in health, mobility and income among the very old, the needs of this group are growing rapidly. In general, the very old need more services, treatments and financial assistance than do younger old people; the personal and societal costs of responding will be very great. Also most of those needs will require personal mobility -- to travel to doctors, clinics, service providers, etc. (and if the providers can come to the elderly patient, they themselves will generate substantial travel).

We may well see a society where fewer and fewer older people will have any living relatives young enough, or living close enough, to provide them with transportation services or all the other support they may lack. Who can and will be able to respond to those needs? And how will societies pay for such services with a smaller and smaller number of people in the work force? As one expert notes:

> *[Even] as life expectancy increases and the general health of senior citizens improves, the number of those who need care is increasing faster than those who are able or willing to provide affordable support*[50].

5. THE TRANSPORTATION IMPLICATIONS OF SOCIETAL TRENDS

5.1. Conclusions

All of the preceding analyses suggest that we will see three groups of older people in the future:

- Those with minor physical or mental problems which a) *do not* seriously interfere with the demand for an active lifestyle but b) *may* slightly impinge on the transportation skills needed to maintain that lifestyle;

- Those with more serious physical and/or mental problems which a) *do* interfere with their lifestyle choices but do not remove the desire to engage in many out-of-home activities and b) which *do* interfere, sometimes seriously, with the transportation skills needed to maintain the activities they wish to pursue; and

- Those with major physical or mental problems (or both) which a) *do* significantly reduce the activities in which they can or do engage and b) *do* dramatically reduce or even remove their ability to independently transport themselves.

This is, of course, a simple way to characterize a complex issue. These groups overlap -- older people can move temporarily from one group to another on a day-to-day basis or for a short duration, due to illness or surgery or the death of a spouse. Moreover, this approach does not imply a logical and orderly progression between groups; while some older people will move slowly from the first to the second to the third group, some people will stay many years in one and suddenly and dramatically fall into another. Nor do these groups correspond exactly to a set of transportation choices; data has long shown that older people too disabled to use public transport or walk very far often drive a car[51]!

But, in general, what will characterize all these elderly groups in the future is a gap between the activities they want or need to engage in and their ability to obtain or provide sufficient transportation resources to do so. Of course, older people may not *know* that there is a difference between their activity patterns and their transportation skill levels. In fact, because their lifestyles will be so active, future elderly may be even more likely to allow their desire to engage in activities to outweigh their transportation concerns or blind them to their problems.

In particular, they can get in a car and drive, even if they know on some level that they should not. A recent University of Michigan study noted:

> *Older drivers observed and acknowledged some changes in several of their activities that are related to safe and effective driving...[But] many older drivers did not seem aware of the risks their declining abilities pose to themselves and others, in spite of reports from some of them regarding having been involved in motor vehicle crashes...Most older drivers thought that they would know when to stop driving based on their decreased confidence and abilities, or increased mistakes. Some, however, acknowledged that even if they knew it was time to stop driving, they would not do so*[52].

These groups will vary in the options open to them. Older men may be able to fill the gap by having their wives drive them but older women may have far fewer options. Some people may choose to move to higher density areas so that they can walk to meet some of their needs -- but this

will not be possible for many older people in the future without substantial changes in housing and land-use policies. Moreover, European elders have shown the same desire to "age in place" seen among North Americans; increasingly they are ageing in smaller and less dense communities. Ultimately, regardless of their options, people will begin to either forgo a range of important activities or engage in unsafe transportation behaviour -- and sometimes both.

Although most elderly Europeans in the future may not depend as much as Americans on driving a private car to fulfill many of their needs, they are clearly much more likely to do so than older Europeans today. Of course, many of the historical patterns described in the preceding analyses have been strongly influenced by governmental policies. There is little doubt that the extraordinary level of auto use in the USA has been made possible by policies which fail to correctly price auto use -- refusing to make people pay for the congestion they create or the pollution they cause when they drive -- while providing abundant and relatively well-maintained roads which poorly-financed public transport systems cannot hope to compete with. Other US policies help subsidize development on low-density land while making it difficult to build and re-build in the city centre.

At the same time, it is hard to ignore the recent lessons from Eastern Europe -- even where petrol was heavily taxed and often scarce, roads poor, public transport services good and inexpensive, people still flocked to own and use cars. The car, whatever its grave societal costs, generally provides a superior service even when priced correctly. Its advantages for older drivers, especially early in retirement, are very clear. Unfortunately, as they age people may lose the ability to safely handle a car long before they lose their interest in the activities the car allowed them to engage in when younger. The irony is that the use of the car in early retirement years may ultimately make later retirement years very difficult by widening the gap between what people are used to doing and the transportation skills they still possess.

5.2. Important policy responses

To meet the needs of a rapidly ageing society, policymakers must address three questions. **First**, we must investigate how to build a "user-friendly" transportation network, one where older people can more safely drive, older pedestrians can safely walk and use public transport and even older cyclists can bike for some of their needs. To do so, we must carefully consider the design and redesign of streets and roads, on-ramps, signs, curbs, lighting and pavement markings all to better accommodate the "various functional deficits" of active and otherwise healthy elderly travellers, as well as those with more serious disabilities. But these strategies must go beyond the transportation infrastructure; they must also include land-use planning and urban design strategies. We must ensure that older people have housing options which do not force them to depend on cars when they no longer should and that they have shopping and medical choices to which they can walk or easily take public transport.

Moreover, the transportation network must be co-ordinated in a meaningful way with all the other systems and services which older people use. If travelling to a facility is too dangerous or encourages older people to drive when they should not, we must consider if services can be brought to people in a cost-effective manner. Much of the talk about cross-sector benefits in transportation has focused on very illusive benefits while ignoring very real ones; if hospitals and care facilities, for example, were required to provide transportation to their patients their costs would be substantially higher.

By delivering a service in a way which requires older people to drive, or to wait for others to drive them, many providers are externalizing not only the direct transportation costs but a host of other costs as well–from increased accident rates to environmental pollution. In short, the total costs may be far higher than if the facilities either provided transport services themselves or delivered the medical or other services to the elderly in their homes. We must find ways to make these providers internalize these costs so we can evaluate the genuinely most cost-effective ways to deliver needed services to older people in the future.

Second, policymakers must focus on ways to make older people better and safer drivers and, if need be, ex-drivers. What kind of training, classes or methods can really help older drivers become safer drivers *who meet their activity needs*? Which approaches actually help older people to drive better, safer, differently as opposed to simply driving less? It may be far harder in the future to convince older people to reduce their driving significantly if that adversely affects their lifestyle -- but they may be very willing to drive differently (at different times of day, or with someone in the car, etc.).

At the same time, we need better predictive measures -- cost-effective ways to know when older people should be told to stop driving. While many countries are experimenting with ways to encourage or even force older people to stop driving (physician counselling or intervention, children reporting their parents to the authorities, mandatory relicensing), there is little evidence that these methods a) accurately target many poor drivers or b) actually encourage many older people to stop driving[53] [54]. We need both effective ways to identify problem drivers -- before they have serious accidents -- and effective ways to get them to stop driving once identified.

It is also worth noting that older people who are not drivers may have to be encouraged to travel less outside the home because they have personal mobility problems or because they are experiencing dementia[55]. Older pedestrians are at greater risk of falling as well as being involved in vehicle accidents; while these accidents are generally not their fault, their slower reflexes place them at greater danger while their physical condition makes it more likely they will be more seriously injured when involved in an accident.

Third, we must develop an array of effective transportation alternatives to offer older people, alternatives which provide meaningful access and mobility when they cannot or should not drive (or should not travel with another older driver). Society must spend considerable energy on making it possible for people to chose other modes when they have problems driving and eventually for all their needs. This requires us to "think outside the box," to move beyond traditional notions of public transport and of demand-responsive services. Around the world communities are experimenting with different kinds of traditional transit, senior carpooling schemes, volunteer driver programmes, new forms of demand services, information and training programmes -- not all have been successful and many have been alarmingly expensive.

But with an ever-growing target market, new technology and a realization of the true costs of not responding, it may be possible to organize and deliver some of these services in a cost-effective way, providing viable options matched to the needs of older travellers.

As a 1994 OECD study warned:

The long-term trends of rising standards of living and...improvements in health status...can be seen as a successful outcome of earlier economic and social policies, leading to longer and healthier lives and greater scope for individual choice and lifetime fulfillment. It does, however, also raise questions whether the traditional social policy prescriptions for "the elderly" -- many of which have their intellectual origins around the beginning of the 20th century -- will continue to be both relevant and sufficient[56].

The ageing of society is a tremendous challenge; on the doorstep to the next Millennium we must abandon the old ways of thinking and find new ways that resonate with the needs of a new generation of older people.

TABLES AND FIGURES

Table 1. **Comparative implications of female survival advantage**

	Percentage of women 60+ widowed	**Percentage of population 60+ who are/will be women**	
	1997	**1997**	**2025**
France	46	57.9	55.6
Italy	43	57.6	55.4
Spain	39	56.8	55.3
UK	43	57.3	54.6
USA	47	57.6	54.0

Source: US Commerce, Bureau of Census, *Gender and Aging; Demographic Dimensions,* by Yvonne J. Gist and Victoria A. Velkoff, International Brief, 113/97-3, Dec. 1997.

Table 2. **Percentage of older Americans who are licensed drivers, 1997**

Age cohort	**Male**		**Female**	
	% licensed	**% of total male drivers**	**% licensed**	**% of total female drivers**
65-69	94.5	4.6	79.9	4.7
70-74	96.0	4.0	77.7	4.2
75-79	90.9	2.9	68.4	3.1
80-84	86.7	1.6	54.9	1.8
85+	71.4	0.9	31.5	1.0
Total 65+	91.7	14.0	66.4	14.8

Source: Office of Highway Information Management, FHWA, Table DL-20.

Table 3. **USA travel patterns by age and sex, 1995**

Age	Average daily trips		Average daily miles	
	Male	**Female**	**Male**	**Female**
Under 16	3.7	3.8	23.7	26.2
16-20	4.6	4.7	37.6	35.0
21-35	4.5	4.8	51.3	40.8
36-65	4.6	4.6	53.2	37.5
65+	3.9	3.0	31.7	19.2
Total 65+	3.4		24.4	

Source: Tables 12 and 13, Draft 1995 NPTS Summary of Travel Trends.

Table 4. **Average daily person trips, miles and km by age cohort of the elderly, USA 1995**

Age cohort	Average daily trips	Average daily miles	Average daily km
60-64	4.1	39.6	63.8
65-69	4.0	30.6	49.3
70-74	3.7	26.7	43.0
75-79	3.2	19.3	31.1
80-84	2.7	15.1	24.3
85-89	1.5	9.1	14.6
Total 65+	3.4	24.4	39.3

Source: Unpublished data from 1995 NPTS.

Table 5. **Daily travel statistics for older Americans (65+) 1983-95**

	1983	1990 (adjusted)	1995	% change 1983-95
Vehicle trips per driver	1.66	2.27	2.94	77.1
Vehicle miles travelled per driver	9.80	14.83	19.56	98.0
Average vehicle trip length	5.92	6.61	6.69	13.0
Average time spent driving (in minutes)	n.a.	30.83	42.89	39.1
Person trips per person	1.82	2.49	3.43	88.5
Person-miles per person	12.21	19.85	25.24	106.7
Average person trip length	6.70	8.12	7.46	11.3

Source: Computed from Table 29 Draft 1995 NPTS Summary of Travel Trends.

Table 6. **Travel mode for all trips by age, USA 1995**

Mode	16-64	65+
Car:	92.2%	91.8%
- As driver	74.4	68.4
- As passenger	17.8	23.4
Public transit	2.0	1.9
Walking	4.6	5.5
Bikes	0.5	0.2
All other modes*	0.8	0.6

* = may not add to 100% due to rounding errors

Source: Unpublished data from 1995 NPTS using Trip Weights removing non-responses.

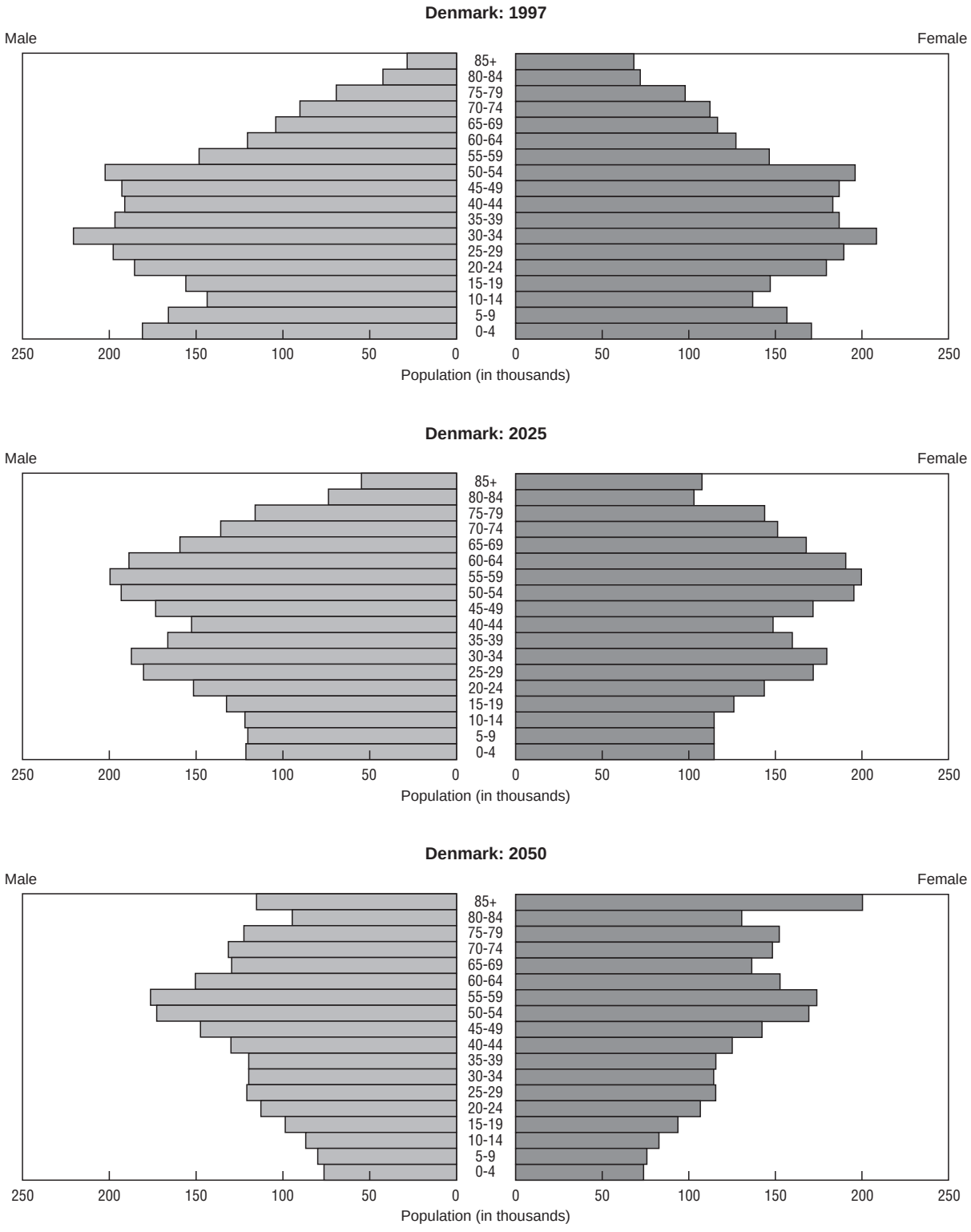
Table 7. **Travel mode for all trips by cohorts of the elderly, USA, 1995**

Mode	65-69	70-74	75-79	80-84	85+
Car:	92.5%	92.0%	91.1%	92.2%	84.8%
- As driver	73.1	69.1	64.7	59.1	50.7
- As passenger	19.4	22.9	26.4	33.1	34.1
Public transit	2.0	1.7	2.3	1.7	2.4
Walking	4.6	5.7	6.0	5.4	11.2
Bikes	0.2	0.2	*	0.3	*
All other modes**	0.7	3.4	0.6	0.4	

* = less than 1%; ** = rounding errors

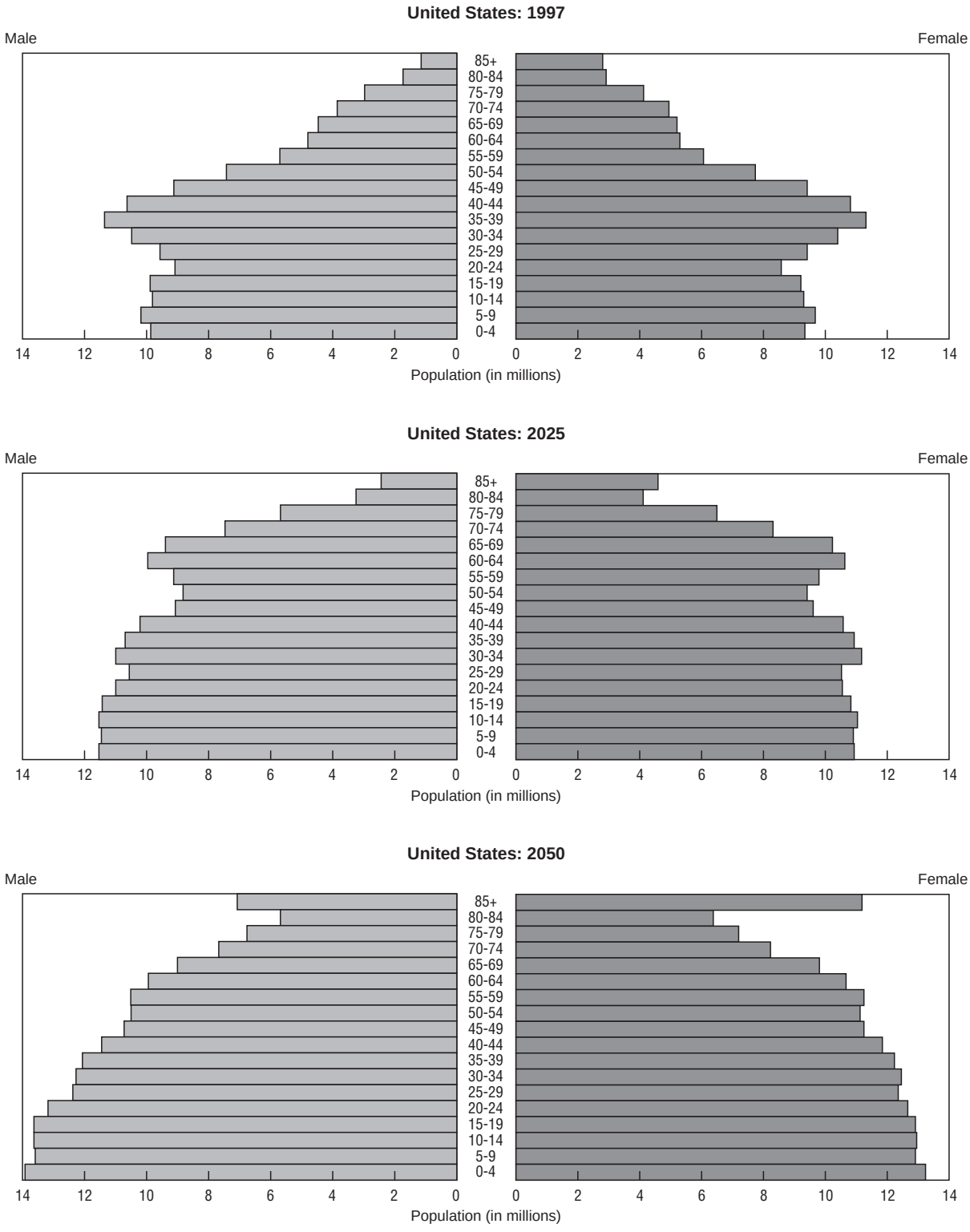
Source: Unpublished data from 1995 NPTS using Trip Weights removing non-responses.

Figure 1A. **Comparative population distribution 1997-2050, Denmark**



Source: US Commerce, Bureau of Census, International Data Base 1997.

Figure 1B. **Comparative population distribution 1997-2050, United States**

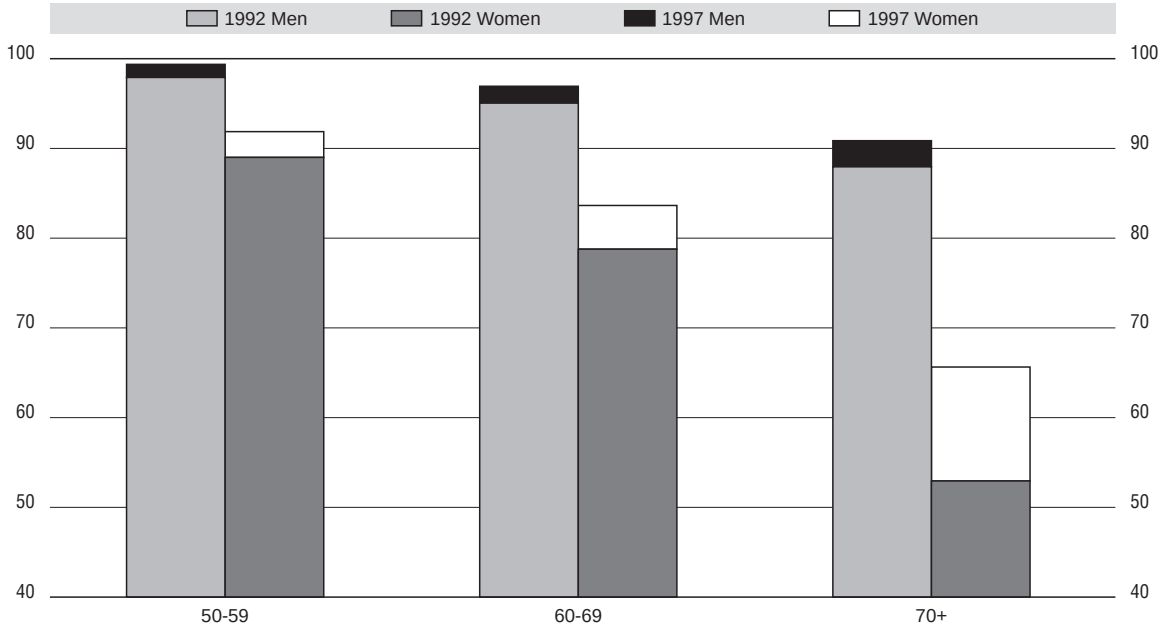


Source: US Commerce, Bureau of Census, International Data Base 1997.

Figure 2. **Percentage of older people living alone in four developed countries, 1990-1995**

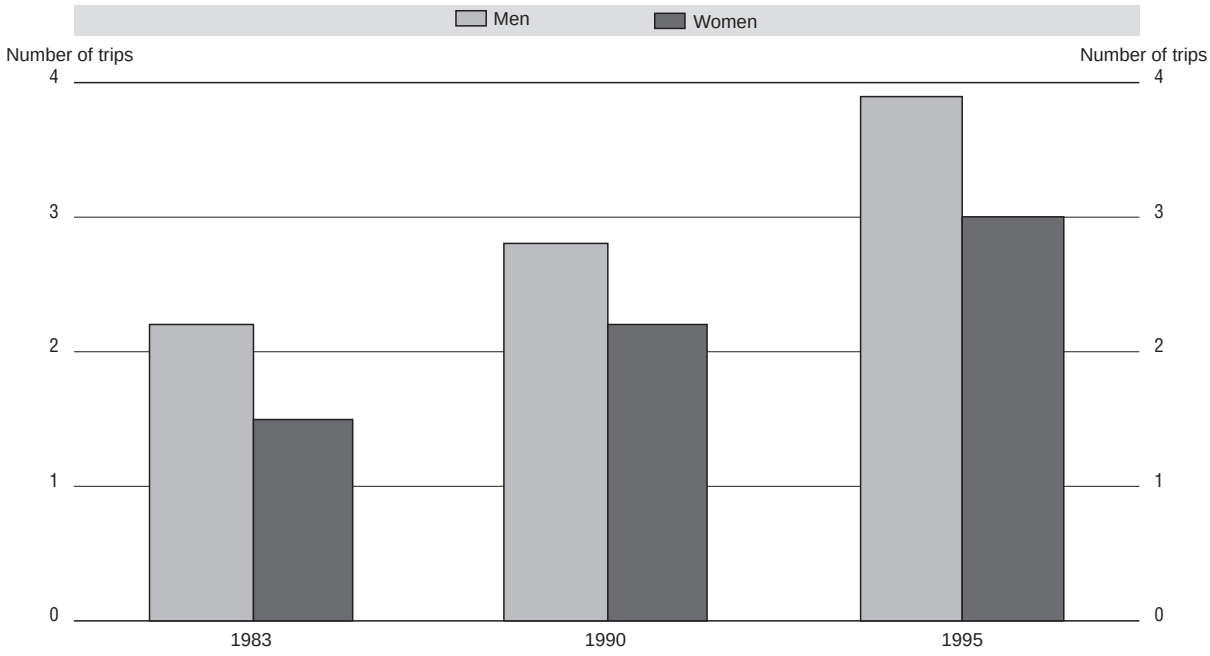
Source: US Census Bureau, *The Official Statistics*, 1B/98-3 Nov. 4, 1998, Figure 4.

Figure 3. **USA driver licence rates by age and sex, 1992 and 1997**



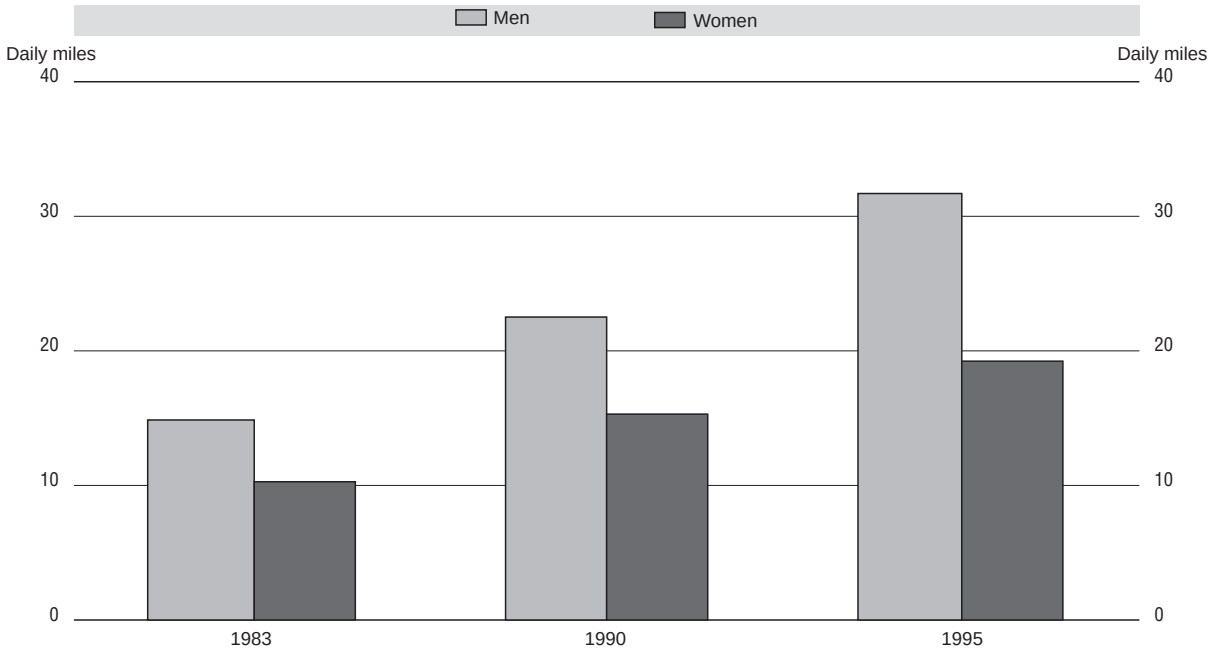
Source: Office of Highway Information Management, FHWA Table DL-20.

Figure 4. **Average daily person trips of older Americans (65+) by sex, 1983-1995**



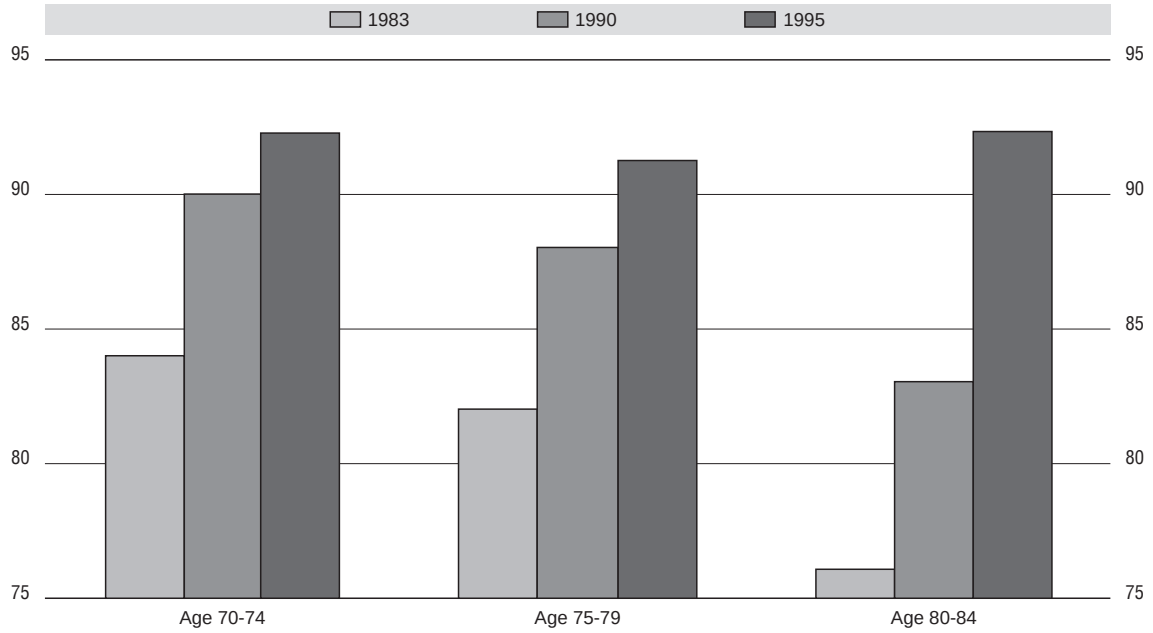
Source: Table 12, Draft 1995 NPTS Summary of Travel Trends.

Figure 5. **Average daily person miles travelled by older Americans (65+) by sex, 1983-1995**



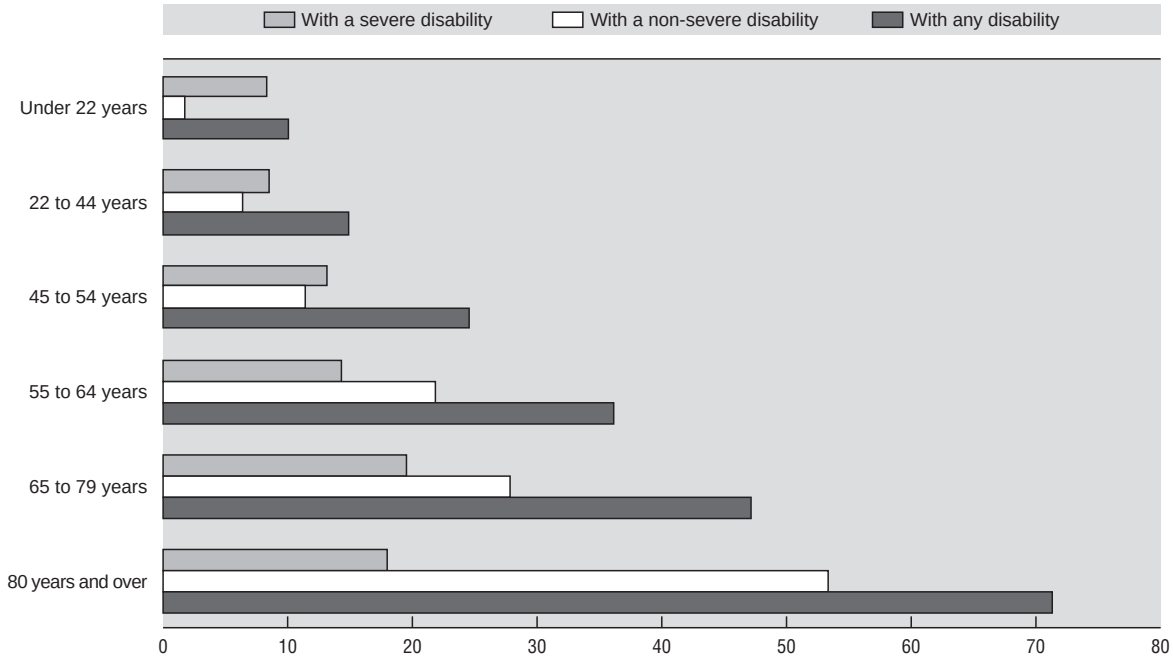
Source: Table 13, Draft 1995 NPTS Summary of Travel Trends.

Figure 6.. **Percentage of all trips taken by car**
By older people, USA, 1983-1995



Source: Unpublished data from 1995 NPTS and Rosenbloom 1995.

Figure 7. **USA disability rates by age, 1994-1995**



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GERMANY

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SUMMARY

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1. INTRODUCTION

For years there has been a steep increase in the proportion of older people and, in particular, of very old people, in all western industrialised countries. This trend is attributable to greater life expectancy as well as low birth rates. Since, at the same time, more employees are retiring at an increasingly early age, the duration of retirement is becoming increasingly long and varied. The demands and expectations expressed by people in their old age are also rising and changing with each new generation as it crosses the retirement threshold. Some demands, however, persist independently of the various age cohorts and their respective social backgrounds.

Older people unanimously agree that remaining independent is the most important factor in growing old with dignity. Maintaining and supporting an independent way of life for older people for as long as possible is also a long-standing political objective. The measures which have been taken in recent years in Germany for this purpose comprise research and development programmes for sheltered dwellings and provisions to improve the living environment, to ensure that new and renovated buildings are free of obstacles, keep shops near dwellings and improve transport infrastructure.

A central aspect of the independent way of life is mobility, meaning that it should be possible to move about within and outside the home. Mobility is a basic aspect of our lives and is not limited to meeting daily needs, activities, etc., but is also an important requirement for participation in social life and for communication with others.

Life as a transport user is, however, not made easy for people who are growing older, and particularly for those among them with mobility handicaps. In their everyday life they have to cope with obstacles and limitations which are often not perceived at all by the younger and more energetic members of the community (including planners and decisionmakers in the transport field).

The car is thus seen as the epitome of mobility. Its use and availability are by now common to all age groups and classes of society and are therefore also seen as the basis of mobility for older people. But it is also a fact that the keenest pedestrians are precisely older people and especially those of them with mobility handicaps. In the upper age brackets, the private car plays an increasingly limited role in daily mobility.

But to keep older people mobile and allow them to be independent in the autumn of their lives, detailed information must be available on their mobility behaviour patterns as a basis for discussion and decisions. This report will make its contribution by providing information on the main aspects of transport use by older people, their mobility behaviour patterns and their attitudes to transport and mobility.

Most of the data provided in this study are based on mobility studies conducted by Socialdata with the use of the new KONTIV method (a survey method specially developed by Socialdata, with which various kinds of mobility data can be obtained in an extremely reliable way) [1]. These data have been merged and extrapolated to the 1997 reference year for the Federal Republic of Germany. The report considers the change in mobility behaviour patterns during the life-cycle and old age, as well as differences between the old and new *Länder*. Basic attitudes and the potential for change are also discussed. Data from the Ongoing Transport Survey (KONTIV) of 1982 have been included as an additional time reference to compare the mobility behaviour patterns of different age cohorts. As this survey provided data only for what was federal territory at that time, the 1997 data were accordingly limited for this comparison level to the old *Länder*. For comparison purposes, the data also had to be adjusted, since in 1982 the only respondents were those aged 10 and over.

Only the population living in private accommodation were included in these mobility studies, meaning that the disabled or those in need of care accommodated as in-patients were excluded. Some 5.3 per cent of older people live in retirement homes, while nursing-home patients aged 65 and over account for 3 per cent of the total population in this age group [2][1].

2. OVERVIEW OF THE SITUATION OF OLDER PEOPLE

2.1. Demographic change

In 1995, 17.1 million older people (aged 60 and over) were living in Germany, which corresponded to a good fifth of the total population. According to a United Nations forecast, the proportion of older people in Germany will have risen to a third of the total population by the year 2025 [3], which is attributable to a general decline in the population as a result of low birth rates and to a continuously rising life expectancy. Population ageing is not only affecting Germany, but is a characteristic of all industrialised nations. For example, the proportion of older people in Europe rose from about an eighth to a fifth in the period 1950-90 [4].

Within the older population age group a number of important trends are to be seen: a lower old-age threshold, owing to declining labour force participation rates among older employees, a sharp increase in very old people and a continuing surplus of women in the upper age brackets.

The average retirement age is going down owing to the increasing number of early retirements and older unemployed. The group of older people is thus spreading downwards if they are defined as “no longer economically active”; the younger old people with their specific mobility behaviour patterns are therefore forming a higher proportion of the older population group. At the same time, the number of the oldest-of-the-old is rising very sharply owing to greater life expectancy, better health care and a declining old-age mortality rate.

According to a population forecast by the Federal Research Agency for Environmental and Regional Planning [BfLR: since 1.1.1998 the Federal Office for Construction and Regional Planning (BBR)] -- the 80 and over age group (in western Germany) will increase by almost a third compared with 1993 by the year 2010, and the 60-79 age group by a sixth (the corresponding growth forecasts for the new *Länder* are, respectively, 17.3 per cent and 17.5 per cent).

In addition, it is forecast that life expectancy will rise in west Germany to 81 years for women and to almost 75 years for men by the year 2010. The existing differences compared with west Germany will narrow owing to a somewhat higher increase in east Germany. However, the gender-specific differences in life expectancy will not be reduced, which will continue to result in a marked surplus of women, particularly in the higher age groups [2]. Even if external factors, such as the shift in the gender balance due to war, no longer count in the future old-age generations, the period of old age will still be dominated by women: although in 1990 there were 168 women per 100 men aged 60 and over, there will still be 131 women per 100 men in the year 2010. In the top old-age group these differences are even clearer: in 1990 for every 100 men aged 80 and over there were 258 women, while a ratio of 100:232 is forecast for the year 2010 [5].

Regional differences in the proportions of older people in the total population also have to be taken into account: at present, the major trends are the "suburbanisation" of ageing, meaning a decrease in the proportions of older people in inner cities and an increase in their number in the suburbs, as well as more rapid population ageing in the new *Länder,* due to the massive exodus of younger people. Higher growth rates for older people are forecast in rural and sparsely-populated regions than in densely populated regions [2].

2.2. Older people's living conditions

Older people's living conditions are marked by some important factors which finally also have repercussions on their behaviour patterns. These factors include, in particular, the smaller size of households in the old-age period and the rising number of older people living alone, their state of health and, within this group, the proportion of those with mobility handicaps and in need of care.

Most older people live in single- and two-person households (Table 4). While over two-thirds of older men live in two-person households, this is the case of only two-fifths of older women. Women account for the main proportion of single-person households, which can be explained by their higher life expectancy of just under seven years and the fact that, on average, they were three years younger than their husbands when they married. Thus, four-fifths of men aged 60 and above were still married while, in the same age group, almost every other woman, or 48 per cent of the total, was a widow [4].

A fifth of older people live with one of their children or grandchildren; however, with a share of just under 4 per cent, large families comprising members of three or more generations scarcely count. Household size declines the older people become, owing to the children's departure and the partner's death [4].

A higher proportion of people living alone is expected, due to increasing divorce and declining marriage rates on the one hand and the growing number of very old people on the other. The proportion of people aged 75 and over living alone was already up by more than a third (west Germany) between 1972 and 1995 and now stands at 55 per cent [2].

An individual's state of health is an important factor in living independently, especially in the case of older people who are on their own. Chronic illnesses and handicaps and, in particular, mobility handicaps may result in a lasting need for assistance and care and make it difficult to continue leading an independent existence. It should be pointed out that mobility is often impaired among older people by an

accumulation of health problems -- such as heart/circulation, sensorimotor and joint/bone disorders -- even if the individuals concerned are not officially classified as handicapped. At the same time, the mobility of all those officially classified as severely disabled is not necessarily affected.

According to a study conducted by Socialdata in 1984, the number of disabled (west-) Germans living at home could be put at 6.98 million (11 per cent of the total population); only 75 per cent of them were officially classified as such, and just under two-thirds of them also suffered from mobility handicaps (almost 8 per cent of the total population). A good third of Germans with mobility handicaps were 75 or over. The most elementary activities outside the home were (almost) invariably ruled out for one in six of them. The proportion of those who actually went out on an average day was about a tenth less than the figure for comparable individuals (identical from the sociodemographic viewpoint). This was, however, offset by the handicapped, owing to the higher proportion of activities when they did go out, which resulted in similar frequencies of activities involving basic needs for both the handicapped and non-handicapped [6]. This example shows that a minimum mobility requirement exists which is respected even if considerable difficulties have to be overcome.

Another Socialdata study provides information on the proportion and situation of people living at home who need assistance and care: the proportion of people requiring assistance and care (not including in-patients) among all older people aged 65 and over was 11 per cent. At the time, roughly a third of people aged 80 and over were cared for and assisted at home. The majority of those in need of assistance and care were women, advanced in age and widowed. A third of those in need of care went out every day or almost every day, while 13 per cent went out frequently and 39 per cent seldom. Altogether, 85 per cent said that they took part regularly or seldom in activities outside the home, almost three-fifths of them went out alone, while 44 per cent were accompanied, just under a fifth had to be driven, pushed or carried and 6 per cent gave no information on their movements. Scarcely a seventh of those in need of care in the 80 or over age bracket could go out without help [7].

Mobility among older people is affected not only by their own state of health but also by external factors. For instance, the transport system's increasing complexity causes older users considerable problems which are often too much for them: an excessive proportion of older people are involved in road traffic accidents, especially as pedestrians. At the same time, the consequences of an accident are more serious than in the case of younger users [8]. These factors may become a subjective obstacle to mobility and discourage older people from going out, which in turn has a negative impact on their independence.

3. MOBILITY AS PEOPLE GROW OLDER

Various sociodemographic variables have been used to produce and assess life-cycle groups in order to show how far the main reasons for daily routines that occur in the various phases of life have repercussions on mobility behaviour patterns. This assessment has been supplemented by a study of finely classified age groups in which gender differences have also been taken into account. In the subsequent summary, the situation of people with mobility handicaps is considered by way of comparison.

3.1. Mobility in the life-cycle

A comparison of the mobility characteristics of the various life-cycle groups (Tables 5a/b) shows greatly varying shares of mobility outside the home: while the shares of children, those in the education/training phase and economically active persons are far above the general average, smaller proportions of housewives (without children), non-active men and pensioners are mobile on an everyday basis. This difference is mainly due to the fact that the latter groups no longer have to go out for education/training or work, or to accompany a child. The gender differences among old people are to be noted: the lower shares of mobility outside the home, especially among women aged over 70, show that the proportions in the highest (and understandably least mobile) age brackets are higher than in the case of men, due to greater life expectancy.

In all, everybody in Germany performs 1.7 activities outside the home per day, which means going out on average 1.3 times and making three trips. The trips are broken down on average into 5.6 stages with different transport modes[2].

The time budget (Tables 5c/d) also changes in the course of life; on average. 18 hours are spent at home and 4 hours 42 minutes at destinations outside the home. Transport is used (per person and day) for a good hour (63 minutes), with a distance of 22 kilometres being covered[3]. While again the highly mobile groups consisting of single, economically-active persons are the major transport users and spend the least time at home, children and housewives as well as non-active men and pensioners are at home for over 20 hours a day. Transport time is correspondingly low and, in the case of women aged over 70, amounts to only 36 minutes, with an average distance of six kilometres being covered.

If activities outside the home (Tables 6a/b) are examined in detail, substantial differences depending on the life-cycle are obviously to be seen, with a wider spread of activities in the case of children, young people and the economically active compared with housewives (with no children) and pensioners. When education/training, occupational activity and child-rearing come to an end, people go out mainly for shopping and leisure activities or to make use of services.

A breakdown of daily trips by main transport mode (Tables 7a/b) shows that the private car has the highest shares: 41 per cent of daily trips are performed as car drivers and 13 per cent as passengers, mostly in a car belonging to the household. Walking (on one's own) accounts for about a quarter (24 per cent) of trips, the bicycle (mainly) for a tenth and public transport for 11 per cent.

Depending on the life-cycle category, however, there are considerable differences which are mainly connected with holding a driving licence, occupational activity and gender. Thus the proportion of car trips rises continuously from the age at which the driving licence was obtained but is, without exception, higher for men than for women. Economically-active men take the highest share of car trips. Women account for a much higher share of trips on foot, by bicycle and public local transport, although their share in trips as private car passengers by far exceeds the corresponding proportion of men. Modal choice by housewives is focussed more on environment-friendly modes (walking, cycling and public transport). Non-active men up to age 60 and young pensioners between 60 and 69 make about half their trips by car, and almost exclusively as drivers. By contrast, women pensioners in this age group show a greater tendency to use environment-friendly modes and travel by car on only about a third of their trips, and mainly as passengers.

The shifts become even clearer in the case of those aged 70 and over. The proportion of self-drive car trips goes down in the case of men to a third of daily trips, while the proportions of trips on foot and by local public transport rise considerably. In the case of women, the proportion of car drivers is cut from 16 to 8 per cent, and the proportion of passengers also declines sharply. In this life-cycle category, the private car is of importance for only a fifth of all trips; a marked shift to environment-friendly modes takes place.

Considering the use of transport modes (Tables 8a/b), i.e. the proportion of people who use a certain (main) transport mode at least once in an ordinary day, the relative increase in trips on foot, by bicycle and local public transport compared with the car can be seen. The user rates total 128 per cent, which gives (minus the 21 per cent of people who do not go out) an average of 1.07 transport modes per day and individual. The user rates for older people are considerably lower, especially in the case of women over 70, with 0.65 transport modes per individual and day (obtained from 114 per cent - 49 per cent); the proportion of pedestrians at 29 per cent remains relatively constant, while in this group only 4 per cent a day drive a car (as against 23 per cent of car drivers among men over 70). Almost every other woman in the older age group does not go out on an ordinary day.

3.2. Mobility as the years pass

A more detailed breakdown of the age groups shows the trends described above more clearly (Tables 9a/b): with regard to the criteria concerned, the group of adults of working age are the most active. Over four-fifths of them go out on an average day when, on average, 2.4 activities are performed. For this purpose, they make 4.1 trips comprising 8.1 stages. Taking everybody in this age group into account, every individual is mobile 72 minutes and covers a total distance of 29 kilometres (per day).

Mobility values decline at pensionable age, when the greatest decreases are to be observed at its start and in the move from the 80-84 year bracket to the top age bracket (85 and over). In between, the decreases are more even and the only additional substantial decline is in the shares of mobility outside the home with the move into the ninth decade. Although almost three-fifths of those aged 75-79 still go out on an ordinary weekday, less than half the 80 to 84-year-olds do so. Of those aged 85 and over, only one in three goes out.

The average trip time follows the same trend since it declines to 62 minutes and 19 kilometres per individual and then decreases continuously, with again a sharp fall among those in the 80-84 age bracket (32 minutes, 5 kilometres) and those aged 85 and over (20 minutes, 4 kilometres). The oldest age group spends on average only 5 per cent of the day out of doors.

But if mobility characteristics are related to the mobile parties in an age group, it can be seen that the decreases in the higher age groups are no longer so marked. Even those aged over 85 -- inasmuch as they do go out -- still account for 2.7 trips and 1.4 activities. This factor again makes it clear that a minimum degree of mobility is needed to remain independent.

A further breakdown by gender reveals marked differences in mobility behaviour patterns (Table 9c), which start with working age and become more pronounced up to the oldest age group. Most striking are the differences in the shares of mobility outside the home as well as in trip time and distance. The share of mobility outside the home among men aged 85 and over exceeds that of women in this group by over half, while the average trip time and distance is even more than twice as high. This is probably partly due

to the differing life expectancies, with the result that women in the over-85 group are on average older than the same group of men. Similarly, the higher proportion of those in need of care and those with mobility handicaps among women could be shown, as is stated in the relevant studies [7].

A breakdown of activities by age group gives the following picture (Table 10a): once pensionable age has been reached, daily trips are distributed among shopping, the use of services (e.g. visits to Post Office or doctor) and leisure activities. In the 60-65 age group, occupational factors may still be a reason for daily activities outside the home. As the years pass, there is an increasing shift in activities to shopping and leisure pursuits.

A breakdown by gender shows how typical role distributions continue to an advanced age (Table 10b). The proportion of trips involving work is considerably higher among men of working age than among women, for whom outings for shopping and accompanying others (e.g. children) are higher. Even when the period of economic activity is over, this "division of labour" persists: women are without exception more involved in shopping trips than men, who instead account for more trips involving leisure.

If the proportions of the activities concerned are related to the average number of activities per individual and day (Table 10c), it can be seen how limited the range of activities among older people actually is. As from age 65, their leisure activities are under the general average and go down to 13 per cent in the top age bracket. Although shopping is the most frequent activity outside the home, it scarcely amounts to a proportion of over a third among the "young" senior citizens, goes down to a fourth in the 80-84 year group and to 14 per cent in the top age bracket (this table takes into account the fact that, among those aged over 85, the average number of activities per day is only 0.9, or 30 per cent of the general average of 3).

When considering the main transport modes used by age group, some aspects, which already emerged in the analysis by life-cycle group, again become clear (Table 11a): the preponderant use of the private car as the main mode is coupled with working life and the car accounts for over half of the trips in the 18-59 age group. At pensionable age, modal choice increasingly shifts towards environment-friendly modes (walking, cycling, public transport). The proportion of trips as pedestrians in the 65-69 age group is higher (30 per cent) than in all the lower age groups and exceeds car use as the driver (28 per cent). Public transport is used by this group for a seventh of trips, while cycling accounts for a tenth. The proportion of trips as car passengers (12 per cent) is, in this case, the highest of all the adult groups concerned, which is mainly attributable to women. As people grow still older, the proportion of car trips (as the driver) declines further (to 9 per cent among those over 85); the proportion of passengers firstly goes down somewhat, but then starts to rise again after age 85. In this age group, the proportion of passengers in cars not belonging to their households also exceeds, for the first time, the proportion using cars owned by their households, which is to be explained by the increasing number of older people who are widowed and live alone. The proportion of trips on foot rises continuously with age. The over-eighties make over half of their trips mainly on foot. In addition, older people (relatively speaking) use public transport the most frequently: the proportion rises from a ninth (11 per cent) among the not so old (60-64) to a quarter among the very old (85+).

In the case of modal choice, there are also substantial differences between the sexes (Table 11b) that appear at the start of working life, as reflected particularly in the very high use of the car (65 per cent) by men of working age. By contrast, women in this age group use the car (as drivers) for only two-fifths of their trips and instead make greater use of environment-friendly modes (walking, cycling, public transport). Although car use generally declines at pensionable age, the differences between men and women still increase. In the 75-79 age group, the proportion of (self-driven) car trips among men is

almost six times higher than among women, and even if the proportion of passengers (higher in the case of women) is also taken into account, the result is that men use private car transport considerably more than women.

If the user shares of the individual age groups are related to the general trip average (Table 11c), the number of trips per capita declines as from age 80 to under half the general average for the population. The proportions of trips by foot and public transport, however, remain for a long time level with the general average or even exceed it.

If modal choice with all stages included is taken into account (Table 12), the importance of walking becomes clearer still: even if the proportion of stages per trip varies from one age group to another, the number of pedestrian stages is roughly equal and -- except in the lowest age bracket (0-17) -- higher than unity (= over 100) in all cases. This means that no trip would be feasible without this basic form of locomotion. Walking is the basis for mobility and becomes increasingly important, especially in old age, when modal choice and spatial contexts change.

The data for transport mode use (Tables 13a/b) also show the increasing importance with age of pedestrian and public transport trips, as well as the marked reduction in car use, and again point to gender differences that increase with age.

The daily record of activity shows when the various age groups are mobile (Tables 14a/b/c). On the basis of the total population, in each case a fifth of trips are made between 9 a.m. and 12 noon, a fifth between 12 noon and 3 p.m., and a third between 3 p.m. and 7 p.m.. A sixth of trips take place in the morning before 9 a.m. and roughly a tenth in the evening after 5 p.m. Among young people there is a greater focus on the morning and the afternoon, while in the case of working age groups the breakdown is close to the average. At pensionable age there is a pronounced shift in mobility times to the morning, during which over two-fifths of trips are performed as from age 65. The proportion of trips at noon and in the early afternoon remains at the average, and the late afternoon is not used so frequently by the less old and assumes importance again only in the higher age bracket. The morning and evening hours, however, are used much less for activities by older people than by the population as a whole. From the breakdown by gender, it can be seen that women are mainly responsible for the renewed increase in the proportion of trips between 3 p.m. and 7 p.m. (Table 14b). By showing the proportion of activities in relation to the total population's degree of activity, the preference among older people for carrying out activities before noon can again be seen, while the use of the evening hours is infinitely small (Table 14c). These timetables are based on subjective and objective reasons and modal choice considerations. Although the car is frequently not used after nightfall for health reasons (e.g. high sensitivity to dazzle which is detrimental to safety), public transport is avoided owing to poorer frequencies, and people, especially women, refrain from walking since they consider it unsafe or dangerous in the evening. The inclination is therefore to shift entertainment activities (e.g. private visits, events for senior citizens) to the afternoon and be at home before dusk. Another reason for the decrease in activity among older people is often the fact that there is nobody to accompany them (owing to the rising number of single persons).

The length of the trips (up to 100 kilometres) performed in a day by the total population is on average 7.4 kilometres (Table 15a). More than every second trip is a short-distance journey (up to three kilometres). A breakdown by age group shows an above-average proportion of short-distance journeys of up to one kilometre among children and young people, while the highest average trip length is recorded by those of working age, among whom the proportion of trips exceeding three kilometres also predominates. At pensionable age, there is a new uptrend towards short distances, with increasingly higher proportions of trips up to one kilometre and, on the whole, a decreasing average distance. Among

those aged over 85, almost every second trip no longer exceeds one kilometre. The breakdown by gender (Table 15b) shows that the focus on short distances is in all cases more pronounced among women than men. On the basis of the real proportions of trips (Table 15c), it becomes clear how few trips exceeding three kilometres there are in the upper old-age bracket. The reasons for this finding are to be seen in the transport modes used (higher proportions of trips as pedestrians, fewer car journeys), the activities associated with old age (limited to basic needs) and old people's state of health (declining physical mobility).

3.3. Summary

As a result of this review, it can be seen that changes in mobility behaviour patterns are, from every viewpoint, closely connected with the end of working life. Entry into retirement is reflected in a general decline in mobility values, with a shift -- but also a reduction -- in activities outside the home and a change with regard to modal choice. The predominance of the private car, which is characteristic of economically-active men, gives way to a wider range of transport modes, with increasing shares for environment-friendly modes, in particular walking.

A further breakdown of groups by age and gender shows that the changes described are even more pronounced as people move into the upper age bracket (as from age 80). Although older people's mobility is greatly reduced, it is still maintained at a low level. This mobility level can be seen as the minimum required to live independently.

Gender differences are seen firstly in a lower share of mobility outside the home as well as substantially lower trip times and distances among women and, secondly, in greater use of environment-friendly modes with substantially higher proportions of trips on foot and by public transport. With regard to activities outside the home, a typical distribution of roles is maintained, with a higher proportion of shopping activities among women and a higher proportion of occupational or leisure activities among men.

Taking all the transport modes necessary for a trip into account, walking is of basic importance in all the age groups concerned. As people grow older, this most natural form of locomotion is increasingly predominant and is the most frequent transport mode among the over-eighties.

The changes in trip distances and the record of daily activities, which are conspicuous precisely in the upper age groups, tally with the population trends in such groups: in particular, the growing proportions of women and single persons in the older age population are responsible for the observed time pattern of the activities carried out and the increasing sensitivity to distance.

Many of these developments, particularly in the upper age groups, are similar to the mobility patterns of people with mobility handicaps and those living at home who are in need of assistance and care. In this case too, the share of mobility outside the home is comparatively low, which is, however, offset by a high number of activities (compared with non-disabled persons who have the same sociodemographic characteristics) where those concerned are mobile (Table 16a). People with mobility handicaps also have long periods at home, although they require quite some time when using transport, so that their actual transport time is close on the general average. As in the case of older people, those with mobility handicaps account for the highest proportion of trips on foot of all the categories concerned[4]. In their case, the use of public transport is also very high (Table 16b).

4. CAR USE

The general focus on the car as a means of locomotion partly obstructs the view of the real possibilities of its use. Although overall a high proportion of the population are licence holders and car owners, the differences among the various age groups are considerable. Apart from the group of minors, who as a rule can be included in private car transport only as passengers, many older people are excluded from this individual means of locomotion, whether because the driving licence can no longer be used for health reasons or because, for financial reasons, it is no longer possible or worthwhile to own a car. Overall, almost four-fifths of adults of working age have a driving licence (Table 17) and nine-tenths of adults have a possibility of using their own household car either as a driver or passenger. At pensionable age, the number of driving licence holders as well as car owners declines. While four-fifths of those aged 60-64 still have a possibility of using their household car, the proportion decreases continuously among higher age groups. Of those aged 80 and over, fewer than a third have the possibility of driving a car or being driven by a member of the household.

In the breakdown by age group of the actual use of a household car, the most striking result is the very high use of cars by young car owners, who account for almost three-quarters of all trips with their own cars (Table 18b). This extreme use of the car gradually declines (Table 18c). Older car owners (Table 18d) still make slightly more than half their daily trips with their own cars, with walking accounting for almost a third. The proportions are similar for people with a driving licence and a household car, with the number of trips being evenly split between journeys as drivers and passengers. Among older people who have neither a driving licence nor the possibility in their own household of being a car passenger, most trips are on foot and a third of them via public transport. These values scarcely differ from car use by older people who do have a driving licence but not the use of a car.

5. MOBILITY IN AN EAST-WEST COMPARISON

Even ten years after Germany's unification, there are still considerable differences between the old and new *Länder* and, starting with demographic characteristics, they apply to practically all spheres of life, including mobility.

We shall therefore compare the present conditions by firstly discussing in each case the situation in Germany as a whole before going into the differences between the old and new *Länder*.

On an average day in 1997 (Table 19a), altogether 79 per cent of the population went out at least once. The number of outings was 1.3 per capita, 1.7 activities were carried out and three trips were made for this purpose. The breakdown by three age groups again shows the decreases in all the values, which have already been frequently stated, characteristic of older people. In the east-west comparison (Table 19b), the proportion of the eastern German population who go out is somewhat higher than in western Germany. This does not apply, however, to the older group for whom the proportion is identical, although mobile individuals among eastern German senior citizens have higher mobility values than their western German counterparts. What is striking is the high trip times among all eastern German age groups, even when trip distances are the same or lower than in western Germany. This points to differences in modal choice.

The proportion of trips on foot in the new *Länder* is thus higher than in the old *Länder* (Tables 20a/b), especially in the group aged up to 29 and among senior citizens. The use of a car as a driver is, accordingly, a third lower among eastern German senior citizens than among their opposite numbers in western Germany. Only the use of local public transport is identical, with about a tenth in all and just under a sixth among older people.

A comparison of activities (Tables 21a/b) shows no differences to speak of between the old and new *Länder*.

At this point, a few more details should be given on the various activities: while the trips involving work, official duties, business and education/training related to the total population amount to a good third of daily trips, these activities count for only very little in older people's mobility (Table 22a), whereas the proportion of activities involving basic needs among older people is very much higher than in the total population (Table 22b). In each case, shopping for food and shopping in general account for about a third of older people's activities involving basic needs; this corresponds roughly to the figure for the total population. If, however, the older people's degree of activity is again related to that for the total population, it can be seen that the proportions of the older group who go shopping every day are lower than in the 30-64 age bracket. But medical care accounts for a higher proportion among older people than in the total population. As far as leisure activities are concerned (Table 22c), general leisure activities, private contacts and sports activities have a less important place among senior citizens, while more emphasis is given to church-going and visits to cemeteries, hobbies and, in particular, relaxation.

6. TRANSPORT PLANNING AND POLICY: OLDER PEOPLE'S ATTITUDES AND POSSIBILITIES OF BEHAVIOURAL CHANGES

The Germans undoubtedly consider that road traffic has increased in recent years; only a few of them see this as a positive development (15 out of 85 per cent). This view is even more pronounced among older people than in the lower age brackets (Table 23).

Only just under every fourth German (24 per cent) classifies the consequences of road traffic as (still) "quite tolerable". Every eighth (16 per cent) now sees them as "no longer tolerable", while the majority (60 per cent) consider them to be "less tolerable". This critical view is similar among all age groups; among older people, the proportion of those who consider that road traffic is no longer tolerable rises to about a fifth.

In order to understand this assessment, it must be remembered that daily travel time ("active mobility") amounts to only about an hour, so that the duration of "passive mobility" is 23 times greater.

In this period of passive mobility, the public is exposed to the increasingly disturbing and apparent effects of traffic; these effects are almost exclusively attributable to private car traffic.

Against this backdrop, it is understandable that the German public should expect the transport planning and policy authorities to no longer focus on car users' interests, but to boost increasingly environment-friendly transport modes (walking, cycling, public transport) (Table 25). Here again, the passive mobility outlook is decisive. Only a little more than a quarter of Germans (27 per cent) expect the

transport planning and policy authorities to produce solutions based on the private car, while the vast majority (73 per cent) expect them to focus on environment-friendly modes. The priority attached to these modes is even more pronounced among older people.

Three-quarters of the population expect further growth in road traffic in the future (up to 2010); almost all (68 of 75 per cent) take a negative view of this (expected) trend (Table 26). This view is, to a large extent, shared by the younger and older age groups. The development of public transport would, however, be unanimously welcome. Older people in particular want greater emphasis on local public transport in the future (Table 27).

In 1997, the Germans performed 45 per cent of their trips on environment-friendly modes (walking, cycling, public transport) and 55 per cent in private vehicles (Table 28). Older people in particular attach special importance to environment-friendly modes which are preferred by two-thirds of people aged over 65.

In all, just under half the trips on environment-friendly modes (20 out of 45 per cent) could in principle be transferred to private vehicles (Table 29). Conversely, an environment-friendly mode could be used for well over half of all private vehicle trips (31 out of 55 per cent). Looking at the picture in relation to age, it can be seen that older people are, to a large extent, identified with environment-friendly modes, which are essential for a good half of their trips and keep them mobile.

7. CHANGES IN MOBILITY BEHAVIOUR PATTERNS OVER TIME

Two major data sources for the years 1982 and 1997 have been used to analyse the changes in mobility over time within and between groups of people. Since only data from the old *Länder* were available for 1982, comparable data were used from the 1997 source.

A general comparison for the total population at the time in the last 15 years shows a slight increase in trips per individual and day (from 2.9 to 3). This increase is attributable only to a higher share of mobility outside the home and a higher number of outings. The mobility behaviour of mobile persons, however, has not changed (Table 30a).

There are interesting shifts in the type of activities outside the home. The proportion of required activities involving work and education/training as well as the proportion of leisure activities are thus down, whereas all three activities involving basic needs (shopping, use of services such as the Post Office or medical care and accompanying others) are up (Table 30b).

The changes in modal choice are even clearer: the proportion of trips with a self-driven car is up from 38 to 46 percentage points as compared with an increase in car passengers from 10 to 13 percentage points. This rise is to the detriment of all other transport modes and reduces the share of environment-friendly modes (walking, cycling, public transport), which were still used for half of all trips in 1982, to 44 per cent (Table 30c).

A cohort analysis was carried out so that these changes could be studied more accurately. In keeping with the time interval between the two surveys, cohorts covering in each case 15 years were defined, starting with cohort A (15 to 29 years inclusive) and ending with cohort E (75 years and above).

A separate review of the cohorts for the years 1982 and 1997 firstly shows a similar trend in mobility indicators for both reference years: the already above-average mobility in cohorts A goes on rising in cohorts B and then declines continuously; in both years the two "old-age cohorts" lie slightly (cohort D) or far (cohort E) below the figure for the total population. In both these cohorts the relatively stable parameters "share of mobility outside the home", "trip time per person and day" and "distance per person and day" show marked decreases -- especially in cohorts E (Tables 31a, b).

These changes and preferences shown by a cohort analysis become still clearer if the analysis is limited to a single parameter. The number of trips per person and day can be used for this purpose; this value is again shown in absolute and index form in Tables 31c and 31d (the index base is the 1982 total; this value -- 2.9 -- is taken as equal to 100). It can be seen that the slight overall increase in mobility (0.1 trip per person and day) remains unchanged in cohorts A and B, whereas this increase is doubled in cohorts C and D. In other words, cohort B (aged 30-44 inclusive) would have had to "expect" in 1982 a decrease in its mobility from 3.4 to 2.9 trips per person/day, and in 1997 a value of 3 could have been expected for the overall increase in mobility. But the actual value is 3.1 (C 97). The same trends are seen in the transition from cohort C 82 to cohort D 97. This means that in the last 15 years the increase in mobility in the 45-74 age bracket has been above average. However, this growth is again lost as from age 75; the indicators for cohorts E 82 and E 97 are even the same; the slight increase in mobility does not persist among the oldest (Table 31c). A finer breakdown of the age cohorts focuses the above-average increase in mobility even more sharply on the 50-64 age group (Table 31d).

It is therefore possible to proceed from the fact that the over-fifties become more mobile, are able to maintain this increased mobility only up to about age 65 and, as from age 75, go back down to the mobility level of the same age group at the start of the 1980s.

The activities carried out in the course of everyday mobility are subject to marked change: the proportion of required activities rises in cohorts B and C, and falls sharply in cohorts D and E; but the trend in activities involving basic needs and leisure run in roughly the opposite direction (Tables 32a/b). It must, however, be remembered that the trend in mobility and therefore the marked decline in mobility as people grow older are not reflected by such percentages.

Therefore, the (grouped) activities in Table 32c are again index-based. (Index 52 for cohorts E 82 and E 97 means, for example, that in both cases mobility is roughly only half that of the total value for 1982.) It can already be seen, with the move from cohort A 82 to B 97, that the increase in the proportion of activities involving basic needs is above average: instead of rising by about a third -- as could be expected from B 82 -- it is up by over two-thirds and therefore by much more than mobility as a whole. This higher proportion of activities involving basic needs is maintained in cohorts C 97 and D 97, and in these cases simply explains the higher overall mobility; and it persists, albeit at a lower level, in cohort E 97, where the higher share of activities involving basic needs is even to the detriment of leisure activities.

A more detailed analysis of cohorts C and D shows that this shift to more activities involving basic needs is a general trend and that leisure activities as from age 65 are affected (adversely) by this change.

It can therefore be asked whether the observed growth in mobility in cohorts C and D invariably means an advantageous extension to the range of personal activities or whether it is not also due to the greater constraints connected with everyday needs.

The comparisons over time at the start of this chapter already showed that the greatest changes concerned modal choice. These changes are also reflected in the cohort analysis. The high increase in car use among middle-aged people and the high proportions of trips by public transport and, in particular, on foot in the higher age brackets are particularly striking (Tables 33a/b).

In the index analysis -- which was also carried out in this case -- the transport modes were again grouped under environment-friendly modes (EFM = walking, cycling, public transport) and motorised private transport (MPT = car as driver or passenger, motorcycles).

It can be seen that the marked increase in MPT exceeds the general rise in mobility (Table 33c) and that the change from a majority use of EFM to MPT no longer takes place in the second half of the sixtieth but in that of the seventieth decade.

However, the fact should not be overlooked that as from age 60 roughly half, from age 70 two-thirds and from age 80 four-fifths of all trips are still made on environment-friendly modes; and it is to be expected that there will be little change in these proportions, particularly in the upper age bracket. It should be rather the contrary: the talk in many countries about medical and psychological tests for elderly licence holders, the increase in single senior-citizen households (with no possibility of being a passenger) and the many kinds of scenarios for the taxation of private vehicle traffic suggest that environment-friendly transport will remain important for older people.

8. SYNOPSIS

Future developments will also depend on the demographic trend in the last few decades: the number of older and in particular very old people will rise further, in absolute and relative terms, with a continuing surplus of women especially in the latter group. A review of older people's living conditions shows the increasing proportions of older people, mostly women, who live alone. Since (fortunately) general life expectancy will rise further, this final period of life is increasingly longer and its organisation will become increasingly important for the individual.

The ability to be mobile is a central aspect of life and the basis for an independent way of life. A review of important parameters in mobility behaviour as people grow old points to many changes: the end of occupational activity results in a general decline in mobility as the trips that were necessary during working life are not fully replaced by other activities. At the same time, the proportion of car trips changes, the environment-friendly modes are increasingly used and the proportion of journeys on foot rises. The observed changes are more pronounced among women than men. But while the under-average participation rate in mobility outside the home and the decrease in journey lengths do not emerge until the period of old age, differences in modal choice can already be seen among those of working age: women use environment-friendly modes considerably more than men, and they keep much less to their own private car.

The developments described above become more pronounced in later life. Mobility decreases substantially, particularly among very old people, although mobile persons in this age group still have a considerable routine programme of activities and trips, for which they increasingly use environment-friendly modes, particularly walking. This trend is accompanied by a decrease in the activity radius and the importance of the short-distance sector rises as people grow older.

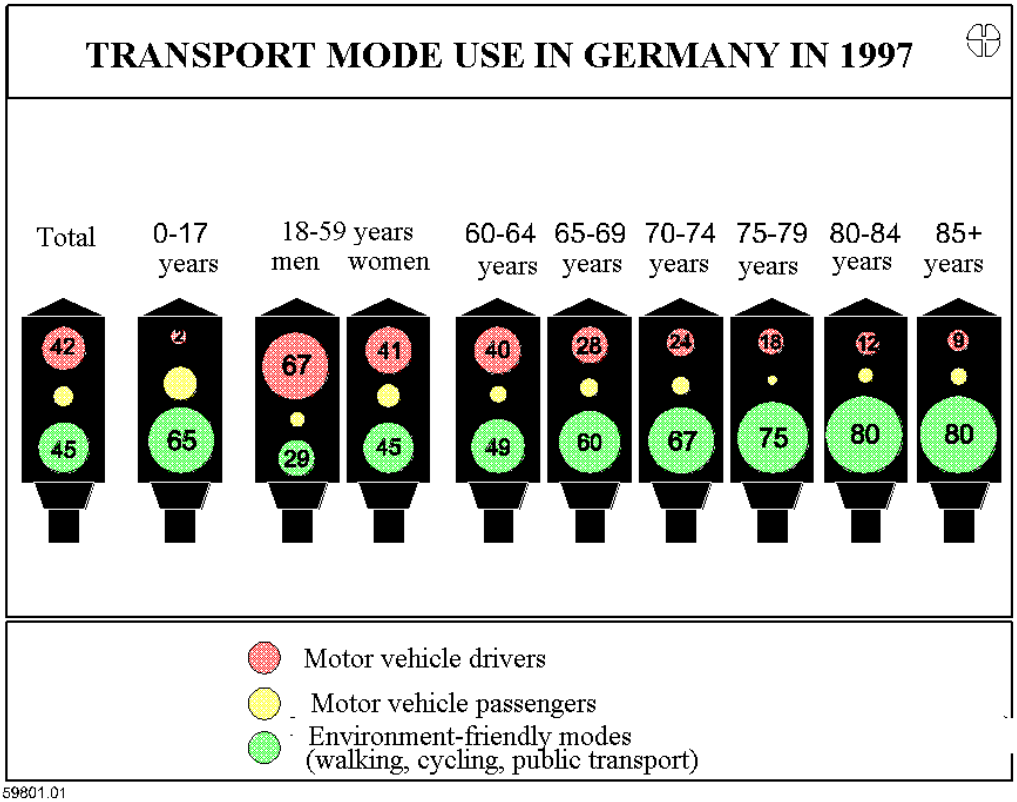
In the developments described, parallels can be frequently drawn with the mobility behaviour patterns of the handicapped and those in need of care, and the similarities are to be seen particularly in the upper age bracket.

The greatest changes affecting older people's mobility behaviour patterns concern modal choice. While the use of private cars declines with age and is no longer a decisive mode, particularly in the case of older women, the importance of walking increases sharply. Irrespective of the fact that practically every trip necessarily involves some walking, this means of locomotion is frequently the only remaining one when other transport modes can no longer be used for age reasons.

This underlines the need to enhance the place of walking as a transport mode, to associate pedestrian facilities more closely with transport infrastructure and to ensure that this infrastructure is completely free of obstacles.

Public transport should also be further developed, especially -- considering the spatially wider spread of the elderly population -- in the outlying areas of towns and around towns where public transport services are still frequently not good enough. Better local public transport would also be consistent with what older people expect of future transport planning activity. The cohort evaluation has also shown that the transfer from private vehicle transport to environment-friendly modes is also to be expected of future generations of the elderly (albeit at a somewhat higher age than previously).

These findings require not only an adjustment in transport planning and policy but, more importantly, a change in the attitude of the authorities concerned. That the latter -- mostly men - mainly associate their own mobility with driving is clearly shown by the figure below.



These transport mode categories show the modal choice of various age brackets grouped under car and motorcycle drivers and under users of environment-friendly transport modes (walking, cycling, public transport). While the total population uses the car and environment-friendly modes to roughly the same extent, the 18-59 male age group is marked, as already stated, by the predominance of the motor vehicle. The modal choice of women of the same age and of the not so old is similar to that of the total population, while older people increasingly opt for environment-friendly modes, as does the group comprising children and young people. A further conclusion can be drawn from this finding, which is that measures facilitating the use of transport by older people are also consistent with the interests of this last-mentioned group.

If transport is to be developed in a way that is to the benefit of a growing proportion of the population, there must first of all be a change of perception in the minds of planners and policymakers. They should not let their decisions be guided by their own behaviour, but base themselves on current realities. Not the least justification for this will be the realisation that they themselves will subsequently benefit from an environmentally compatible form of development once they reach old age: and living to an old age is something almost everybody wants.

NOTES

1. See Table 1-3 for the basic demographic data for the groups concerned.

2. Parts of a trip involving different transport modes.

3. Only “private everday transport” is included in this analysis. Business transport, holiday transport and all trips to destinations at a distance exceeding 100 km are excluded.

4. In this case, those with mobility handicaps, a control group with similar sociodemographic characteristics, and the total population.

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ANNEX

LIST OF TABLES

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EXPLANATORY NOTES

The following list explains the terms used in the tables.

ACTIVITY	Doing something at a destination outside the home.
OUTING	Leaving one's home to carry out one or more activities.
STAGE	Part of a trip identified by the transport mode used. A trip may therefore consist of several stages (in locomotion). In addition, stages involving waiting or connections are also to be taken into account.
MOBILE PERSONS	Mobile persons who make at least one trip on the survey reporting day.
PERSONS	All the (private) household members included in the survey. The behaviour data therefore refer to all persons from age 0.
DAY	The survey days cover all weekdays and reflect an average day in the year.
TRANSPORT MODES	The means of locomotion used for a trip; in principle, a number of transport modes can be used for a trip. If more than one transport mode is used, a "main transport mode" is selected; the selection is based on the order of priority between public transport, motorised private transport (cars, two-wheelers) and non-motorised transport (cycling, walking).
TRANSPORT MODE	Use of the particular "main transport mode" on the reporting day.
USE	As soon as somebody uses a particular transport mode, he or she belongs to the corresponding user group. If somebody uses various transport modes on the reporting day, he or she also belongs to several user groups.
TRIP	Change of location due to an activity at a destination outside the home. More than one transport mode can therefore be used for a trip.
DATA	The results are "seasonally adjusted" and weighted socio-demographically, and are also adjusted for the non-response.
VALIDATION	Effect and for non-reported trips.

BASE OVERVIEW

	TOTAL	UNDER 6 YEARS	IN EDUCATION/ TRAINING PHASE				ECONOMICALLY ACTIVE			
							SINGLE		WITH PARTNER NO CHILDREN	
			UP TO 18 YEARS MALE	UP TO 18 YEARS FEMALE	18 YEARS AND OVER MALE	18 YEARS AND OVER FEMALE	MALE	FEMALE	MALE	FEMALE
PERSONS	235 920	14 155	15 570	14 155	9 909	8 257	6 370	5 898	35 388	27 131
TRIPS	706 760	32 799	42 290	38 560	32 899	25 779	24 917	21 980	120 912	87 548

PER PERSON/DAY	ACTIVE		HOUSEWIVES UP TO 60		NON-ACTIVE				
	WITH PARTNER + CHILD								
	MALE	FEMALE	NO CHILD	WITH CHILD	MEN UP TO 60	60 – 69 MALE	60 – 69 FEMALE	70 AND OVER MALE	70 AND OVER FEMALE
PERSONS	14 174	7 539	13 441	8 257	5 660	11 560	12 977	8 257	17 222
TRIPS	52 620	29 591	37 896	31 656	16 500	34 680	30 087	18 301	27 745

BASE OVERVIEW

	TOTAL	UP TO 17 YEARS	18-59 YEARS	60-64 YEARS	65-69 YEARS	70-74 YEARS	75-79 YEARS	80-84 YEARS	85 YEARS AND OVER
PERSONS	235 920	44 768	140 550	12 974	11 795	10 145	6 252	5 426	4 010
TRIPS	706 760	116 497	478 275	36 518	29 795	22 518	11 854	7 542	3 761

Table 1. **AGE GROUPS – GERMANY, 1995**

	TOTAL	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Male	48.7	51.3	51.1	48.7	45.0	36.1	32.6	28.8	24.3
Female	51.3	48.7	48.9	51.3	55.0	63.9	67.4	71.2	75.7
TOTAL	100	100	100	100	100	100	100	100	100
Share	*100*	*19.4*	*59.6*	*5.5*	*4.9*	*4.2*	*2.4*	*2.3*	*1.7*

Source: *Statistisches Bundesamt, 1997*.

Table 2. **AGE GROUPS – OLD/NEW *LÄNDER* , 1995**

		OLD *LÄNDER*			NEW *LÄNDER*		
	TOTAL	UP TO 29 YEARS %	30 – 64 YEARS %	65 YEARS AND OVER %	0 – 29 YEARS %	30 – 64 YEARS %	65 YEARS AND OVER %
Male	48.7	51.3	58.0	36.4	52.1	50.4	33.9
Female	51.3	48.7	42.0	63.6	47.9	49.6	66.1
TOTAL	100	100	100	100	100	100	100
Share	*100*	*29.5*	*40.3*	*13.0*	*6.0*	*8.6*	*2.6*

Source: *Statistisches Bundesamt, 1997*.

Table 3. A**GE GROUPS – OLD *LÄNDER***

	1982				1995			
	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %	TOTAL %	0 - 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Male	47.8	51.4	48.8	35.2	48.7	51.3	50.8	36.4
Female	52.2	48.6	51.2	64.8	51.3	48.7	49.2	63.6
TOTAL	100	100	100	100	100	100	100	100
Share	*100*	*40.7*	*44.3*	*15*	*100*	*35.6*	*48.7*	*15.7*

Source: *Statistisches Bundesamt 1984*, 1997.

Table 4. **HOUSEHOLD STRUCTURE OF OLDER PEOPLE – GERMANY 1991 –**
– SHARES BY GENDER AND AGE (AS %) –

Households	FROM AGE 60			60 – 64 YEARS			65 – 69 YEARS			70 – 74 YEARS			75 YEARS AND OVER		
	Total	m	f	Total	m	f	Total	m	f	Total	m	f	Total	m	f
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
With 1 member	34	14	47	17	10	24	27	10	38	38	13	53	53	24	67
With 2 members	52	68	42	61	64	58	60	73	52	53	76	40	37	66	23
With 3 members	9	12	7	15	18	13	9	12	7	6	8	4	5	6	5
With 4 and more members	5	6	4	7	8	5	4	5	3	3	3	3	5	4	5
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Bundesministerium für Familie und Senioren, 1994.

Table 5a. **MOBILITY INDICATORS BY LIFE-CYCLE GROUP**
– GERMANY, 1997 –

Per person/day	TOTAL %	UNDER 6 YEARS %	IN EDUCATION/TRAINING PHASE				ECONOMICALLY ACTIVE			
							SINGLE		WITH PARTNER NO CHILDREN	
			UP TO 18 YEARS MALE %	UP TO 18 YEARS FEMALE %	18 YEARS AND OVER MALE %	18 YEARS AND OVER FEMALE %	MALE %	FEMALE %	MALE %	FEMALE %
Mobility outside home (% share)	79	71	85	83	82	81	90	90	85	85
MOBILE PERSONS:										
- Activities	2.2	1.8	1.7	1.7	2.4	2.2	2.7	2.5	2.4	2.2
- Outings	1.6	1.5	1.5	1.5	1.6	1.6	1.7	1.6	1.6	1.5
- Trips	3.8	3.3	3.2	3.2	4.0	3.8	4.4	4.1	4.0	3.7
- Stages	7.1	5.5	4.8	5.1	8.0	7.7	9.0	10.2	8.5	7.3
ALL PERSONS:										
- Activities	1.7	1.3	1.4	1.4	1.9	1.8	2.4	2.3	2.0	1.8
- Outings	1.3	1.0	1.3	1.3	1.4	1.3	1.5	1.4	1.4	1.4
- Trips	3.0	2.3	2.7	2.7	3.3	3.1	3.9	3.7	3.4	3.2
- Stages	5.6	3.9	4.1	4.2	6.6	6.2	8.1	9.2	7.2	6.2

Table 5b. **MOBILITY INDICATORS BY LIFE-CYCLE GROUP – GERMANY, 1997 –**

Per person/day	ECONOMICALLY ACTIVE WITH PARTNER + CHILD		HOUSEWIVES UP TO 60		NON-ACTIVE				
	MALE %	FEMALE %	CHILDLESS %	WITH CHILD %	MEN UP TO 60 %	60 – 69 MALE %	60 – 69 FEMALE %	70 AND OVER MALE %	70 AND OVER FEMALE %
Mobility outside home (% share)	87	86	75	82	72	75	68	62	51
MOBILE PERSONS:									1.7
- Activities	2.5	2.6	2.1	2.6	2.3	2.2	1.9	2.0	1.4
- Outings	1.8	1.9	1.7	2.0	1.7	1.8	1.5	1.6	3.1
- Trips	4.3	4.5	3.8	4.6	4.0	4.0	3.4	3.6	4.9
- Stages	9.0	8.7	6.5	8.1	7.5	6.9	5.6	6.0	
ALL PERSONS:									0.9
- Activities	2.2	2.3	1.6	2.2	1.6	1.7	1.3	1.2	0.7
- Outings	1.5	1.6	1.2	1.6	1.3	1.3	1.0	1.0	1.6
- Trips	3.7	3.9	2.8	3.8	2.9	3.0	2.3	2.2	2.5
- Stages	7.8	7.5	4.9	6.6	5.4	5.2	3.8	3.7	

Table 5c: **TIME BUDGET BY LIFE-CYCLE GROUP**
– Germany, 1997 –

			IN EDUCATION/TRAINING PHASE				ECONOMICALLY ACTIVE			
							SINGLE		WITH PARTNER NO CHILDREN	
Per person/day	TOTAL	UNDER 6 YEARS	UP TO 18 YEARS MALE	UP TO 18 YEARS FEMALE	18 YRS AND OVER MALE	18 YRS AND OVER FEMALE	MALE	FEMALE	MALE	FEMALE
Time at home	18 h 15	20 h 32	18 h 48	18 h 50	16 h 16	16 h 53	11 h 56	13 h 26	16 h 04	17 h 12
Time on transport	1 h 03	0 h 38	0 h 52	0 h 52	1 h 13	1 h 11	1 h 29	1 h 17	1 h 18	1 h 08
Time at destinations	4 h 42	2 h 50	4 h 20	4 h 18	6 h 31	5 h 56	10 h 35	9 h 17	6 h 38	5 h 40
Distance (km)	22	11	13	13	29	25	38	26	36	26

Table 5d. **TIME BUDGET BY LIFE-CYCLE GROUP**
– Germany 1997 –

Per person/day	ECONOMICALLY ACTIVE WITH PARTNER + CHILD		HOUSEWIVES UP TO 60		NON-ACTIVE				
	MALE	FEMALE	CHILDLESS	WITH CHILD	MEN UP TO 60	60 – 69 MALE	60 – 69 FEMALE	70 AND OVER MALE	70 AND OVER FEMALE
Time at home	15 h 50	17 h 57	20 h 20	20 h 38	20 h 20	20 h 26	21 h 12	21 h 21	22 h 01
Time on transport	1 h 16	1 h 08	0 h 54	0 h 59	1 h 00	1 h 06	0 h 50	0 h 50	0 h 36
Time at destination	6 h 54	4 h 55	2 h 46	2 h 23	2 h 40	2 h 28	1 h 58	1 h 49	1 h 23
Distance (km)	38	24	16	18	19	18	12	11	6

Table 6a. **ACTIVITIES BY LIFE-CYCLE GROUP**
– Germany, 1997 –

	TOTAL %	UNDER 6 YEARS (%)	IN EDUCATION/TRAINING PHASE				ECONOMICALLY ACTIVE			
							SINGLE		WITH PARTNER NO CHILDREN	
			UP TO 18 YEARS MALE %	UP TO 18 YEARS FEMALE %	18 YEARS AND OLDER MALE %	18 YEARS AND OLDER FEMALE %	MALE %	FEMALE %	MALE %	FEMALE %
Work	19	-	1	1	10	9	31	31	35	35
Duties/business	7	-	0*	0*	4	3	15	6	17	6
Education/training	8	23	42	44	24	25	1	1	1	1
Shopping	26	28	11	13	17	20	20	25	17	27
Use of services	6	6	3	3	4	5	4	5	4	5
Accompanying others**	4	8	1	1	2	2	1	3	2	2
Leisure	30	35	42	38	39	36	28	29	24	24
TOTAL	100	100	100	100	100	100	100	100	100	100

* under 0.5 %
** taking/fetching them somewhere

Table 6b. **ACTIVITIES BY LIFE-CYCLE GROUP**
– Germany 1997 –

	ECONOMICALLY ACTIVE		HOUSEWIVES UP TO 60		NON-ACTIVE				
	WITH PARTNER + CHILD								
	MALE %	FEMALE %	CHILDLESS %	WITH CHILD %	MEN UP TO 60 %	60 – 69 MALE %	60 – 69 FEMALE %	70 AND OVER MALE %	70 AND OVER FEMALE %
Work	34	25	4	2	5	2	1	1	0*
Duties/business	16	4	2	1	5	5	1	3	1
Education/training	1	1	1	2	2	-	-	-	-
Shopping	17	25	47	38	35	42	48	45	49
Use of services	4	5	10	8	13	13	12	13	15
Accompanying others**	6	18	4	22	5	2	2	1	0*
Leisure	22	22	32	27	35	36	36	37	35
TOTAL	100	100	100	100	100	100	100	100	100

* Under 0.5 %.
** Taking them to/fetching them from somewhere.

Table 7a. **MODAL CHOICE BY LIFE-CYCLE GROUP**
– Main transport mode used – Germany 1997 –

	TOTAL	UNDER 6 YEARS	IN EDUCATION/TRAINING PHASE				ECONOMICALLY ACTIVE			
							SINGLE		WITH PARTNER NO CHILDREN	
	%	%	UP TO 18 YRS MALE %	UP TO 18 YRS FEMALE %	18 YRS AND OVER MALE %	18 YRS AND OVER FEMALE %	MALE %	FEMALE %	MALE %	FEMALE %
Walking	24	35	37	37	15	17	19	23	12	19
Cycling	10	7	21	18	14	14	9	10	6	8
Mot. two-wheeler	1	-	3	1	4	2	1	-	1	0*
Car as driver	41	-	0*	0*	44	34	58	47	70	43
Car as passenger - household car	10	52	18	20	4	5	0*	0*	2	14
Car as passenger - non-household car	3	3	5	5	4	7	3	4	2	3
Public transport	11	3	16	19	15	21	10	16	7	13
TOTAL	100	100	100	100	100	100	100	100	100	100

* Under 0.5%.

Table 7b. **MODAL CHOICE BY LIFE-CYCLE GROUP**
– Main transport mode used – Germany 1997 –

	ECONOMICALLY ACTIVE WITH PARTNER + CHILD		HOUSEWIVES UP TO 60		NON-ACTIVE				
	MALE %	FEMALE %	CHILDLESS %	WITH CHILD %	MEN UP TO 60 %	60 – 69 MALE %	60 – 69 FEMALE %	70 AND OVER MALE %	70 AND OVER FEMALE %
Walking	11	19	31	31	24	31	38	39	50
Cycling	6	9	11	9	9	10	11	9	7
Mot. two-wheeler	2	0*	0*	0*	1	1	0*	0*	-
Car as driver	72	51	29	42	53	46	16	35	8
Car as passenger - household car	2	12	16	12	3	2	18	2	8
Car as passenger - non-household car	2	2	3	2	1	1	2	2	4
Public transport	5	7	10	4	9	9	15	13	23
TOTAL	100	100	100	100	100	100	100	100	100

* Under 0.5%.

Table 8a. **TRANSPORT MODE USE BY LIFE-CYCLE GROUP**
– Main transport mode used – Germany 1997 –

	TOTAL %	UNDER 6 YEARS %	IN EDUCATION/TRAINING PHASE				ECOMICALLY ACTIVE			
							SINGLE		WITH PARTNER NO CHILDREN	
			UP TO 18 YEARS MALE %	UP TO 18 YEARS FEMALE %	18 YEARS AND OVER MALE %	18 YEARS AND OVER FEMALE %	MALE %	FEMALE %	MALE %	FEMALE %
No outings	21	29	15	17	18	19	10	10	15	15
Walking	27	33	40	40	19	23	27	31	17	24
Cycling	14	10	28	24	21	19	15	16	11	13
Mot. two-wheeler	1	-	2	1	3	1	1	0*	1	0*
Car as driver	33	-	0*	0*	38	30	57	47	64	38
Car as passenger	15	44	25	27	11	17	6	7	6	21
Public transport	17	3	23	25	26	33	21	29	12	21
TOTAL (multiple answers)	128	119	133	134	136	142	137	140	126	132

* Under 0.5%.

Table 8b. **TRANSPORT MODE USE BY LIFE-CYCLE GROUP**
– Main transport mode used – Germany 1997 –

	WITH PARTNER + CHILD		HOUSEWIVES UP TO 60		NON-ACTIVE				
	MALE	FEMALE	CHILDLESS	WITH CHILD	MEN UP TO 60	60 – 69 MALE	60 – 69 FEMALE	70 AND OVER MALE	70 AND OVER FEMALE
	%	%	%	%	%	%	%	%	%
No outings	13	14	25	18	28	25	32	38	49
Walking	17	28	31	37	26	32	32	31	29
Cycling	11	16	16	15	13	14	13	10	6
Mot. two-wheeler	2	0*	0*	0*	1	0*	0*	0*	-
Car as driver	67	46	22	36	38	39	11	23	4
Car as passenger	7	20	19	19	6	4	18	4	8
Public transport	9	13	14	8	12	12	16	14	18
TOTAL (multiple answers)	126	137	127	133	124	126	122	120	114

* Under 0.5%.

Table 9a. **MOBILITY INDICATORS BY AGE GROUP – Germany 1997 –**

Per person/day	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Mobility outside home (% share)	79	80	84	75	70	63	58	47	33
MOBILE PERSONS:									
- activities	2.2	1.7	2.4	2.1	2.0	2.0	1.8	1.6	1.4
- outings	1.6	1.5	1.7	1.7	1.6	1.5	1.4	1.4	1.3
- trips	3.8	3.2	4.1	3.8	3.6	3.5	3.2	3.0	2.7
- stages	7.1	5.1	8.1	6.7	6.0	5.8	5.3	4.6	4.2
ALL PERSONS:									
- activities	1.7	1.4	2.0	1.6	1.4	1.2	1.0	0.8	0.5
- outings	1.3	1.2	1.4	1.2	1.1	1.0	0.9	0.6	0.4
- trips	3.0	2.6	3.4	2.8	2.5	2.2	1.9	1.4	0.9
- stages	5.6	4.1	6.7	5.1	4.1	3.7	3.1	2.2	1.4

Table 9b. **TIME BUDGET BY AGE GROUP – Germany 1997 –**

Per person/day	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Time at home	18 h 15	19 h 13	16 h 48	19 h 59	20 h 58	21 h 24	21 h 27	22 h 30	22 h 45
Time on transport	1 h 03	0 h 48	1 h 12	1 h 02	0 h 55	0 h 50	0 h 43	0 h 32	0 h 20
Time at destinations	4 h 42	3 h 59	6 h 00	2 h 59	2 h 07	1 h 46	1 h 50	0 h 58	0 h 55
Distance (km)	22	13	29	19	14	10	8	5	4

Table 9c. **MOBILITY INDICATORS BY AGE GROUP – Germany 1997 –**

	TOTAL %		UP TO 17 YEARS %		18 – 59 YEARS %		60 – 64 YEARS %		65 – 69 YEARS %		70 – 74 YEARS %		75 – 79 YEARS %		80 – 84 YEARS %		85 YEARS AND OVER %	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Mobility outside home (% share)	81	76	80	80	84	83	79	71	74	67	70	60	63	55	58	43	44	29
MOBILE PERSONS:																		
- activities	2.3	2.1	1.7	1.7	2.4	2.3	2.3	1.9	2.2	1.9	2.2	1.8	1.9	1.7	1.6	1.5	1.6	1.3
- outings	1.6	1.6	1.5	1.5	1.7	1.7	1.7	1.5	1.7	1.4	1.7	1.5	1.6	1.3	1.4	1.4	1.4	1.2
- trips	3.9	3.7	3.2	3.2	4.1	4.0	4.0	3.4	3.9	3.3	3.9	3.3	3.5	3.0	3.0	2.9	3.0	2.5
ALL PERSONS:																		
- activities	1.8	1.6	1.4	1.4	2.0	1.9	1.8	1.4	1.6	1.2	1.5	1.1	1.2	0.9	0.9	0.7	0.7	0.4
- outings	1.4	1.2	1.2	1.1	1.5	1.4	1.4	1.0	1.3	1.0	1.2	0.9	1.0	1.8	0.8	0.5	0.6	0.3
- trips	3.2	2.8	2.5	2.5	3.5	3.3	3.2	2.4	2.9	2.2	2.7	2.0	2.2	1.7	1.7	1.2	1.3	0.7
- duration (min)	69	56	48	46	78	65	73	52	63	49	59	46	51	38	41	27	32	15
- distance (km)	27	17	13	12	34	23	24	14	17	11	14	9	11	7	8	4	7	2

Table 10a. **ACTIVITIES BY AGE GROUP – Germany 1997 –**

	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Work	19	1	25	9	3	1	1	1	1
Duties/business	7	0*	10	6	4	2	2	1	1
Education/training	8	37	4	-	-	-	-	-	-
Shopping	26	16	24	38	45	46	47	50	45
Use of services	6	4	5	11	12	15	14	12	10
Accompanying others**	4	3	5	2	1	1	0*	0*	-
Leisure	30	39	27	34	35	35	36	36	43
TOTAL	100	100	100	100	100	100	100	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere

Table 10b. **ACTIVITIES BY AGE GROUP**
– Germany 1997 –

	TOTAL %		UP TO 17 YEARS %		18 – 59 YEARS %		60 – 64 YEARS %		65 – 69 YEARS %		70 – 74 YEARS %		75 – 79 YEARS %		80 – 84 YEARS %		85 YEARS AND OVER %	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Work	22	15	1	1	29	21	13	4	3	1	2	0*	2	0*	1	0*	0*	0*
Duties/business	11	3	0*	0*	14	4	9	2	7	2	4	1	3	1	5	1	0*	-
Education/training	8	8	37	37	4	4	-	-	-	-	-	-	-	-	-	-	-	-
Shopping	21	31	15	18	18	30	33	45	40	49	43	48	44	49	46	52	42	49
Use of services	5	7	4	4	5	6	11	12	12	12	14	15	14	15	10	16	10	11
Accompanying others**	3	6	3	3	3	7	2	2	2	1	2	1	1	0*	0*	0*	-	-
Leisure	30	30	40	37	27	28	32	35	36	35	35	35	36	35	38	31	48	40
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 10c. **ACTIVITIES BY AGE GROUP**
– Germany 1997 –

	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Work	19	1	29	8	2	1	1	0*	0*
Duties/business	7	0*	12	6	3	1	1	0*	0*
Education/training	8	30	5	-	-	-	-	-	-
Shopping	26	13	28	36	37	33	28	24	14
Use of services	6	3	6	10	10	10	8	6	3
Accompanying others**	4	3	6	2	1	1	0*	0*	-
Leisure	30	32	32	32	29	25	21	17	13
TOTAL	100	82	118	94	82	71	59	47	30

* Under 0.5%.
**Taking them to/fetching them from somewhere.

Example for the reader: In this table, the actual ratio of activities performed by one group to the general average is taken into account. For example, the 85+ age bracket performs on average 0.5 activities per person and day, or 30 per cent of the general average of 1.7 activities per day. In this group, shopping accounts for 14 per cent of activities, the use of services for 3 per cent and leisure for 13 per cent.

Table 11a. **MODAL CHOICE BY AGE GROUP**
– Main transport mode used – Germany 1997 –

	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Walking	24	36	18	29	37	41	46	51	52
Cycling	10	16	8	9	10	10	7	6	3
Mot. two-wheeler	1	2	1	1	0*	0*	0*	-	-
Car as driver	41	-	54	39	28	24	18	12	9
Car as passenger - household car	10	28	6	9	10	7	4	4	5
Car as passenger - non-household car	3	5	3	2	2	2	3	4	6
Public transport	11	13	10	11	13	16	22	23	25
TOTAL	100	100	100	100	100	100	100	100	100

* Under 0.5%.

Table 11b. **MODAL CHOICE BY AGE GROUP**
– Main transport mode used – Germany 1997 –

	TOTAL %		UP TO 17 YEARS %		18 – 59 YEARS %		60 – 64 YEARS %		65 – 69 YEARS %		70 – 74 YEARS %		75 – 79 YEARS %		80 – 84 YEARS %		85 YEARS AND OVER %	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Walking	20	28	36	36	14	23	25	33	31	41	35	46	39	51	43	56	50	55
Cycling	9	11	17	16	7	10	8	11	9	10	11	9	7	6	9	4	5	2
Mot. two-wheeler	2	0*	2	1	2	0*	1	0*	0*	0*	0*	-	0*	-	-	-	-	-
Car as driver	52	30	-	-	65	41	55	20	46	14	42	11	35	6	21	6	16	4
Car as passenger - houshold car	6	14	28	28	2	11	2	19	3	16	1	11	2	5	3	4	3	7
Car as passenger - non-household car	2	4	4	5	2	3	1	2	1	3	1	3	2	5	5	4	4	7
Public transport	9	13	13	14	8	12	8	15	10	16	10	20	15	27	19	26	22	25
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* Under 0.5%.

Table 11c. **MODAL CHOICE BY AGE GROUP**
– Main transport mode used – Germany 1997 –

	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Walking	24	31	20	27	31	30	29	24	16
Cycling	10	14	9	9	8	7	4	3	1
Mot. two-wheeler	1	2	1	1	0*	0*	0*	-	-
Car as driver	41	-	61	36	23	18	12	6	3
Car as passenger - household car	10	24	7	8	8	5	2	2	1
Car as passenger - non-household car	3	4	4	2	2	2	2	2	2
Public transport	11	12	11	10	11	11	14	10	7
TOTAL	100	87	113	93	83	73	63	47	30

* Under 0.5%.

Example for the reader: In this table, the actual ratio of the trips made by one group to the general average is taken into account. For example, the 85+ age bracket has an average of 0.9 trips per person and day, or 30 per cent of the general average of three trips per person and day.

Table 12. **MODAL CHOICE BY AGE GROUP**
– Stages by transport mode – Germany 1997 –

	TOTAL	UP TO 17 YEARS	18 – 59 YEARS	60 – 64 YEARS	65 – 69 YEARS	70 – 74 YEARS	75 – 79 YEARS	80 – 84 YEARS	85 YEARS AND OVER
	%	%	%	%	%	%	%	%	%
Walking	109	92	114	104	101	102	103	104	106
Cycling	10	17	9	10	10	10	7	6	3
Mot. two-wheeler	1	2	1	1	0*	0*	0*	-	-
Car as driver	41	-	54	39	28	24	18	12	9
Car as passenger - household car	10	28	6	9	10	7	4	4	6
Car as passenger - non-household car	3	3	3	2	2	2	4	4	5
Public transport	14	15	12	14	16	20	27	28	28
TOTAL	188	157	199	179	167	165	163	158	157

* Under 0.5%.

Example for the reader: On average there are 1.88 stages per trip, with 1.09 of these stages on foot.

Table 13a. **TRANSPORT MODE USE BY AGE GROUP – Main transport mode used –**
– Germany 1997 –

	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
No outings	21	20	16	25	30	37	42	53	67
Walking	27	37	23	30	33	33	31	27	18
Cycling	14	22	14	13	12	10	6	5	1
Mot. two-wheeler	1	1	1	0*	0*	0*	0*	-	-
Car as driver	33	-	47	31	20	15	11	6	3
Car as passenger	15	32	13	12	12	8	6	5	4
Public transport	17	18	17	15	15	17	20	16	12
TOTAL: (Multiple answers)	128	130	131	126	122	120	116	112	105

* Under 0.5%.

Table 13b. **TRANSPORT MODE USE BY AGE GROUP**
– Main transport mode used – Germany 1997 –

	TOTAL		UP TO 17 YEARS		18 – 59 YEARS		60 – 64 YEARS		65 – 69 YEARS		70 – 74 YEARS		75 – 79 YEARS		80 – 84 YEARS		85 YEARS AND OVER	
	%		%		%		%		%		%		%		%		%	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
No outings	19	24	20	20	16	17	21	29	26	33	30	40	37	45	42	57	56	71
Walking	24	30	37	37	19	28	29	30	32	33	33	33	32	31	28	27	24	16
Cycling	14	14	23	21	13	15	13	13	13	12	13	8	8	5	9	3	2	1
Mot. two-wheeler	1	0*	1	0*	2	0*	0*	0*	0*	0*	0*	-	0*	0*	-	-	-	-
Car as driver	43	23	-	-	59	36	48	14	37	9	33	7	24	4	12	3	6	1
Car as passenger	11	19	31	32	7	19	4	19	4	16	2	11	4	7	6	5	4	4
Public transport	14	19	17	18	14	19	13	18	12	17	12	19	15	22	17	15	15	10
TOTAL: (Multiple answers)	126	129	129	128	130	134	128	123	124	120	123	118	120	114	114	110	107	103

*Under 0.5%.

Table 14a. **DAILY RECORD OF ACTIVITIES BY AGE GROUP**
– Germany 1997 –

START OF TRIP	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
5.00 – 8.59 a.m.	17	20	18	13	10	9	8	6	5
9.00 – 11.59 a.m.	21	15	18	35	41	41	46	44	44
12.00 – 2.59 p.m.	20	26	19	19	20	20	19	20	20
3.00 – 6.59 p.m.	31	33	32	26	24	25	24	26	27
After 7 p.m.	11	6	13	7	5	5	3	4	4
TOTAL	100	100	100	100	100	100	100	100	100

Table 14b. **DAILY RECORD OF ACTIVITIES BY AGE GROUP**
– Germany 1997 –

START OF TRIP	**TOTAL**		UP TO 17 **YEARS**		18 – 59 YEARS		60 – 64 YEARS		65 – 69 YEARS		70 – 74 YEARS		75 – 79 YEARS		80 – 84 YEARS		85 YEARS AND OVER	
	%		**%**		**%**		**%**		**%**		**%**		**%**		**%**		**%**	
	m	f	m	f	m	f	m	f	m	f	m	f	m	f	m	f	m	f
5.00 – 8.59 a.m.	18	16	20	20	20	17	15	10	11	9	10	8	8	8	8	6	8	4
9.00 – 11.59 a.m.	20	23	15	15	16	20	32	38	39	43	41	42	47	45	44	44	44	44
12.00 – 2.59 p.m.	19	21	26	26	17	20	19	20	20	20	19	20	18	20	21	19	18	20
3.00 – 6.59 p.m.	31	31	33	33	32	32	26	25	25	23	25	26	23	24	22	28	25	29
After 7 p.m.	12	9	6	6	15	11	8	7	5	5	5	4	4	3	5	3	5	3
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 14c. **DAILY RECORD OF ACTIVITIES BY AGE GROUP – Germany 1997 –**

START OF TRIP	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
5.00 – 8.59 a.m.	17	17	20	12	8	7	5	3	2
9.00 – 11.59 a.m.	21	13	20	33	34	30	29	21	13
12.00 – 2.59 p.m.	20	23	22	18	17	14	12	9	6
3.00 – 6.59 p.m.	31	29	36	24	20	18	15	12	8
After 7 p.m.	11	5	15	6	4	4	2	2	1
TOTAL	100	87	113	93	83	73	63	47	30

Example for the reader: In this table, the actual ratio of trips by one group to the general average is taken into account. For example, the 85+ bracket has an average of 0.9 trips per person and day, or 30 per cent of the general average of three trips per person and day.

Table 15a. **TRIP DISTANCES BY AGE GROUP**
– Germany 1997 –

Distance per trip	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Up to 1 km	27	40	22	30	37	39	41	45	49
1.1 to 3 km	24	27	22	25	26	27	28	28	25
3.1 to 5 km	13	11	14	13	12	12	10	11	9
5.1 to 10 km	16	11	18	16	12	11	11	9	9
10.1 to 100 km	20	11	24	16	13	11	10	7	8
TOTAL	100	100	100	100	100	100	100	100	100
Average distance (km)	7.4	4.8	8.4	6.7	5.4	4.8	4.4	3.9	3.5

Table 15b. **TRIP DISTANCES BY AGE GROUP**
– Germany 1997 –

Distance per trip	TOTAL		UP TO 17 YEARS		18 – 59 YEARS		60 – 64 YEARS		65 – 69 YEARS		70 – 74 YEARS		75 – 79 YEARS		80 – 84 YEARS		85 YEARS AND OVER	
	%		%		%		%		%		%		%		%		%	
	m	f	m	f	m	f	m	f	m	f	m	f	m	f	m	f	m	f
Up to 1 km	22	32	40	39	17	27	25	36	32	41	34	42	36	46	38	50	43	54
1.1 to 3 km	22	25	26	28	21	24	25	24	25	26	28	26	27	29	28	28	25	23
3.1 to 5 km	14	12	12	11	14	14	14	13	14	11	14	11	13	8	14	8	8	10
5.1 to 10 km	18	15	11	12	19	17	17	13	14	11	11	11	13	9	9	9	14	7
10.1 to 100 km	24	16	11	10	29	18	19	14	15	11	13	10	11	8	11	5	10	6
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Average distance (km)	8.6	6.2	4.9	4.7	9.9	6.9	7.4	5.8	5.9	5.0	5.4	4.3	5.1	3.9	5.0	3.3	5.5	3.3

Table 15c. **TRIP DISTANCES BY AGE GROUP**
– Germany 1997 –

Distance per trip	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Up to 1 km	27	34	25	28	31	28	26	21	15
1.1 to 3 km	24	23	25	23	21	20	18	13	7
3.1 to 5 km	13	10	16	12	10	9	6	5	3
5.1 to 10 km	16	10	20	15	10	8	7	4	3
10.1 to 100 km	20	10	27	15	11	8	6	4	2
TOTAL	100	87	113	93	83	73	63	47	30

Example for the reader: In this table, the actual ratio of the trips by one group to the general average is taken into account. For example, the 85+ age bracket has an average of 0.9 trips per person and day, or 30 per cent of the general average of three trips per person.

Table 16a. **MOBILITY INDICATORS FOR PERSONS WITH MOBILITY HANDICAPS - Germans aged 18 and over -– Old *Länder* 1984 –**

Per person/day	TOTAL (PERSONS WITHOUT MOBILITY HANDICAPS)	COMPARABLE PERSONS*	PERSONS WITH MOBILITY HANDICAPS
Mobility outside home (% share)	76	67	60
MOBILE PERSONS:			
- activities	2.2	1.8	1.9
- outings	1.6	1.5	1.5
- trips	3.8	3.3	3.4
ALL PERSONS:			
- activities	1.7	1.2	1.2
- outings	1.2	1.0	0.9
- trips	2.9	2.2	2.1
Time at home	18 h 36	20 h 24	21 h 11
Time on transport	1 h 09	0 h 58	0 h 55
Time at destinations	4 h 15	2 h 38	1 h 54

* Persons with the same sociodemographic characteristics as those with mobility handicaps.

Table 16b. **MODAL CHOICE OF PERSONS WITH MOBILITY HANDICAPS – Germans aged 18 and over – Old *Länder* 1984 –**

	TOTAL (PERSONS WITHOUT MOBILITY HANDICAPS) %	COMPARABLE PERSONS* %	PERSONS WITH MOBILITY HANDICAPS %
Walking	24	36	45
Cycling	9	7	6
Mot. two-wheeler	2	1	0
Car as driver	45	32	19
Car as passenger - household car	6	6	7
Car as passenger - non-household car	3	3	4
Public transport	11	15	19
TOTAL	100	100	100

* Persons with the same sociodemographic characteristics as those with mobility handicaps.

Table 17. **PRIVATE CAR AVAILABILITY BY AGE GROUP**
– Germany 1997 –

	TOTAL %	UP TO 17 YEARS %	18 – 59 YEARS %	60 – 64 YEARS %	65 – 69 YEARS %	70 – 74 YEARS %	75 – 79 YEARS %	80 – 84 YEARS %	85 YEARS AND OVER %
Driving licence and own car	41	-	56	47	36	29	24	14	6
Driving licence and household car	13	-	19	11	9	6	4	2	2
No driving licence, but household car	30	93	15	20	23	19	14	17	23
Driving licence, no household car	4	-	4	4	3	5	6	6	4
No driving licence, no household car	12	7	6	18	29	41	52	61	65
TOTAL	100	100	100	100	100	100	100	100	100

Table 18a. **MODAL CHOICE BY CAR AVAILABILITY**
– Germany 1997 –

	TOTAL					
	TOTAL	DRIVING LICENCE AND OWN CAR	DRIVING LICENCE AND HOUSEHOLD CAR	NO DRIVING LICENCE, BUT HOUSEHOLD CAR	DRIVING LICENCE, NO HOUSEHOLD CAR	NO DRIVING LICENCE, NO HOUSEHOLD CAR
	%	%	%	%	%	%
Walking	24	15	22	34	34	46
Cycling	10	6	11	16	17	14
Mot. two-wheeler	1	1	1	2	2	1
Car as driver	41	69	39	-	14	-
Car as passenger - household car	10	3	13	28	-	-
Car as passenger - non-household car	3	1	3	5	6	7
Public transport	11	5	11	15	27	32
TOTAL	100	100	100	100	100	100

Table 18b. **MODAL CHOICE BY CAR AVAILABILITY**
– Germany 1997 –

	UP TO 29 YEARS					
	TOTAL %	DRIVING LICENCE AND OWN CAR %	DRIVING LICENCE AND HOUSEHOLD CAR %	NO DRIVING LICENCE, BUT HOUSEHOLD CAR %	DRIVING LICENCE, NO HOUSEHOLD CAR %	NO DRIVING LICENCE, NO HOUSEHOLD CAR %
Walking	24	11	17	33	28	41
Cycling	12	5	12	17	19	19
Mot. two-wheeler	2	1	3	2	3	2
Car as driver	29	73	38	-	13	-
Car as passenger - household car	16	3	11	28	-	-
Car as passenger - non-household car	4	2	6	5	8	9
Public transport	13	5	13	15	29	29
TOTAL	100	100	100	100	100	100

Table 18c. **MODAL CHOICE BY CAR AVAILABILITY**
– Germany 1997 –

	30-64 YEARS					
	TOTAL %	DRIVING LICENCE AND OWN CAR %	DRIVING LICENCE AND HOUSEHOLD CAR %	NO DRIVING LICENCE, BUT HOUSEHOLD CAR %	DRIVING LICENCE, NO HOUSEHOLD CAR %	NO DRIVING LICENCE, NO HOUSEHOLD CAR %
Walking	20	15	23	37	35	39
Cycling	8	6	11	15	17	15
Mot. two-wheeler	1	1	1	1	2	2
Car as driver	53	70	40	-	17	-
Car as passenger - household car	7	3	14	26	-	-
Car as passenger - non-household car	2	1	2	4	5	8
Public transport	9	4	9	17	24	36
TOTAL	100	100	100	100	100	100

Table 18d. **MODAL CHOICE BY CAR AVAILABILITY**
– Germany 1997 –

	65 YEARS AND OVER					
	TOTAL %	DRIVING LICENCE AND OWN CAR %	DRIVING LICENCE AND HOUSEHOLD CAR %	NO DRIVING LICENCE, BUT HOUSEHOLD CAR %	DRIVING LICENCE, NO HOUSEHOLD CAR %	NO DRIVING LICENCE, NO HOUSEHOLD CAR %
Walking	41	30	33	44	48	55
Cycling	9	7	9	11	11	10
Mot. two-wheeler	0*	0*	0*	0*	1	0*
Car as driver	23	54	23	-	1	-
Car as passenger - household car	7	2	24	30	-	-
Car as passenger - non-household car	3	1	2	3	4	4
Public transport	17	6	9	12	35	31
TOTAL	100	100	100	100	100	100

* Under 0.5%.

Table 19a. **MOBILITY INDICATORS**
– Germany 1997 –

Per person/day	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Mobility outside home (% share)	79	81	83	60
<u>MOBILE PERSONS</u>				
- Activities	2.2	2.1	2.4	1.9
- Outings	1.6	1.6	1.6	1.5
- Trips	3.8	3.7	4.0	3.4
- Stages	7.1	6.7	7.9	5.6
<u>ALL PERSONS:</u>				
- Activities	1.7	1.7	2.0	1.1
- Outings	1.3	1.3	1.3	0.9
- Trips	3.0	3.0	3.3	2.0
- Stages	5.6	5.5	6.5	3.4
- Duration (Min)	63	60	69	44
- Distance (km)	22	21	27	10

Table 19b. **MOBILITY INDICATORS**
Old/new *Länder* comparison

Per person/day	GERMANY 1997 TOTAL %	OLD *LÄNDER* 1997 TOTAL %	UP TO 29 YEARS %	30- 64 YEARS %	65 YEARS AND OVER %	NEW *LÄNDER* 1997 TOTAL %	UP TO 29 YEARS %	30- 64 YEARS %	65 YEARS AND OVER %
Mobility outside home (% share)	79	79	81	83	60	80	82	84	60
MOBILE PERSONS:									
- activities	2.2	2.2	2.0	2.4	1.8	2.2	1.9	2.4	2.0
- outings	1.6	1.7	1.7	1.6	1.5	1.5	1.5	1.5	1.6
- trips	3.8	3.9	3.7	4.0	3.3	3.7	3.4	3.9	3.6
- stages	7.1	7.2	6.9	7.8	5.6	7.0	6.2	7.8	5.7
ALL PERSONS:									
- activities	1.7	1.7	1.6	1.9	1.1	1.7	1.6	2.0	1.2
- outings	1.3	1.3	1.4	1.4	0.9	1.3	1.2	1.3	1.0
- trips	3.0	3.0	3.0	3.3	2.0	3.0	2.8	3.3	2.2
- stages	5.6	5.6	5.6	6.5	3.3	5.6	5.1	6.6	3.4
- duration (min)	63	60	59	67	44	69	60	78	51
- distance (km)	22	22	21	27	10	22	19	27	9

Table 20a. **MODAL CHOICE**
– Main transport mode used – Germany 1997 –

	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Walking	24	24	20	41
Cycling	10	12	8	9
Mot. two-wheeler	1	2	1	0*
Car as driver	41	29	53	23
Car as passenger - household car	10	16	7	7
Car as passenger - non-household car	3	4	2	3
Public transport	11	13	9	17
TOTAL	100	100	100	100

* Under 0.5%.

Table 20b. **MODAL CHOICE**
– Main transport mode used – Old/new *Länder c*omparison

	GERMANY 1997	OLD LÄNDER 1997				NEW LÄNDER 1997			
	TOTAL	TOTAL	UP TO 29 YEARS	30- 64 YEARS	65 YEARS AND OVER	TOTAL	UP TO 29 YEARS	30- 64 YEARS	65 YEARS AND OVER
	%	%	%	%	%	%	%	%	%
Walking	24	23	23	20	41	26	28	21	45
Cycling	10	10	13	8	8	8	10	7	10
Mot. two-wheeler	1	1	2	1	0*	1	2	1	0*
Car as driver	41	42	29	54	24	40	28	51	17
Car as passenger - household car	10	10	15	6	7	12	16	9	9
Car as passenger - non-household car	3	3	5	2	3	2	4	2	2
Public transport	11	11	13	9	17	11	12	9	17
TOTAL	100	100	100	100	100	100	100	100	100

* Under 0.5%.

Table 21a. **ACTIVITIES**
– Germany 1997 –

	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Work	19	13	26	2
Duties/business	7	4	10	3
Education/training	8	22	1	0*
Shopping	26	18	27	46
Use of services	6	4	6	13
Accompanying others**	4	3	5	1
Leisure	30	36	25	35
TOTAL	100	100	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 21b. **ACTIVITIES**
Old/New *Länder* Comparison

	GERMANY 1997	OLD *LÄNDER* 1997				NEW *LÄNDER* 1997			
	TOTAL %	TOTAL %	UP TO 29 YEARS %	30-64 YEARS %	65 YEARS AND OVER %	TOTAL %	UP TO 29 YEARS %	30- 64 YEARS %	65 YEARS AND OVER %
Work	19	19	14	26	2	17	11	24	1
Duties/business	7	7	4	10	3	8	4	12	1
Education/training	8	8	21	1	0*	9	24	1	0*
Shopping	26	26	18	27	46	26	16	28	46
Use of services	6	6	4	6	13	7	4	8	14
Accompanying others**	4	4	3	5	1	4	5	4	1
Leisure	30	30	36	25	35	29	36	23	37
TOTAL	100	100	100	100	100	100	100	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 22a. **DETAILED ACTIVITIES: I. REQUIRED ACTIVITIES**
– Germany 1997 –

	TOTAL	TOTAL BREAKDOWN			"REAL" BREAKDOWN		
	TOTAL	UP TO 29 YEARS	30 - 64 YEARS	65 YEARS AND OVER	UP TO 29 YEARS	30 - 64 YEARS	65 YEARS AND OVER
	%	%	%	%	%	%	%
Work	19	13	25	2	13	30	1
Local duty/business trips	7	4	10	3	4	12	2
Non-local duty/business trips	0*	0*	0*	0*	0*	0*	0*
Education/training	7	18	1	-	18	1	-
Further training	0*	1	0*	-	1	0*	-
Practical training	0*	0*	0*	-	0*	0*	-
Nursery school	1	3	-	-	3	-	-
PART TOTAL	34	39	36	5	39	43	3

* Under 0.5%.

Example for the reader: In the table section to the right, the actual ratio of trips made by one group to the general average is taken into account. For example, the 30-64 age bracket has 1.1 activities per person and day, or 65 per cent of the total of 1.7 activities per person and day.

Table 22b. **DETAILED ACTIVITIES: II. ACTIVITIES MEETING BASIC NEEDS – Germany 1997 –**

	TOTAL	TOTAL BREAKDOWN			"REAL" BREAKDOWN		
	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Shopping in general	12	8	13	21	8	16	13
Food shopping	10	7	11	19	7	13	11
Non-food shopping	1	1	2	1	1	2	1
Food + nf shopping	2	1	2	3	1	2	2
Shopping stroll	0*	0*	0*	1	0*	0*	1
Accomp. others regularly	4	3	5	1	3	6	1
Accomp. others** occas.	1	0*	0*	0*	0*	0*	0*
Medical care	3	2	3	7	2	4	5
Daily needs	1	1	1	3	1	1	2
Admin. formalities	0*	0*	0*	1	0*	0*	1
Personal service	1	0*	1	2	0*	1	1
Non-personal service	1	1	1	1	1	1	1
PART TOTAL	36	24	39	60	24	46	39

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 22c. **DETAILED ACTIVITIES: III. LEISURE ACTIVITIES**
– Germany 1997 –

	TOTAL	TOTAL BREAKDOWN			"REAL" BREAKDOWN		
		UP TO 29 YEARS	30 - 64 YEARS	65 YEARS AND OVER	UP TO 29 YEARS	30 - 64 YEARS	65 YEARS AND OVER
	%	%	%	%	%	%	%
Leisure in general	4	5	3	2	5	4	1
Private contacts	11	14	8	10	14	9	8
Visit to a restaurant	2	3	2	2	3	2	1
Cultural activities	1	2	1	1	2	1	0*
Use of social facilities	0*	1	0*	0*	1	0*	0*
Church, cemetery	2	1	2	5	1	2	3
Hobby	2	2	2	3	2	2	2
Sports	3	5	3	2	5	4	1
Meeting others	0*	0*	0*	0*	0*	0*	0*
Relaxation	5	4	4	10	4	5	7
PART TOTAL	30	37	25	35	37	29	23
TOTAL	100	100	100	100	100	118	65

* Under 0.5%.

Table 23. **ROAD TRAFFIC TREND**

IN RECENT YEARS	TOTAL	UP TO 29 YEARS	30 – 64 YEARS	65 YEARS AND OVER
"Increase"	85	77	84	95
- positive	15	17	13	15
- negative	70	60	71	80
"No increase"	15	23	16	5
TOTAL	100	100	100	100

Table 24. **EFFECTS OF ROAD TRAFFIC**

	TOTAL	UP TO 29 YEARS	30 – 64 YEARS	65 YEARS AND OVER
Quite tolerable	24	21	24	28
Less tolerable	60	67	60	52
No longer tolerable	16	12	16	20
TOTAL	100	100	100	100

Table 25. **WHAT IS EXPECTED OF TRANSPORT PLANNING/POLICY**

	TOTAL	UP TO 29 YEARS	30 – 64 YEARS	65 YEARS AND OVER
Emphasis on car	27	33	25	20
Emphasis on environment-friendly modes	73	67	75	80
TOTAL	100	100	100	100

Table 26. **ROAD TRAFFIC TREND**

Expectations up to 2010	TOTAL	UP TO 29 YEARS	30 – 64 YEARS	65 YEARS AND OVER
"Increase"	75	75	76	77
- positive	7	10	6	5
- negative	68	65	70	72
"No increase"	25	25	24	23
TOTAL	100	100	100	100

Table 27. **PUBLIC TRANSPORT TREND**

EXPECTATIONS UP TO 2010	TOTAL	UP TO 29 YEARS	30 – 64 YEARS	65 YEARS AND OVER
"Increase"	45	38	46	53
- positive	43	37	44	50
- negative	2	1	2	3
"No increase"	55	72	54	47
TOTAL	100	100	100	100

Table 28. **MAIN TRANSPORT MODE**
– Germany 1997 –

	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Environment-friendly modes (EFM)	45	49	37	67
Motorised private transport (MPT)	55	51	63	33
TOTAL	100	100	100	100

EFM: Walking, cycling, public transport.
MPT: Car drivers and passengers and motorised two-wheelers.

Table 29. **POSSIBLE CHANGES IN BEHAVIOUR**
– Germany 1997 –

	TOTAL %	UP TO 29 YEARS %	30 - 64 YEARS %	65 YEARS AND OVER %
Environment-friendly modes (EFM)	45	49	37	67
- in theory transferable to MPT [no material constraint and MPT alternative(s) available]	20	19	22	12
- not transferable to MPT [material constraint and/or no MPT alternative(s) available]	25	30	15	55
Motorised private transport (MPT)	55	51	63	33
- in theory transferable to EFM [no material constraint and EFM alternative(s) available]	31	21	33	10
- not transferable to EFM [material constraint and/or no EFM alternative(s) available]	24	30	30	23
TOTAL	100	100	100	100

Table 30a. **MOBILITY INDICATORS – PER DAY – 1982-97**
– Old *Länder* –

Per person and day	1982	1997
Mobility outside the home (% share)	75	79
MOBILE PERSONS:		
- activities	2.2	2.2
- outings	1.7	1.7
- trips*	3.9	3.9
ALL PERSONS:		
- activities	1.7	1.7
- outings	1.2	1.3
- trips	2.9	3.0
- duration (min)	62	60
- distance (km)	21	22

* Stages not available for 1982.

Table 30b. **ACTIVITIES 1982-97**
– Old *Länder* –

	1982	1997
Work	20	19
Duty/business	6	7
Education/training	10	8
Shopping	24	26
Use of services	4	6
Accompanying others**	3	4
Leisure	33	30
TOTAL	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 30c. **MODAL CHOICE 1982-97**
– Main transport mode used – Old *Länder* –

	1982	1997
Walking	27	23
Cycling	11	10
Mot. two-wheeler	2	1
Car as driver	38	42
Car as passenger	10	13
Public transport	12	11
TOTAL	100	100

Note: A breakdown between car passengers by household and non-household car cannot be given for 1982.

Table 31a. **MOBILITY INDICATORS BY AGE COHORT**
– Old *Länder*, 1982 –

Per person/day	TOTAL	15 - 29 YEARS	30 - 44 YEARS	45 - 59 YEARS	60 – 74 YEARS	75 YEARS AND OVER
Mobility outside home (% share)	75	77	82	77	66	52
MOBILE PERSONS:						
- activities	2.2	2.4	2.4	2.2	1.9	1.5
- outings	1.7	1.8	1.8	1.6	1.6	1.3
- trips*	3.9	4.2	4.2	3.8	3.5	2.8
ALL PERSONS:						
- activities	1.7	1.8	2.0	1.6	1.3	0.8
- outings	1.2	1.4	1.4	1.3	1.0	0.7
- trips	2.9	3.2	3.4	2.9	2.3	1.5
- duration (min)	62	67	66	64	58	42
- distance (km)	21	25	28	22	13	7

* Stages for 1982 not available.

Table 31b. **MOBILITY INDICATORS BY AGE COHORT**
– Old *Länder*, 1997 –

Per person/day	TOTAL	15 - 29 YEARS	30 - 44 YEARS	45 - 59 YEARS	60 - 74 YEARS	75 YEARS AND OVER
Mobility outside home (% share)	79	83	86	81	70	50
MOBILE PERSONS:						
- activities	2.2	2.3	2.5	2.6	2.0	1.6
- outings	1.7	1.6	1.8	1.2	1.6	1.4
- trips*	3.9	3.9	4.3	3.8	3.6	3.0
ALL PERSONS:						
- activities	1.7	1.9	2.1	1.8	1.4	0.8
- outings	1.3	1.4	1.4	1.3	1.1	0.7
- trips	3.0	3.3	3.5	3.1	2.5	1.5
- duration (min)	60	69	69	66	55	35
- distance (km)	22	28	30	25	15	7

* Stages for 1982 not available.

Table 31c. **MOBILITY BY AGE COHORT**
– Old *Länder* –

Per person/day	TOTAL	A 15 - 29 YEARS	B 30 - 44 YEARS	C 45 - 59 YEARS	D 60 – 74 YEARS	E 75 YEARS AND OVER
1982						
Trips per person/day	2.9	3.2	3.4	2.9	2.3	1.5
(index*)	(100)	(110)	(117)	(100)	(79)	(52)
1997						
Trips per person/day	3.0	3.3	3.5	3.1	2.5	1.5
(index*)	(103)	(114)	(121)	(107)	(86)	(52)

* 1982 total = 100.

Table 31d. **MOBILITY BY AGE COHORT**
– Old *Länder* –

	COHORT C: 45-59 YEARS			COHORT D: 60-74 YEARS		
	45 - 49 YEARS	50 - 54 YEARS	55 - 59 YEARS	60 - 64 YEARS	65 – 69 YEARS	70 - 74 YEARS
1982						
Trips per person/day	3.0	2.9	2.7	2.4	2.3	2.1
(index*)	(103)	(100)	(93)	(83)	(79)	(72)
1997						
Trips per person/day	3.1	3.2	2.9	2.7	2.4	2.2
(index*)	(107)	(110)	(100)	(93)	(83)	(76)

* 1982 total = 100.

Table 32a. **ACTIVITIES BY AGE COHORT**
– Old *Länder*, 1982 –

	TOTAL %	15 – 29 YEARS %	30 - 44 YEARS %	45 -59 YEARS %	60 – 74 YEARS %	75 YEARS AND OVER %
Work	20	19	29	30	7	1
Duties/business	6	4	11	10	4	1
Education/training	10	14	1	0*	0*	0*
Shopping	24	18	22	26	41	47
Use of services	4	4	4	5	9	9
Accompanying others**	3	3	5	2	1	0*
Leisure	33	38	28	27	38	42
TOTAL	100	100	100	100	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 32b. **ACTIVITIES BY AGE COHORT – Old *Länder,* 1997-**

	TOTAL %	15 – 29 YEARS %	30 – 44 YEARS %	45 - 59 YEARS %	60 – 74 YEARS %	75 YEARS AND OVER %
Work	20	20	27	27	6	1
Duties/business	8	5	9	12	5	2
Education/training	6	14	1	1	-	-
Shopping	26	19	25	27	42	47
Use of services	6	4	5	6	12	14
Accompanying others**	4	3	8	2	1	0
Leisure	30	35	25	25	34	36
TOTAL	100	100	100	100	100	100

* Under 0.5%.
** Taking them to/fetching them from somewhere.

Table 32c. **ACTIVITIES BY AGE COHORT – Old *Länder*-**

	TOTAL	**A** 15 – 29 YEARS	**B** 30 – 44 YEARS	**C** 45 - 59 YEARS	**D** 60 – 74 YEARS	**E** 75 YEARS AND OVER
	%	%	%	%	%	%
1982						
Required activities [1]	36	41	48	40	9	1
Activities meeting basic needs [2]	31	27	36	33	40	29
Leisure activities [3]	33	42	33	27	30	22
TOTAL [4]	100	110	117	100	79	52
1997						
Required activities [1]	35	44	45	42	10	1
Activities meeting basic needs [2]	37	30	46	38	47	32
Leisure activities [3]	31	40	30	27	29	19
TOTAL [4]	103	114	121	107	86	52

[1] Work; duties/business; education/training.
[2] Shopping; use of services; accompanying others.
[3] Leisure.
[4] 1982 total = 100.

Table 32d. **ACTIVITIES BY AGE COHORT**
– Old *Länder* -

	COHORT C: 45-59 YEARS			COHORT D: 60-74 YEARS		
	45 – 49 YEARS %	50 – 54 YEARS %	55 – 59 YEARS %	60 - 64 YEARS %	65 – 69 YEARS %	70 -74 YEARS %
1982						
Required activities [1]	46	41	33	16	6	4
Activities meeting basic needs [2]	30	33	33	38	42	40
Leisure activities [3]	27	26	27	29	31	29
TOTAL [4]	103	100	93	83	79	72
1997						
Required activities [1]	43	44	33	16	7	2
Activities meeting basic needs [2]	37	39	40	46	48	47
Leisure activities [3]	27	27	27	31	28	27
TOTAL [4]	107	110	100	93	83	76

[1] Work; duties/business; education/training.
[2] Shopping; use of services; accompanying others.
[3] Leisure.
[4] 1982 total = 100.

Table 33a. **MAIN TRANSPORT MODE BY AGE COHORT**
– Old *Länder*, 1982 –

	TOTAL %	15 – 29 YEARS %	30 - 44 YEARS %	45 -59 YEARS %	60 – 74 YEARS %	75 YEARS AND OVER %
Walking	27	22	21	27	44	57
Cycling	11	13	8	10	8	4
Mot. two-wheeler	2	5	1	1	1	0*
Car as driver	38	35	56	44	23	9
Car as passenger	10	12	9	9	9	7
Public transport	12	13	5	9	15	23
TOTAL	100	100	100	100	100	100

* Under 0.5%.

Table 33b. **MAIN TRANSPORT MODE BY AGE COHORT**
– Old *Länder*, 1997 –

	TOTAL %	15 – 29 YEARS %	30 - 44 YEARS %	45 -59 YEARS %	60 – 74 YEARS %	75 YEARS AND OVER %
Walking	22	16	18	19	28	47
Cycling	10	12	8	9	10	6
Mot. two-wheeler	1	2	1	0*	0*	0*
Car as driver	46	44	57	54	40	16
Car as passenger	10	11	8	9	11	8
Public transport	11	15	8	9	11	23
TOTAL	100	100	100	100	100	100

* Under 0.5%.

Table 33c. **MAIN TRANSPORT MODE BY AGE COHORT – Old *Länder-***

	TOTAL	**A** 15 – 29 YEARS	**B** 30 – 44 YEARS	**C** 45 - 59 YEARS	**D** 60 – 74 YEARS	**E** 75 YEARS AND OVER
	%	%	%	%	%	%
1982						
Environment-friendly modes [1]	50	52	40	46	53	43
Motorised private transport [2]	50	58	77	54	26	9
TOTAL [3]	100	110	117	100	79	52
1997						
Environment-friendly modes [1]	44	49	41	40	49	40
Motorised private transport [2]	59	65	80	67	37	12
TOTAL [3]	103	114	121	107	86	52

[1] Walking; cycling; public transport.
[2] Car as driver; car as passenger; mot. two-wheeler.
[3] 1982 total = 100.

Table 33d. **MAIN TRANSPORT MODE BY AGE COHORT**
– Old *Länder* –

	COHORT C: 45-59 YEARS			COHORT D: 60-74 YEARS		
	45 – 49 YEARS %	50 – 54 YEARS %	55 – 59 YEARS %	60 - 64 YEARS %	65 – 69 YEARS %	70 -74 YEARS %
1982						
Environment-friendly Modes [1]	43	45	49	48	55	55
Motorised private Transport [2]	60	55	44	35	24	17
TOTAL [3]	103	100	93	83	79	72
1997						
Environment-friendly Modes [1]	40	40	43	46	49	50
Motorised private Transport [2]	67	70	57	47	34	26
TOTAL [3]	107	110	100	93	83	76

[1] Walking; cycling; public transport.
[2] Car as driver; car as passenger; mot. two-wheeler.
[3] 1982 total = 100.

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THE AGING POPULATION AND TRANSPORT:
A NEW BALANCE BETWEEN DEMAND AND SUPPLY

SUMMARY

Ancona, April 1998

Tables and graphs elaborated by Denis Tarabelli (Biometrical and Statistical Centre - INRCA)

1. INTRODUCTION

According to the Universal Declaration of Human Rights, approved by the United Nations in 1948, mobility is a human right.

More recently, in 1990 in the USA, the American with Disabilities Act (ADA) aims at guaranteeing all disabled citizens complete and equal protection and full access to public institutions, both in the abstract and physical senses.

According to an ECMT definition, mobility is a fundamental part of all activities performed away from home.

Referring the concept of mobility to the elderly, it is well known that the new approaches to modern geriatrics are based on the concepts of autonomy and quality of life. All possible efforts for the elderly are intended to modify and thus improve both autonomy and quality of life. Medical interventions, which have traditionally addressed recovery from disease, are useful only when they affect the global reality of the elderly. Therefore, financial, social and family aspects should be dealt with as well.

Such globality would not be complete unless it included an analysis of indoor and outdoor mobility.

Indoor mobility of the elderly has been studied mostly by the various indices of “Physical Activity of Daily Living”, or “Instrumental Activities of Daily Living” or, particularly in Scandinavian countries, by physical activity in relation to the effects which this produces on the individual's health.

The subject of outdoor mobility has been less deeply studied.

By the term “outdoor mobility”, we mean the capacity to go outside the home, move in traffic, participate in sporting, recreative and socialising activities. It is considered a prerequisite for successful ageing, as freedom to move as one likes means health and well being, both physical and psychological.

In fact, it is very important for the elderly to be able to find new interests because, with ageing, one loses the role and status acquired in the labour market as well as parental duties, thus creating much time that is free from duties and participation in active life. In this situation, social relations have to be cultivated in a much more meaningful way, getting involved in new activities which can replace in a satisfying way the previous tasks (Mollenkopf, 1996).

To carry out this positive change, it is necessary not only to have a good individual capacity for communication, a solid network of interpersonal relations and good health, but also an adequate possibility of moving and an offer of suitable services.

A new orientation which involves disciplines of a more social nature addresses the environmental conditions which can facilitate or complicate the elderly person's social life. In this view, the lifestyle, in all its many aspects, is seen as a factor which can influence the behavioural choices of the elderly, relative to the number and kind of activities performed.

The first step towards acquiring positive changes in lifestyle is to identify what are the real needs of the elderly, who are in no way a homogeneous category.

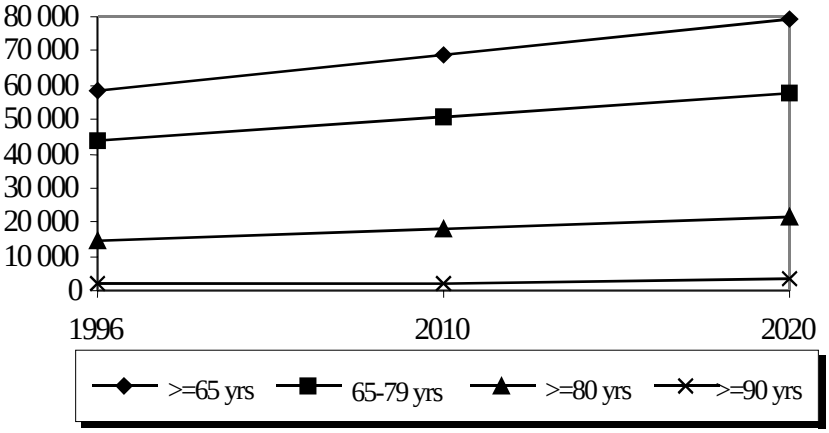
Three kinds of knowledge sources can be identified here: the first two are connected to an objective perspective, that is, normative needs defined by experts and expressed needs, which are articulated as demand; the third source relates to the subjective point of view and concerns the perceived needs, as experienced by people (Van Berlo, 1996).

According to this theoretical scheme, in this paper, demand for transport by the elderly will be treated in two well-defined parts: one concerning the evolution of the demographic and social phenomenon linked to ageing of the population and thus to changes in characteristics of the elderly population, particularly in relation to the use of transport modes; the other linked to the subjective perception of problems connected to the use of transport and more generally to outdoor mobility, by means of a survey analysis.

2. THE DEMOGRAPHIC TREND IN THE EUROPEAN UNION COUNTRIES

In the countries of the European Union, as in all industrialised western countries, the structure by age of the population has changed towards an increase in the elderly population (65+). The concomitant phenomena at the basis of population ageing are well known: the decrease in number of births and the increase of lifespan together determine a shift in the age structure of the population in favour of the elderly generations, with a considerable growth in the number of elderly, especially elderly women (Figure 1).

Figure 1. **Elderly population by age groups at 1996, 2010, 2020 -** (Thousands)



Source: EUROSTAT, Demographic Statistics, 1996

This tendency, already great in the last thirty years, will continue in the near future, so much so that by the year 2020 the number of elderly people will be double that registered in 1960. This means that in 2020, according to the baseline hypothetical estimate made by EUROSTAT, about 80 million over-65s will be living in the European Union, of which more than 22 million will be between 65-79 years and another 22 million will have reached or be over 80 years of age; in the same way, the number of the over-90s will increase considerably and be more than 3 million in 2020 (Table 1).

Table 1. **Elderly population by age group on 1st January 1997, 2010, 2020 (Thousands)**

	Population	1996				2010				2020			
		>=65	65-79	>=80	>=90	>=65	65-79	>=80	>=90	>=65	65-79	>=80	>=90
EUR 15	372654	58093	43670	14423	1763	68808	50532	18276	2100	79369	57565	21804	3338
B	10143	1626	1239	386	49	1854	1335	519	51	2203	1596	607	92
DK	5251	796	391	205	27	875	662	213	28	1076	841	235	32
D	81818	12733	9438	3294	385	16411	12645	6489	366	17677	12635	5042	605
GR	10465	1653	1289	364	50	2088	1543	545	65	2319	1613	706	112
E	39242	6060	4734	1326	155	7112	5107	2005	237	7898	5623	2275	362
F	58256	8858	28379	2360	354	10290	7123	3167	367	12870	9233	3637	676
IRL	3616	415	322	93	11	503	385	118	16	690	544	146	21
I	57333	9645	7279	2366	264	11602	8437	3165	327	12837	9011	3826	585
LUX	413	58	44	14	2	73	54	19	2	92	67	25	4
NL	15494	2061	1579	482	62	2527	1891	636	86	3323	2567	756	118
A	8055	1225	917	308	35	1429	1067	362	35	1595	1211	384	53
P	9921	1457	1174	282	26	1661	1281	380	27	1884	1427	457	45
FIN	5117	732	568	164	17	868	646	222	25	1163	903	260	37
S	8838	1543	1129	415	53	1655	1189	466	66	1969	1494	475	74
UK	5869	9234	6869	2364	276	9863	7168	2695	403	11770	8800	2970	521

Source: EUROSTAT, Demographic Statistics.

Considering the picture in perspective, we can conclude that in the next thirty years the only population to grow in the European Union will be the over-65-year-olds, while we shall witness a progressive decline in other demographic classes, though with some variations among the different countries.

The evolution of this ageing phenomenon must be interpreted in such a way that attention is drawn to the different styles of ageing and consequently to the differing needs of the people concerned.

Population ageing is directly connected to the increase of average lifespan which, in Europe, is of about 73.4 years for men and 80 for women, even if the values differ slightly among the Member States (Table 2).

The importance of this change derives from the fact that, within the elderly population, there are strong elements of heterogeneity linked primarily to the different age classes and sex, as the prevalence of women in old age gives rise to a feminising phenomenon of ageing.

Table 3 shows that the distribution of the population based on sex is less balanced with increasing age. Considering the data concerning Europe, it can be seen how the whole elderly population is made up mainly of women, as the absolute value of the latter exceeds that of men by a third. Considering the breakdown by age groups, it can be seen that if already between 65 and 79 years the number of women and men begins to diversify, a noticeable difference is observed in the 80+ classes, with ten million women compared to four and a half million men, representing a ratio of two to one, while among the 90+ the ratio is about three to one (Figure 2). Obviously, while the existing diversification in the male and female lifespan is not compensated, this kind of configuration will remain stable.

Table 2**. Life expectancy at certain ages (males and females)**

1993 (%)

	Males			Females		
	0	**65**	**75**	**0**	**65**	**75**
EUR 15	73.4	15.0	9.0	80.0	18.8	11.3
B	73.0	14.4	8.5	79.9	18.7	11.2
DK	72.6	14.0	8.4	77.8	17.5	10.8
D	72.7	14.4	8.6	79.2	18.2	10.8
GR	75.0	15.9	9.6	79.9	18.3	10.5
E	73.9	15.8	9.5	81.1	19.6	11.6
F	73.3	15.9	9.7	81.4	20.3	12.4
IRL	72.6	13.4	7.9	78.1	17.0	10.1
I	74.4	15.5	9.4	80.7	19.3	11.6
L	72.2	14.2	8.4	79.4	22.7	11.0
NL	74.0	14.4	8.4	80.0	18.8	11.3
A	73.0	14.8	8.8	79.4	18.4	10.9
P	70.6	13.9	7.9	77.9	17.3	9.8
FIN	72.1	14.0	8.3	79.5	17.9	10.4
S	75.5	15.6	9.1	80.8	19.2	11.5
UK	73.6	14.2	8.5	78.9	17.9	11.0

Source: EUROSTAT, Demographic Statistics; 1997.

Table 3**. Population by age group and sex - 1996**

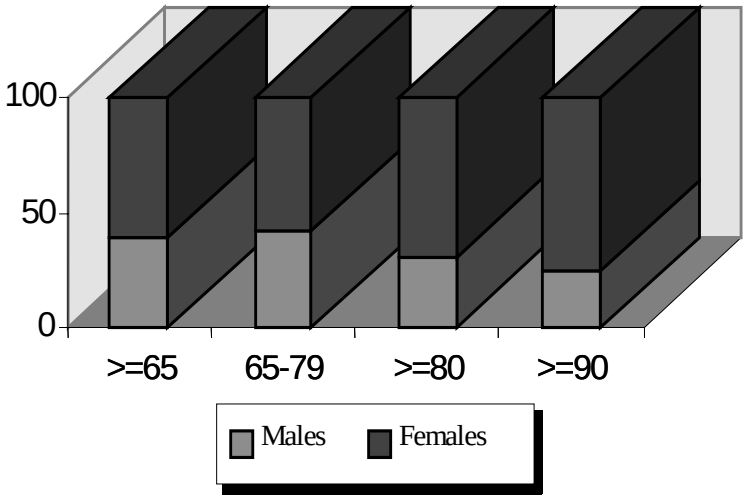
(Thousands)

	Males				Females			
	>=65	**65-79**	**>=80**	**>=90**	**>=65**	**65-79**	**>=80**	**>=90**
EUR 15	23085	18599	4487	426	35007	25071	9936	1338
B	653	538	115	11	972	701	271	39
DK	329	261	67	6	467	329	137	20
D	4586	2658	884	86	8147	5737	2410	299
GR	734	1627	151	20	918	705	213	30
E	2520	2072	448	45	35301	2662	878	111
F	3557	2818	739	80	5301	3680	1621	273
IRL	177	144	33	3	237	177	60	8
I	3956	3151	805	70	5689	4128	1561	194
L	22	18	4	0	36	26	10	1
NL	829	684	145	14	1232	896	336	48
A	446	359	88	8	778	558	220	27
P	600	504	96	7	856	670	186	19
FIN	271	226	45	4	461	342	119	14
S	653	508	144	13	891	620	270	39
UK	3752	3030	722	59	5482	3839	1642	217

Source: EUROSTAT, Demographic Statistics; 1997

Figure 2. **Proportion of males and females by groups of age**

EUR15 - 1996



Source: EUROSTAT, Demographic Statistics; 1997

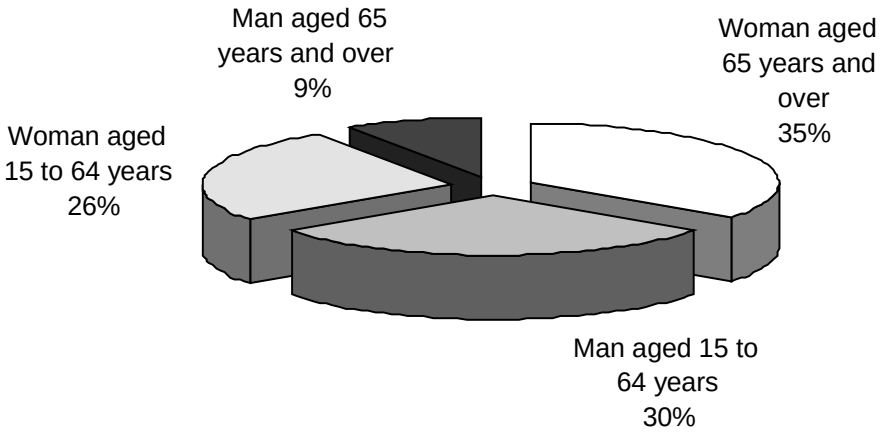
The ageing rate (percentage ratio between the elderly population of 65 years and over and the young generation of under-15s) by sex gives an overall dimension of the phenomenon: in 1995 it was equal to 108.3 per cent for women and 67.4 per cent for men, according to EUROSTAT data. This means that, at that time, the European female population of over-65s was overtaking the young one, of under-15s, while for the males this ratio is a little more than two-thirds.

Referring now to Italy, in this country demographic ageing has been high in the last ten years: the ageing rate has risen from 68.1 per cent in 1971 to 80.4 per cent in 1981 (National Institute of Statistics - ISTAT) to 109.1 per cent in 1995, according to Eurostat statistics. This increase is particularly evident for women, where the value reaches 132 per cent. It is estimated that in 2020 the weight of the over-70-year-olds will be 22.7 (EUROSTAT, 1996). Furthermore, the strong negative tendency of the population growth forecasts a further acceleration of the ageing phenomenon. In fact in Italy, the mean fertility rate is currently equal to 1.22 children per woman (the lowest value in Europe).

Coming back to the general European situation, the diversity in distribution by sex in the older age groups points to differences in the family conditions in which elderly men and women live.

The elderly family tends, in fact, to be characterised, at first, by the elderly couple without offspring and, at a later phase with increase of age, by the growing prevalence of elderly people living alone, mainly women who are widows, often very old. Figure 3 shows the composition by age of families made up of single people in Europe. The highest percentage, equal to 35 per cent, is made up of over-65-year-old women, followed by 30 per cent of men in adult age. The percentage of elderly men living alone is significantly low, equal to 9 per cent of the total (Figure 3).

Figure 3. **Households of one person by sex and age - EUR 15 - 1996**



Source: EUROSTAT, Labour Force Survey, 1996

The differences produced by this variety of situations, in terms of characteristics, behaviour, requirements and expectations, necessitate further study and the need to keep account of the various segments of the elderly population in a dynamic outlook.

Within this population there are, above all, substantial differences linked to age, with a general distinction between those who are still healthy and have a good level of autonomy and those who instead need treatment and care. This first distinction leads us to differentiate between third-age elderly and those in the fourth age, i.e. from 75-80 years on. This second phase of old age is that on which, quite rightly, most attention has been focused: in fact, the extreme problems of these situations, characterised by poverty, loneliness, health problems and disability, have attracted the attention of social and public interests.

Related to this aspect, many studies in the geriatric field have shown that the ageing of the population involves an increase of disabilities in the elderly, whether as an absolute number or as a percentage over the total population.

It is difficult to know the exact number of the elderly with disabilities in the European Union. Nevertheless, we can estimate that, as is shown in a recent research study in five European countries (Ferrucci *et al.*), the level of disability among older people aged 60 and over becomes a problem for a percentage of people which varies among the countries from between 10 and 20 per cent. If we consider two important outdoor activities, that is "walking at least 400 metres" and "moving around outdoors", between 11 and 15.7 per cent of elderly people need help.

Even if the majority of the elderly are healthy and can perform the activities of daily living without help, and so can be considered as active citizens and new consumers in the future, at the same time, it is important to consider the needs of the increasing oldest population regarding new systems of health and social protection.

However, numerous other factors today give a characteristic of heterogeneity to the elderly population and one can assume that, in the future, these factors will tend to sharpen the differences, as new generations of elderly will have lifestyles greatly different from the present ones.

3. THE ELDERLY AND WORK

One of the dimensions in evaluation can be seen in the changes which occur regarding the extension and active life modes of the elderly in their working life. Work, in fact, is an important factor which contributes to the determination of the social and economic status, the lifestyle and the perception which people have of themselves and their role.

Regarding the present situation in the European Union, the EUROSTAT data show that the elderly over-60s who still work amount to about 4 million men and 2 million women, that is, around 10 per cent of the population, a very low percentage. Regarding participation according to sex, the mean European data is made up of two-thirds men and one-third women, with certain differences among the Member countries (Table 4).

Table 4. **Proportion of employed elderly people (60 and over), by sex** **(%)**
1996

	EUR 15	B	DK	D	GR	E	F	IRL	I	L	NL	A	P	FIN	S	UK
Males	65.96	73.17	68.75	68.18	68.45	69.46	51.91	77.92	74.02	66.67	73.08	62.07	61.66	55.56	55.19	63.27
Females	34.04	26.83	31.25	31.82	31.55	30.54	48.09	22.08	25.98	33.33	26.92	37.93	38.34	44.44	44.81	36.73

Source: EUROSTAT, Labour Force Survey; 1996.

As to the characteristics of work relationships, the latest survey on work in Europe (EUROSTAT, Labour Force Survey, 1991) demonstrates that the condition of independent worker is more frequent among the occupied elderly, both male (44 per cent) and female (30 per cent), compared to the age group 14-59 years, which shows 17 per cent for men and 9 per cent for women.

This fact is due mainly to the rigidity of different pension schemes which have actually contributed to making elderly people leave the labour market.

In fact those who are not bound by obliged pensionable age continue to work into older age and this explains why they are over-represented in the group of elderly people who are still occupied.

This picture gives an idea of why until now the growth of independence among the elderly has not been particularly favoured by social rules and pension schemes, which have pushed these people towards expulsion on the basis of their age according to a rather anachronistic model.

This phenomenon must be kept in close correlation with the sector of activity of elderly people (Table 5). The elderly are employed mainly in services, with a greater percentage of women; this sector offers a high degree of flexibility and can adapt better to the needs of individuals who prefer

not to work full-time. This is followed by the traditional farming sector, which generally occupies more elderly people with a lower grade of education, where about a quarter of the active elderly still work, while it occupies only 6 per cent of men and 5 per cent of women in the younger age groups.

Table 5. **Sector of activity of elderly people (60 and over) in employment, by sex and age group -- 1991**

(%)

	Males		**Females**	
	14-59	**>=60**	**14-59**	**>=60**
Services	51.0	50.9	74.6	66.7
Industry	43.0	26.3	20.4	10.4
Agriculture	6.0	22.8	5.0	22.9

Source: EUROSTAT, Labour Force Survey, 1991.

This type of configuration reflects the market situation of the past, where increasing age corresponded to increasing work in the farming sector and decreasing work in services, a situation that is linked to the change from a farming economy to an industrial one.

The data confirm, however, that it is not age which determines retirement but social dynamics. For the future, it is evident that the situation is destined to undergo significant changes due to demographic and socio-cultural modifications of the population.

The great number of women entering the labour market, the increase in mean working age, a higher level of education and a greater diffusion of work in services for elderly men and women will bring about great changes. These, which have been discussed over a long period of time, will lead to greater flexibility of working hours and to work structures to meet the needs of a population which will be active for much longer. This will result in an extension of working life, with repercussions on mobility, as the people who work are those who move more.

Needs for autonomy will increase in this population, who will want suitable infrastructure for their psychological and physical conditions, which are not those of the younger, minority generations. In this sense, one can assume that all means of transport (bus, train, plane, car) will be characterised by easy access and flexibility.

4. TRANSPORTATION MODES AND ROAD RISKS

The car has become a fundamental aspect of modern daily life, due to the characteristics of flexibility and independence offered by this means of transport. European citizens are travelling more and more, especially by car, which has become the most widely used mode of transport.

In fact, by 1990, the number of kilometres travelled by car represented 68 per cent of total kilometres travelled by all modes of transport.

Between 1985-90, the annual average increase in kilometres travelled by car was about 5 per cent, while transportation by rail and bus increased only by 8 per cent in the whole period (EUROSTAT, Social Portrait of Europe, 1993).

The number of private cars has notably increased in recent decades in all the EU countries, with a greater increase (300 per cent in the period 1970-92) in those countries, such as Portugal, Greece and Spain, where car ownership was at a low level in the 1970s. Austria, Finland and Germany also recorded a strong increase in that period, with rates of 161, 147 and 128 per cent, respectively (EUROSTAT, 1993).

Table 6 shows the increase of vehicles circulating in Italy: in the period 1970-95, the number of inhabitants per car decreased from 4.9 to 1.7. Both the number of cars and the total number of circulating vehicles is now three times as much.

Table 6. **Vehicles in use - Italy, 1970-95**

Year	Cars	Trucks	Buses	Total	Variation (%)	Density No. of inhabitants per car (%)
1970	10 181 192	890 507	38 856	11 110 555	-	4.9
1980	17 686 236	1 370 628	58 149	19 115 013	72.04	3.0
1990	27 415 828	2 416 772	77 731	29 910 331	56.48	1.9
1995	30 000 000	2 730 000	765	32 806 500	9.68	1.7

Source: Automobile in cifre, 1996, ANFIA - ACI.

As regards older people, the ownership of the car is variable in Europe; today, the maximum seems to be around 50 per cent of older people in countries such as France, Belgium, the Netherlands, the United Kingdom and Denmark (Mobility and Older People, Report by AIT/FIA, 1995). In Italy, the figure was 40.5 per cent in 1993 (ISTAT, 1994).

Travelling for work and business is an important motivation for car use. Table 7 shows that in Italy the car is the predominant means of transport as long as people work, also for the elderly. The increasing number of older people active in the labour market will probably increase the need for the car by this segment of the population.

Table 7 - Transport mode used for work journeys - Employed persons aged 14 and over, by age group and sex - Italy (%)

Age group	On foot	By transport	Train	Tram,bus, metro	By car as driver	By car as passenger	Moped	Cycle
				Males				
14-17	12.9	86.6	3.2	4.7	-	30.4	42.3	8.0
18-19	14.5	85.1	0.8	1.5	29.1	22.6	28.2	3.7
20-24	11.7	86.6	1.5	7.2	62.1	11.0	8.0	2.6
25-34	9.3	88.6	2.1	6.9	72.9	4.0	5.0	2.4
35-44	9.9	89.2	3.0	7.1	73.8	3.1	3.9	2.9
45-54	11.5	87.0	2.6	8.6	70.7	2.6	3.9	2.9
55-64	19.5	78.3	1.4	9.6	58.9	3.3	3.0	2.4
>=65	29.0	61.5	1.8	11.0	48.2	2.8	0.3	0.8
Total	**11.6**	**86.7**	**2.3**	**7.6**	**69.1**	**4.2**	**4.9**	**2.7**
				Females				
14-17	14.1	85.9	-	13.2	-	25.1	26.1	21.0
18-19	12.8	85.2	1.4	23.9	23.4	19.1	13.0	12.4
20-24	11.0	87.7	2.7	15.3	57.1	11.1	5.6	4.2
25-34	11.3	87.5	3.0	13.7	64.1	8.5	2.3	3.9
35-44	16.9	81.9	1.5	12.7	59.5	8.4	1.1	3.9
45-54	22.5	75.8	1.5	14.6	49.0	9.9	0.9	4.7
55-64	38.5	58.5	1.0	13.5	28.7	12.1	1.5	4.7
>=65	41.1	39.9	-	9.7	12.8	16.6	-	-
Total	**17.2**	**81.2**	**2.0**	**13.8**	**55.5**	**9.5**	**2.2**	**4.3**
				Total				
14-17	13.3	86.3	2.1	8.0	-	28.6	36.8	12.4
18-19	13.8	85.1	1.0	10.0	27.0	21.3	22.5	7.0
20-24	11.4	87.0	2.0	10.6	60.0	11.1	7.0	3.3
25-34	10.1	88.1	2.4	9.5	69.5	5.8	3.9	3.0
35-44	12.4	86.5	2.5	9.3	68.6	5.0	2.9	3.3
45-54	15.1	83.3	2.2	10.6	63.5	5.0	2.9	3.5
55-64	24.0	73.6	1.3	10.6	51.7	5.4	2.7	3.0
>=65	32.1	55.9	1.3	10.6	39.1	6.3	0.2	0.6
Total	**13.6**	**84.7**	**2.2**	**9.8**	**64.2**	**6.1**	**3.9**	**3.3**

Source: ISTAT, Indagine Multiscopo sulle Famiglie, Aspetti della vita quotidiana - 1995.

Otherwise, the widespread possession of a driving licence among men and women in the adult and younger generations, together with improved economic conditions, will increase the possibility of owning a car.

So we can presume that in the future the number of cars will increase as well as their utilisation.

Concerning travel for leisure, it is well known that the propensity to travel decreases with age both for domestic and international travel (Table 8). In 1990, the number of trips per capita was 1.91 for the younger age group (55-59) and 1.12 for the over-75s (against the 2.42 of the European adult population).

Table 8. **Senior propensity to travel**
1990

Domestic travel **Age groups**	**Population (000)**	**Trips (000)**	**Trips per capita (%)**
55-59	20 244	38 708	1.91
60-64	22 124	38 96	1.76
65-69	17 834	29 472	1.65
70-74	13 796	16 347	1.19
>=75	16 599	18 625	1.12
International travel			
55-59	20 244	11 848	0.59
60-64	22 124	11 689	0.53
65-69	17 834	7 357	0.41
70-74	13 796	5 394	0.41
>=75	16 599	5 073	0.31

Source: EUROSTAT and ETDC Study in: Mobility and older people,
Report by the AIT/FIA for the European Comission, Brussels, 1995.

Nevertheless, there has been an increasing trend in the last few years. In fact, in Europe, domestic travel by older tourists aged 55 and over has grown from 1988 to 1991 from 132.5 to 148.1 million trips, with an average growth of 4 per cent per year; international travel by older people grew less rapidly in the same period, from 40.7 million trips in 1988 to 43.1 in 1991, with an average growth of 2 per cent a year (ETDC supplementary data, Mobility and Older People, Report by AIT/FIA, 1995).

This is probably due to better socio-economic conditions and the changing life-styles of the elderly, for whom retirement is more often accompanied by a desire for mobility, especially when visiting friends and family and travelling.

It is important to note that, in general, domestic day trips are made by private car, while, due to the longer distances, senior travellers on international trips prefer travelling by air. In this case, the use of the car is the second mode and the third is the coach/bus, respectively used for 29, 26 and 24 per cent of total trips in 1990. Other means of transport involve a very low percentage (Mobility and Older People, Report by AIT/FIA, 1995).

The increasing movement of private cars increases the risk of accidents. In 1994, about 50 000 people were killed on European roads. The EU figure for road deaths per 10 000 inhabitants is 1.35, with a range from 0.65 in the United Kingdom to 2.51 in Portugal (EUROSTAT, Facts Through Figures, 1996).

The risk of accidents is higher in the urban areas: in Italy, 73.2 per cent of the total accidents in 1995 happened in urban areas and 26.8 per cent in extra-urban areas (ISTAT, 1997, *Gli incidenti stradali negli anni '90*).

In these kind of accidents, pedestrians are the weakest subjects, in fact, 93 per cent of accidents involving pedestrians occur in towns. Elderly pedestrians are those more at risk of death, in fact, they represent more than 50 per cent of total victims.

Table 9 shows that the percentage of older drivers involved in traffic accidents is relatively low in the European countries. This is due not only to a reduced use of the car by the elderly, but to the fact that they are statistically less at risk of being involved in an accident. However, as pedestrians the elderly are more at risk of death because more frail.

Table 9. **Traffic casualties, by means of transport and age (row percentages)**

Pedestrians

	0-14	15-24	25-64	>=65
EUR 12	-	-	-	-
Belgium	30.57	14.63	34.98	19.82
Denmark	17.90	17.74	30.57	33.79
Germany	31.21	12.80	36.11	19.88
Greece	15.74	10.56	39.99	33.71
Spain	21.50	14.20	37.15	27.15
France	27.64	14.63	37.57	20.17
Ireland	29.12	16.68	26.17	28.04
Italy	13.56	13.83	45.29	27.33
Luxembourg	26.56	15.63	41.15	16.67
Netherlands	34.97	14.47	31.77	18.79
Portugal	-	-	-	-
United Kingdom	36.38	19.80	28.90	14.92

Cycles without auxiliary motor

	0-14	15-24	25-64	>=65
EUR 12	-	-	-	-
Belgium	24.40	24.11	37.99	13.50
Denmark	18.48	29.93	41.37	10.22
Germany	12.01	27.26	49.84	10.89
Greece	39.47	27.12	22.28	11.14
Spain	22.33	33.50	33.05	11.12
France	23.42	25.51	39.96	11.11
Ireland	30.42	34.43	21.81	13.34
Italy	16.12	17.30	41.00	25.57
Luxembourg	25.58	16.28	51.16	6.98
Netherlands	21.34	22.87	40.38	15.41
Portugal	-	-	-	-
United Kingdom	28.77	31.57	35.56	4.10

Mopeds

	0-14	15-24	25-64	>=65
EUR 12	-	-	-	-
Belgium	2.15	71.59	24.08	2.18
Denmark	2.32	53.00	37.82	6.86
Germany	0.96	49.88	43.21	5.95
Greece	1.94	56.25	38.93	2.87
Spain	2.65	68.13	22.98	6.24
France	3.95	68.62	24.44	2.99
Ireland	-	-	-	-
Italy	5.75	55.76	32.11	6.38
Luxembourg	-	90.38	7.69	1.92
Netherlands	1.96	79.02	15.83	3.20
Portugal	-	-	-	-
United Kingdom	0.67	63.37	32.23	3.73

Passenger cars

	0-14	15-24	25-64	>=65
EUR 12	-	-	-	-
Belgium	7.09	29.19	57.01	6.71
Denmark	5.32	33.21	49.66	11.81
Germany	4.84	35.27	55.14	4.75
Greece	5.50	23.16	66.71	4.62
Spain	6.02	32.50	53.46	8.01
France	6.76	29.66	56.50	7.08
Ireland	7.45	25.80	55.97	10.78
Italy	4.17	31.63	59.08	5.12
Luxembourg	3.98	32.47	58.91	4.64
Netherlands	4.19	29.85	54.75	11.21
Portugal	-	-	-	-
United Kingdom	7.30	31.96	53.53	7.21

Source: EUROSTAT, *Transport Annual Statistics - 1970-1990.*

5. OUTDOOR MOBILITY AND TRANSPORT NEEDS: A SURVEY RESULTS

When talking about outdoor mobility of the elderly, meaning the capacity to go outside and move in the surrounding environment, it is very important to understand whether the reduction in degree of outdoor mobility found in the elderly person is the result of free choice or is rather due to reduced physical capacities or, again, a consequence of architectural barriers and unsuitable means of transport.

A tentative answer to this complex problem arises from the Outdoor Mobility research, conducted within the European COST A5 programme "Ageing and Technology" (European co-operation in the field of scientific and technical research). This research, carried out in three countries, Italy (Ancona), Germany (Chemnitz and Mannheim) and Finland (Jyvaskyla) and co-ordinated by Heidrun Mollenkopf (Germany), was based on a new concept of mobility involving a collaboration of professional figures from different backgrounds who do not often have the opportunity of working together, such as sociologists, psychologists, transport engineers and ergonomists, large car and telecommunications producers and those responsible for public city transport who were interested in the project.

A questionnaire and diary of trips were used in the survey to evaluate the actual degree of mobility, the state of health, rating of the surrounding environment, use of different means of transport and other civil, social, economic, etc. background variables.

Regarding the Italian sample, the survey was carried out by INRCA in the town of Ancona in the last two months of 1995. Ancona has about 100 000 inhabitants, is situated on the Adriatic coast and has a high proportion of elderly. Those aged 55 or over constituted, at that time, 35 per cent of the population, while if we consider only people aged 65 or over the percentage was 22 per cent. The latter value is considerably higher than the national average (14.8 per cent) (ISTAT, 1993).

The 600 individuals in the sample were randomly chosen, stratified by sex, age and living area (centre, suburbs and surrounding areas).

The results of the survey, carried out in Italy, can give rise to some interesting considerations, even if related to a specific situation.

In general, respondents were quite satisfied with their outdoor mobility: in fact, the mean value of satisfaction (measured with the Likert scale at 11 levels from 0 to 10) in this area is 6.2, with a median corresponding to 7. Nine and a half per cent of subjects fall at the lower end of the scale, with values between 0 and 2, while 32.8 per cent are at the upper end with values between 8 and 10. However, the most important data is that 77 per cent of respondents have an adequate degree of mobility.

As expected, age was a factor which tends to considerably reduce satisfaction with mobility (Table 10). The mean satisfaction score with mobility in the first three age groups did not differ much, while there was a significant decrease after 69 years and 79 years and a much greater decrease after 84 years.

Table 10. **Satisfaction with outdoor mobility by age group**

Age group	Satisfaction with outdoor mobility (%)
55-59	7.07
60-64	7.10
65-69	6.98
70-74	6.43
75-79	6.45
80-84	5.75
85 and over	3.96

Because of this result, we used the same age groups to interpret the aspects linked to the respondents' needs and behaviour.

Analysing some variables which indicate general perception of traffic, about a quarter of the elderly felt they could not cope well in today's traffic and nearly a half complained about the lack of consideration for elderly people's needs (Table 11).

Table 11. **Traffic perceptions by age group***

(%)

	55-69	70-79	80+	Total
Traffic sometimes is so busy that you do not dare to go out on the street	17.6	25.1	26.7	22.8
Nowadays I often feel helpless in traffic	24.3	26.2	33.5	27.8
As an elderly person you feel disadvantaged in today's traffic	40.5	48.6	48.2	45.5

*Multiple answers

These data indicate just how difficult it can be for an elderly person to move in his/her surrounding environment, either on foot or using transport. This inadequacy differs among the age groups, even if the differences are not significant.

Two data are very important: within the two oldest age groups, about one-quarter of respondents had such a negative rating of traffic that they did not go out of their house and, within the oldest age group, one-third of persons actually said they often felt quite confused and disorientated.

To analyse how elderly people carry out their trips, Table 12 shows the different means of travel which our respondents used to reach important services (e.g. grocers, chemist, etc.).

Table 12. **Ways of reaching important services by elderly people***

	% Total
On foot	64.8
Car as driver	16.0
Car as passenger	19.3
Moped	0.7
Bus	7.2
Other	0.7
Cannot reach them	6.8

*Multiple answers

As expected, walking is the most frequent means, while the car is the most common transport mode, followed by the bus. These data must be related to the fact that Ancona is a middle-sized town and that the elderly often use important services within their area. Overall, these data are a significant indicator of how the elderly in our sample behave regarding means of transport.

We shall now look in detail at these transport modalities.

First, we shall analyse the most frequent method of travel, i.e. on foot, as we feel that analysing the problems met by the elderly and their needs is a very important factor with which to understand the demand for traffic infrastructure.

The problems mainly concern the relationship with the means of transport, which undermine the sense of safety of the elderly and make the surrounding environment dangerous (Table 13).

Table 13. **Traffic problems by age group***

(%)

	55-69	**70-79**	**80+**	**Total**
Children and youths should be forbidden to ride their bicycles on the sidewalk	67.6	79.1	77.0	74.2
Many cars and motorcycles are going too fast when they approach the pedestrian crossing, so you never know whether they will brake or not	66.7	67.9	56.0	63.7
Many cars and motorcycles drive too near the sidewalk	58.1	61.5	53.4	57.7
Many cars and motorcycles drive too fast so you see them only at the last minute	54.0	62.6	54.5	56.8
The sidewalks are often so narrow you have to step into the street to make way for other pedestrians	30.2	35.3	32.5	32.5

*Multiple answers

These subjective problems, linked to the perceptions of the elderly, do influence their sense of security, so much so that, in the last five years, 51 pedestrians have had at least one accident, which corresponds to 47.7 per cent of the total number of accidents registered in our survey.

It must be noted that the number of accidents involving pedestrians increases with age, in spite of less frequent walking. The data indicates that difficulties in moving in city traffic increase with age and have serious consequences, such as the increase in accidents.

Accidents are a great problem for the elderly, above all their consequences, which often result in high costs for society and a poor quality of life for the elderly, as in many cases the accidents cause disability and a loss of or decrease in self sufficiency.

The elderly asked for improvements in traffic conditions, and these must be interpreted as needs which the elderly genuinely have (Table 14). Among the infrastructure asked for were more benches on the pavements, and this was expressed by nearly half of the elderly in our sample. Percentages just as high were found in the desire for more road courtesy and greater road safety, which confirms just how dangerous and hostile the outdoor environment can be for our respondents.

Table 14. **Traffic needs by age group***

(%)

Needs	**55-69**	**70-79**	**80+**	**Total**
More benches on sidewalks	56.3	48.7	41.4	49.2
More road courtesy	62.6	44.9	39.3	49.7
More road (traffic) safety	62.1	47.6	32.5	48.2
More pedestrian crossings (islands)	33.8	34.2	23.6	30.7
Longer times for crossing at traffic lights	34.7	21.4	20.4	26.0

*Multiple answers

Coming back to the means most frequently used for making trips, the second way, and the first means of transport, is the car. This shows that an important prerequisite to outdoor mobility is, in fact, owning a car.

In our sample, 67 per cent of respondents had at least one car in the family (it must be remembered that the families included young people). This data is very high if we consider that in Germany and Finland only 47 per cent of the respondents owned cars.

It can be seen that car ownership varies depending on the kind of family. Those who live alone most often do not own cars: most of these people are very old and female, and therefore have faced more cultural and economic obstacles in taking a driving licence and owning a car (Table 15).

Table 15. **Car ownership in different family groups**

(%)

	Yes	No	Total
Lives alone	9.7	90.3	100
Lives with partner	76.5	23.5	100
Lives with others	79.0	21.0	100

Concerning driving licences, we found the following situations:

- 36.3 per cent of subjects have a valid driving licence, of these 79.3 per cent are male while 20.7 per cent are female;
- 57 per cent have never had one, of these 33.2 per cent are male and 66.8 per cent are female;
- 6.7 per cent had a driving licence but have stopped driving, of these 75.6 per cent are male and 24.4 per cent female.

Those who had stopped driving (N=41) had an average age of 79 years; after analysing the reasons behind this, we found that health is the main reason, followed by heavy traffic, difficulties in driving a car and no need. Other causes were indicated, in very low percentages, such as economic reasons and the need to have someone else present when driving.

Possession of a driving licence varies significantly depending on the different age groups; in fact, between the first and second age-groups, the number of people who have a driving licence drops by a half, and decreases even further in the over-80s, as can be expected (Table 16).

Table 16. **Driving licence by age group**

(%)

Driving licence	Age 55-69	Age 70-79	Age 80+
Yes	61.5	29.4	9.2
No	38.5	70.6	90.8
Total	100.0	100.0	100.0

Obviously, a gender difference was also found, which was not so marked in the younger age groups. This indicates a growing increase among women who own a car, a factor which will influence the older age groups in the future.

We shall now analyse the frequency of driving a car and the number of kilometres driven in the last year among those with a driving licence and who have a car in their family nucleus (Tables 17 and 18).

Table 17. **Frequency of driving by persons with licence and car**

(%)

	Age 55-69	Age 70-79	Age 80+	Total
Less than 1-2 times a week	2.9	5.9	1.5	10.3
1-2 times a week	15.8	11.3	2.0	29.1
Nearly every day	43.4	12.8	4.4	60.6
				100

Table 18. **Distances driven (km) by persons with licence and car**

(%)

	Age 55-69	Age 70-79	Age 80+	Total
Less than 5 000 km	24.1	20.7	5.9	50.7
5 000-10 000 km	18.8	5.4	2.0	26.2
10 000-20 000 km	13.8	3.9	0	17.7
More than 20 000 km	5.4	0	0	5.4
				100

These two variables allow us to identify the different models of drivers depending on the age groups; as can be seen, there is a substantial group of drivers, made up of three-quarters of those between 55-69 years, for whom the car is a means of daily transport. From this data, we can understand the reasons why subjects in this age group are much more satisfied with their mobility compared to the other age groups. Analysing the number of kilometres driven in the previous year, we found that most subjects use their car for short trips, as 75 per cent had driven less than 10 000 km in the year.

We asked respondents if certain situations created problems, in order to analyse which situations created the greatest problems for car drivers (Table 19). Certain difficult situations emerged from the results which most respondents tried to always avoid.

Table 19. **Problems for car drivers***

Problems	**%**
Driving long distances	29.6
Driving on the motorway	28.1
Driving at sunset or at night	18.7
Driving along unknown roads	15.8
Driving in bad road conditions	9.4
Driving in heavy traffic	6.9
Driving during rush hours	5.9
Driving at dangerous crossroads	3.0

* Multiple answers

These avoiding strategies do not produce an overall positive effect, as the number of accidents is high (41 as drivers in the last five years) and corresponds to 38.3 per cent of the total number of accidents involving the elderly in our sample. With age, the number of accidents as car drivers decreases, which obviously relates to the fact that this means of transport is less used with growing age. However, most of the accidents involving the elderly as car drivers do not have any serious consequences (N=32).

Table 20 shows the results of car accidents reported by the respondents.

Table 20. **Consequences of car accidents***

	N	**%**
No consequences	32	78.0
Consequences on health	3	7.3
Financial consequences	2	4.9
I feel more insecure	4	9.7
I drive less	1	2.4
I don’t drive anymore at all	1	2.4
I’m no longer able to leave my home	0	0.0

* Multiple answers

Although, as can be seen, the results demonstrate that car accidents do not have any consequences in most cases, these sometimes can be of a psychological, health or economic nature. This indicates that in spite of the fact that car accidents constitute the highest number of all accidents, these do not cause serious problems to the elderly in our sample. This can also be explained by the fact that probably the car is used nearly exclusively in town and therefore the accidents are rarely serious ones.

Attention must be given to the minority of respondents who have had psychological or physical consequences (feelings of insecurity, health problems, etc.) which have inhibited their outdoor mobility and quality of life.

Combining the elements analysed up to this point, that is, car ownership, having a driving licence and actually driving a car, the whole sample can be evaluated as shown in Table 21.

Table 21. **Driving situation**

Ownership of car	Driving licence	Effective driving	N	%
No	No	No	200	33.3
Yes	No	No	189	31.5
Yes	Yes	No	8	1.3
Yes	Yes	Yes	203	33.9
		TOTAL:	600	100.0

The subjects belonging to the first three groups, that is those who have neither a car nor a driving licence, or who do not drive anyway (N=397 equal to 66 per cent), can make necessary trips by car if someone is willing to take them (Table 22). If we analyse this aspect, we find a very small group of people who not only do not have a licence or a car but neither do they have someone to accompany them.

Table 22. **Availability of person with car for those who do not drive**

	N	%
Have nobody to accompany me	15	3.8
Can be accompanied only in emergencies	81	20.4
Can be accompanied only when really necessary	207	52.1
Can be accompanied whenever I like	94	23.7
Total:	397	100.0

For a large part of our sample, car availability is limited, even if, except for a very small percentage, nearly all respondents have someone to accompany them, at least whenever really necessary.

Developing the need of having a car further, we verified if subjects complained that not having a car prevented them from reaching important people, services and from performing leisure activities.

This situation occurred only in three cases out of our whole sample. Other kinds of difficulties, such as not having an accompanying person, and too long distances were more frequently mentioned.

This indicates that within our sample there was no unsatisfied need of having a car, although there were needs for greater mobility to satisfy personal requirements.

To conclude this in-depth analysis of the car, considering that the car is the means of transport most widely used, we wanted to determine if there are differences in terms of outdoor mobility between those who use the car and those who do not, and whether the ones who do not have someone to accompany them by car.

Where satisfaction with mobility is concerned, those who personally drive have a significantly greater satisfaction with mobility than those who don't, either with an accompanying person or not. Those who neither drive nor have an accompanying person, or have someone only in emergencies, have much less satisfaction with mobility than those who do not drive but have an available person to accompany them.

This means that owning a car significantly increases satisfaction with one's mobility; without a car, having someone who will accompany you partially compensates this lack.

Regarding the social activity of respondents, intended as number of activities carried out, those who drive a car carry out many more activities than those who do not. Among the non-drivers, those with someone to accompany them do more activities than those who do not have an accompanying person.

Therefore the car also determines the social dimension of a person's life, even though having an available accompanying person can partially diminish the difficulties.

It must be pointed out that these relationships are not univocal, as other variables correlated positively with driving can influence satisfaction with mobility and with the number of social activities. This is the case of age and health conditions, as those who drive are not only younger but have fewer physical impairments than those who do not. Also car drivers have significantly fewer psychological difficulties or fears than those who do not drive.

Finally, before moving on to public transport, it must be mentioned that a fair percentage of drivers in all age groups would not give up driving in exchange for free bus tickets.

This result -- the importance of the car for the elderly -- is in agreement with other European research studies conducted in this sector (Madre & Bussière, 1995; Traenkle, Gelau & Metker, 1993). Convinced car drivers make up about 16 per cent of drivers; most of them would agree to travel by bus only if they were unable to drive any more (about 75 per cent) or if public transport conditions improved.

This last consideration introduces us to the use and need of public transport by the respondents.

About two-thirds of our respondents use public transport (69 per cent): this result is linked to sex and age (Table 23).

Table 23. **Users of public transport, by sex and age**

(%)

	M	**F**	**Total**
Age 55-69	21.0	22.8	43.8
Age 70-79	17.2	15.0	32.2
Age 80+	16.0	8.0	24.0
Total	54.2	45.8	100.0

As can be seen, with advancing age, the number of people using public transport decreases. Men use public services more, even if this difference is only found in the over-80-year-olds.

The level of satisfaction among those who use it is good: in fact, the average of the whole sample is 7.4, with a median of 7. Only 3.8 per cent were negative (between 0-2) while 33.2 per cent were positive (between 8-10).

One factor which is incisive in the use of public transport is the degree of physical impairment, the more impaired the person the greater the difficulties in using public transport. In our sample, we analysed the percentage of those using public transport with temporary or permanent disability (Table 24).

Table 24. **Use of public transport by persons with physical impairments**

(%)

Use of public transport	**Physical impairments**		
	No problem	**Yes, temporarily**	**Yes, constantly**
Yes	82.7	71.1	48.1
No	17.3	28.9	51.9
Total	100	100	100

It can be seen that temporary impairment considerably lowers the percentage of use, while the presence of permanent impairment reduces the percentage of use still further. If we analyse the non-users of public transport and the reason why they don't use it, we find some interesting results. The non-users, as already seen with the users, are clearly defined by sex and age (Table 25).

Table 25. **Non-users of public transport, by sex and age**

(%)

	M	**F**	**Total**
Age 55-69	12.3	9.6	21.9
Age 70-79	11.7	17.1	28.8
Age 80+	16.6	32.7	49.3
Total	40.6	59.4	100

If we analyse non-use, two apparently contradictory aspects emerge: on the one hand, the absence of need to use public transport and, on the other, the inconvenience of using it. In our society the need is often connected to the offer: probably the percentage of elderly who say they do not need public transport, say so because the difficulties in using it determine an effective non-availability of the means and therefore a perception of not needing it (Marcellini, Pavan & Ulisse, 1989). It must be pointed out that Ancona does not have an underground and that the limited use of public transport is partially due to the limited offer.

If we analyse the kind of public transport used (N=413) and the frequency of use, we find interesting information (Table 26).

Table 26. **Means of transport and frequency of use**

(%)

Frequency of use	**Bus**	**Train**	**Plane**	**Taxi**
Regularly	30.0	2.3	0	0.7
Sometimes	38.5	22.0	8.8	9.5
Never	31.5	75.7	91.2	89.8
Total	100.0	100.0	100.0	100.0

It can be seen that the bus is by far the most used mode, as two-thirds of public transport users take the bus, while one-third takes the train. Aeroplanes and taxis are used by a very limited number of people.

As the bus is the most popular mode, it is interesting to analyse how the elderly rate the bus service, separating users from non-users (Table 27).

Table 27. **Problems with using a bus**

(%)

	Users	Non-users	Total
I have difficulty in getting in and out of the bus because of the high steps	53.0	55.1	53.7
The automatic bus doors are poorly installed, so that you can easily get caught in them	55.6	23.5	23.2
The buses start too quickly and jerkily	74.3	34.8	34.7
Buses run too seldom at certain times of the day	29.1	26.7	28.3
Too few people offer their seat in the bus for a person who needs to sit down	59.8	24.1	48.7
The timetable and route maps are difficult to read and understand	16.9	13.2	12.7
There are not enough seats or shelters at the bus stops	47.9	24.5	40.7

* Multiple answers

The value accorded to these items is higher in the group which uses public transport, except for the items about steps being too high and that buses run too infrequently, which are fairly similar in the two groups.

These last two aspects are problems which concern even those who do not use the bus. For this reason, they can be considered to be among the most important aspects which prevent a certain part of the population from using this public service due to the lack of offer to a given demand. We should also underline that probably the situation with the bus is more common in Mediterranean countries, where there are far fewer low-floor buses.

6. CONCLUSION

It is clear that the profound changes in demographic structure, due to the growth of ageing populations in the western countries and especially in the European Union countries, will require a deep reorganisation of society, whether in public services and the welfare state or in private supply.

Of course, this demographic revolution has, and will have still more in the future, consequences for transport systems and for guaranteeing mobility in the elderly age groups. These two factors will have to undergo changes, bearing in mind the present situation and some possible tendencies:

- The number of potential elderly users will grow as the demographic composition of the population changes and we will have more old people;
- The elderly users will be qualitatively different, as they will work longer, be more alone, have a higher educational level and a certain number -- still a minority but on the increase -- could have reduced mobility or be severely disabled, or have cognitive and sensory disorders (sight, hearing…);

- The majority of the elderly would probably require greater mobility than at present, due to the need to work, travel and have interpersonal contacts, especially in the southern European countries;
- Regarding subjective needs, it has been seen that many elderly people consider outdoor mobility as very important for their quality of life and that a decrease in mobility with growing age does not always depend on a decrease in desired mobility or on health problems, but more often on obstacles and hindrances in the environment and in the transport system;
- There will be more elderly people who own driving licences and cars; in particular, the increase will be proportionally higher among women;
- The elderly are victims of serious traffic accidents and have a negative relationship with today's chaotic traffic.

However, coming back to a wider outlook, we can say that certainly a new balance is necessary between demand and supply, through a reorganisation of the offer and of transport policies, in relation to current changes and to the needs expressed by the elderly:

- The car will still be widely used by the elderly, so that car industries will have to design cars that meet the real needs of the elderly and their performances, which gradually decrease. Closely connected to this greater presence of elderly car drivers, there is the problem of traffic safety, which can be increased with new technological aids, both in the car itself and in the infrastructure. Often elderly drivers adopt compensatory behaviour, probably to balance the decrease in their performance, avoiding long journeys or motorways; in this direction, the new technologies such as telematics can provide much support;
- Improvement of public transport could counterbalance the use of the car, above all in Mediterranean countries, as it better meets the needs of the elderly with reduced mobility, who we presently see to be in a minority. It can be assumed the current "ageing of ageing" will increase the number of people with reduced psycho-physical performance, who today are often only potential or excluded users;
- Improvement of public transport must affect all means of transport, including trains and aeroplanes (design…);
- Greater accessibility and diffusion of accessible transport (e.g. low-floor buses) must be considered. Flexibility in transport is very important and can be implemented by adapting the existing system, or with door-to-door solutions which respond to the needs of the elderly with reduced capacity or who live in isolated areas;
- Also infrastructure must be modified, improving the connectivity and integration between means of transport and security of traffic conditions, especially for pedestrians.

In addition to these foreseen trends, we must introduce a new methodological scheme to confront the problems of the elderly from the market aspect of demand and supply.

The elderly are not an undifferentiated group and so their needs for mobility and transport have to be analysed in relation to many important variables, such as gender, age, income, level of education, degree of disability and even country and residential area.

In fact, there is a great difference in the offer of transport, with diverse accessibility, not only between the northern and southern European countries, but also within the same country or city.

In this case, the offer conditions the need and the perception of it.

To conclude, we can say that the increase in age reduces mobility and the use of means of transport, but that this behaviour is only partly age-related, the present organisation of public transport and the existing offer creating a far from negligible obstacle.

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NORWAY

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CHANGES IN ELDERLY PERSONS' MODES OF TRAVEL

SUMMARY

Oslo, May 1998

1. ISSUES AND DATA MATERIAL

1.1. Background and issues

In 1992, approximately 14 per cent of the Norwegian population were aged 67 or more, totalling some 600 thousand persons. By the year 2030, it is estimated that this percentage will have risen to about 20 per cent (Parliamentary Report No. 4, 1996-97, Supplement). It is particularly among the eldest, aged 80 years and above, that the increase is expected to be largest.

A large number of earlier studies concerned with journeys undertaken by the elderly and activities related to transport have been concentrated on aspects of traffic safety and transit problems (Staahl *et al.*, 1986; Noorbom *et al.*, 1991; Jenstav, 1988). The question of a change in the lifestyle of the elderly has been the theme of the discussion only to a limited degree (Ølnes, 1988; Vilhelmsen, 1989).

Studies of travel behaviour and travel custom throughout time show that it is the increased use of the car, particularly by women, which is the most salient (Vibe, 1993; Hjorthol, 1990; Kranz, 1997). In Norway, the use of the car by men was relatively high from the mid-1970s and for this reason the increase since has not been particularly notable. Concerning women, on the other hand, the increase has been considerable, particularly among the higher age groups.

With regard to travel activity and transport needs, the elderly form a heterogeneous group. Very many have a high level of activity, where health does not place any limits on the desire to travel. Others, however, will be faced with problems regarding movement and will require particular incentives in order to undertake travel.

With the generally improved health among the elderly, increased access to a car, more leisure time and a relatively good income for many, this provides a basis for more varied activities and travel than was previously the case for these age groups. The elderly of tomorrow comprise groups in the population who throughout their working career, have had a relatively easy access to the car and who have developed the habit of using the car, which they will almost certainly carry over to their lives as pensioners.

Following a possible lowering of the retirement age, new groups of younger pensioners will arise with greater vigour and with greater demands on mobility and activity. This group of elderly, who might be referred to as the “youthful elderly”, will thus represent a potential for increased use of the car, both because they assumedly are developing a more car-based life style in their younger years and because they have the means to obtain and drive a car when they become pensioners.

In the future, a larger proportion of the elderly will belong to the eldest group, who, at least today, have reduced mobility. This is a group which will require special services within the transport system, adaptation of the normal public transport and adjustment to the road traffic system, as presumably many will continue to drive a car as long as they are able to do so.

It is important to discuss these two lines of development: increased car use among the younger pensioners and greater demands from the older age groups (both public transport and traffic in general), in relation to those trends emerging in the transport sector and thereby those demands and challenges with which the transport system will be confronted.

In this report, we will concentrate on the development of travel activity and the use of various means of transport. We will describe and analyse the development of travel behaviour and travel habits among the elderly in Norway during the latter part of the 1980s and the early 1990s and, on this basis, discuss possible lines of development.

The main issues can be formulated in terms of the following questions:

- What is the distribution of transport resources among the older age groups and how does this vary between men and women? Has this pattern changed during the period from 1984-85 to 1991-92?;
- What is the extent of travel activity among the various age groups? Has this changed between 1985 and 1992? What is the nature of the cohort effects (generation effects) in relation to the age-group effects? Is there any difference between men and women?;
- What is the pattern of travel purpose (objectives) in the various age groups, also in consideration of gender? Have travel purposes changed within the period 1985 to 1992?;
- What is the distribution of mode of travel between the various groups of the elderly? Have changes occurred in the use of transport means among the elderly between 1985 and 1992 and, in which case, what is the nature of these?

1.2. The data sources

The analyses are based on the results of the two Norwegian national travel surveys conducted in 1984-85 and 1991-92 respectively. The Institute of Transport Economics bore the professional responsibility for both surveys.

The Travel Behaviour Survey 1984-85 (RVU 84/85) was the first comprehensive national travel survey in Norway (Stangeby, 1987). The survey comprised a net sample of 4 320 persons, randomly selected in the age range 13 to 74. The response rate was 77 per cent. The survey was conducted as a series of home interviews by the Central Bureau of Statistics during the period September 1984 until September 1985.

The Travel Behaviour Survey 1991-92 (RVU 91/92) was based on telephone interviews with 6 000 persons aged 13 and above at the time of the interview. The interviews were undertaken by Norsk Gallup A/S. The response rate was 67.5 per cent. These commenced in September 1991 and continued for more than a year.

The two national travel behaviour surveys are constructed along similar lines such that, in principle, they are directly comparable. The survey forms used may be subdivided into three main sections.

One group of questions is concerned with background information on the person interviewed and his/her household; sociodemographic variables, transport resources, health problems associated with use of various means of transport and questions relating to the type of residential area, such as distance and availability of public transport, distance to service institutions, etc.

The next main group of questions is associated with activities and travels the previous day. These are registered so as to include all journeys taken within a 24-hour period commencing at midnight the previous day and are described as a daily log. Total number of journeys, point of commencement and destination, purpose of the journey, the means of transport used and time use were recorded.

The third group of questions is associated with the extent of long journeys. In the survey report RVU 84/85, questions were posed concerning journeys of between 100 and 400 kilometres undertaken during the previous month (medium-distance journeys) and of journeys over 400 kilometres undertaken during the previous six months. In the second report, RVU 91/92, respondents were asked about journeys over 100 kilometres undertaken during the previous three months.

In this report, we will use data which have been recorded in the daily logbook, i.e. journeys undertaken on the previous day.

The age groups selected for analysis in this report are from 50 years and above. In RVU 84/85 these accounted for 32 per cent of the sample and 35 per cent in RVU 91/92. The increase in the age groups' share of the sample is due to the fact that in 1991-92 there was no upper age limit.

1.3. Factors influencing travel activity and choice of travel mode

In general, it may be said that there are three groups of variables which influence the extent of travel and use of transport means. First, there are the transport resources, individual and public transport and the possibility to utilise these. The second group of variables is concerned with that which establishes the need for transport, including activities and responsibilities in everyday life. The third group of variables includes structural relationships, such as the location of the various functions of transport system infrastructure. In this report, we will focus on the first two groups of variables.

Individual and public transport resources

- Driving licence;
- Access to a car;
- Health and mobility factors associated with use of transport means;
- Access to public transport.

The distribution of transport resources is particularly dependent upon income, age, gender and place of residence. The extent of travel and use of transport means vary in accordance with these variables (Hjorthol, 1990, 1997; Vibe and Hjorthol, 1993; Vibe, 1993). Women travel less frequently than men. The elderly, especially women, travel less frequently than younger persons and neither do they use the car so much.

Factors and activities conditioning transport demand

- Children of pre-school age and early school years in the household;
- Work activity;
- Other types of activity outside the home.

Children in the household and paid work are important variables regarding the level of activity, the organisation of daily life and thereby the extent of travel and the use of the car. The household's total activity level is also of significance for time management and the need for flexible transport.

For the older groups, with whom we are concerned in this report, children in the household are of little interest. Paid work activity will be marginal for the eldest. It is thus of interest to observe the extent to which other activities take over from work activity, or whether only the level of activity is reduced.

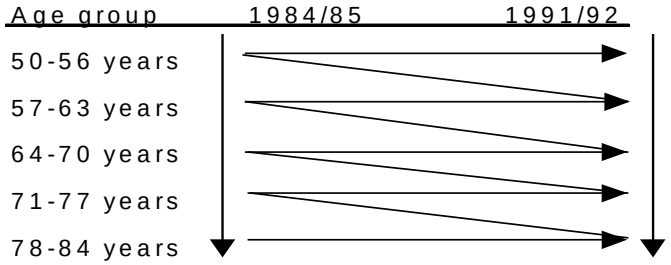
1.4. Cohort analyses

The availability of time-series data from representative samples enables the analysis of cohorts at group levels. A cohort is normally defined based on the date of birth. All people born in the same year or in the same time interval are considered as cohorts. Cohort material provides the possibility to follow the development for a specific cohort group over time, to make comparisons with different age groups at a point in time and to compare the same age groups at different points in time.

Cohort analyses are normally used in studies of social changes where one is interested in the significance both of conditions when growing up and the socialisation process of a specific year group, as well as the effects on all within a certain period.

With the basis in the data sets from 1984-85 and 1991-92, a standard cohort table (Glenn, 1977) is presented which illustrates the various effects (Table 1.1).

Table 1.1. **Standard cohort table for age groups in 1977 and 1985**



Based on a cohort table, three types of effects may be analysed:

1. Cohort effect;
2. Period effect;
3. Age effect.

The Cohort effect, which is measured along the diagonals, shows that the differences in socialisation and earlier experiences between different cohorts can vary, and that specific characteristics will follow the cohort. Intra-cohort comparisons are made by following the same cohort at different points in time, in this case from 1984-85 to 1991-92.

The Period effect (the horizontal lines) is associated with a specific period and applies to all cohorts. Along the horizontal lines, inter-cohort comparisons are made, i.e. comparisons between the same age categories at two different times in order to investigate the period effect. In our example, differences in the economic situation between the two points of time might, for example, have the same significance for all cohorts.

The Age effect (the verticals) is associated with the life span and the ageing process, where one is located along the chronological time scale. Differences between the age groups at the same point in time may be examined by tracing the vertical arrows.

It can be difficult to distinguish between the three effects. In the analyses, all three effects may be of interest. Particular importance is attached to the Cohort and Period effects. These two will possibly amplify each other. When the analyses are applied to the period 1984-85 to 1991-92, this indicates that all cohorts have experienced the same occurrences and external events. They have been subjected to the same period effect. What is then of interest is whether the various cohorts have been influenced by the period effect in the same manner, or whether the cohort effect has had an influence. However, the age effects will also be of interest as changes in adjustment occur which are associated with social change, such as that experienced during the change from work life to pensioner and with the biological changes accompanying the ageing process.

There is a six-year interval between the two surveys. We have therefore chosen to divide the sample into cohort groups, which cover seven birth years: 1908-14, 1915-21, 1922-28 and 1929-35. This corresponds to the age groups, 71-77 years, 70-64 years, 57-63 years and 50-56 years in 1985. In 1992, there will also be those in the age group 78-84 years.

2. DISTRIBUTION AND CHANGES IN TRANSPORT RESOURCES

2.1. Driving licence and access to a car

The driving licence and access to a car are two of the most important assumptions for the mode of travel chosen. While a very large proportion of today's 18- and 19-year-olds in Norway acquire a licence for a car, this was much less common for those in this sample when they were of that age. For the 1984-85 survey, this will concern those who had taken their driving licence in 1953-54 or earlier, and for the 1991-92 survey, the corresponding years were 1959-60. These were periods when it was far less common for youth to acquire a driving licence. This suggests that it is people in these age groups who can have had a need for a driving licence later in life.

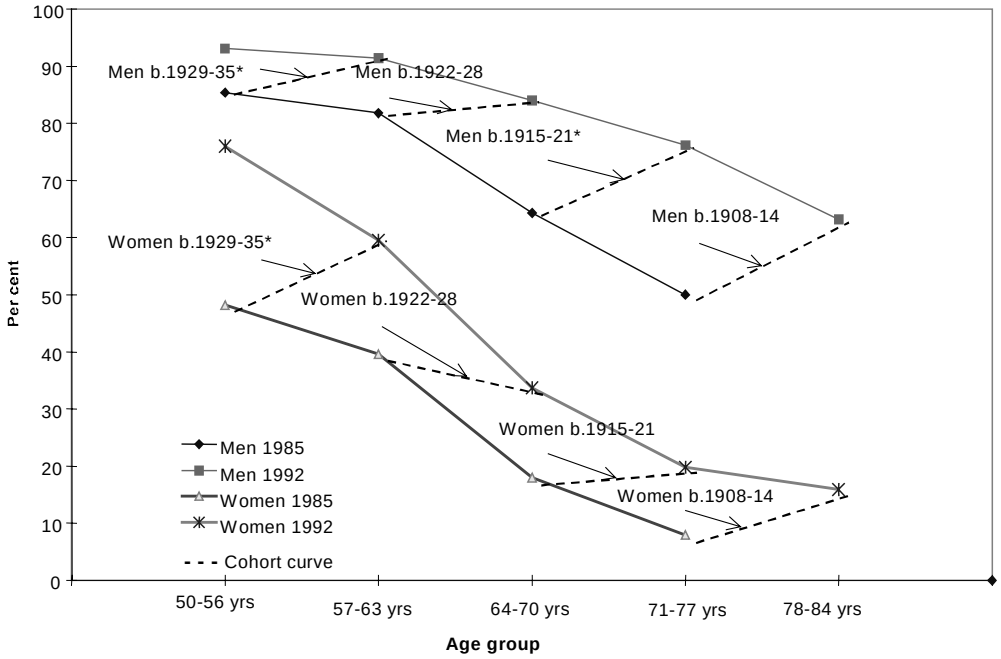
Ownership of a car has a clear association with income. In Norwegian households with an income between NOK 150 000 and 200 000, there are on average 0.98 cars, while there are 1.49 cars per household in the NOK 375 000 to 450 000 (Vibe, 1993). Income declines with age and, correspondingly, car ownership to a certain extent. But even assuming that there is less direct need for a car, for example, in association with paid work, older people still retain the car.

Car ownership, access to a car and use of a vehicle have been closely associated with gender, particularly in the higher age groups (Hanson and Johnston, 1985; Johnson-Anumonwo, 1992; Hanson and Pratt, 1995; Hjorthol, 1990). Older women seldom possess a driving licence and have correspondingly less access to a car than men. The differences are smaller among the younger age groups although even here men have generally more access to a car than do women.

We linked the information on possession of a driving licence and whether a car is found in the household. An examination was then made of the extent to which these criteria were fulfilled among the different cohorts and age groups for men and women in 1984-85 and 1991-92 (Figure 2.1).

The whole lines show the period curves for women and men, respectively. The dotted lines show the cohort curves.

Figure 2.1. **Proportion with driving licence and access to a car in the household, by age group/cohort, gender and year of survey**



* Significance probabilities <0.05

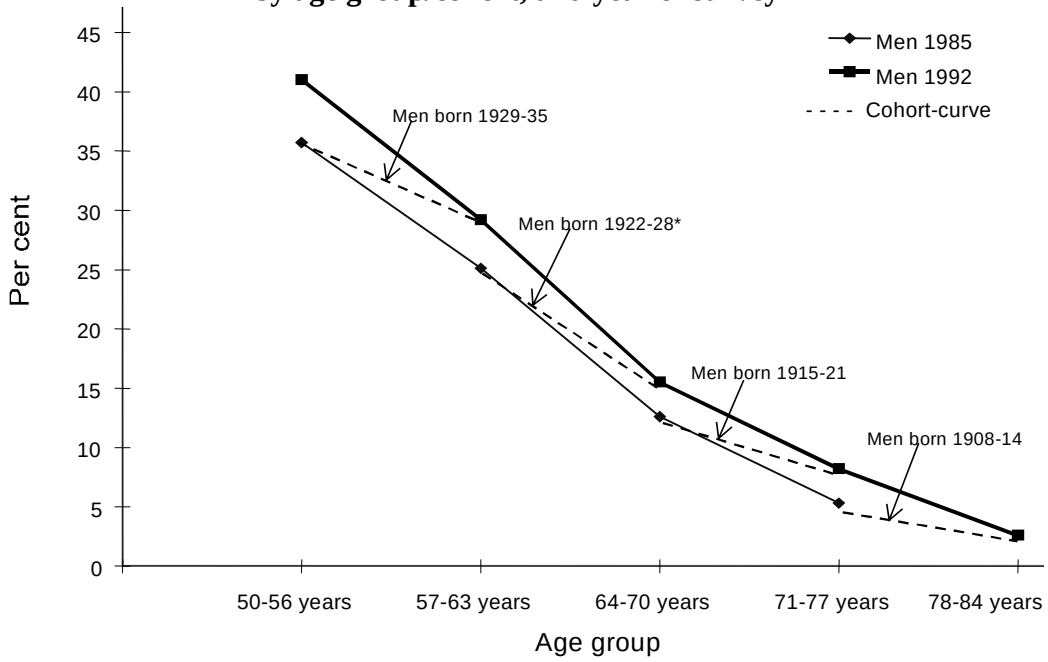
As expected, the proportion of persons having a driving licence and access to a car both in 1984-85 and 1991-92 is higher among men than women, and the share declines with increasing age for both sexes. We also note a distinct period effect in that the curves are clearly located higher for the second survey. Further, there is a significant cohort effect for the youngest women, i.e. among those women who were aged 50-56 in 1984-85 and where there has been an increase in the proportion possessing a driving licence and with access to a car. The same applies to men born in the period 1915-21, i.e. those who were in the age group 64-70 in 1984-85. There is also a similar tendency for men in the age group over 70.

If we look only at those possessing a licence and ignore the question of access to a car, we generally find the same results. This suggests that in the period between the two surveys there is a considerable proportion of women in their 50s who have acquired a driving licence. Among men at the time of the first survey, 85 per cent in this age group possessed a licence, such that there was little opportunity for an increase here. The corresponding percentage among women was 48 per cent. Among men aged 64 and above, however, the proportion with a licence was lower, and many men in this age group acquired a licence in the period between the two surveys.

The car has largely become the property of the individual. An increasing number of households have two cars. In 1984-85, 22 per cent of all households had two cars and 27 per cent in 1991-92 (Vibe, 1993).

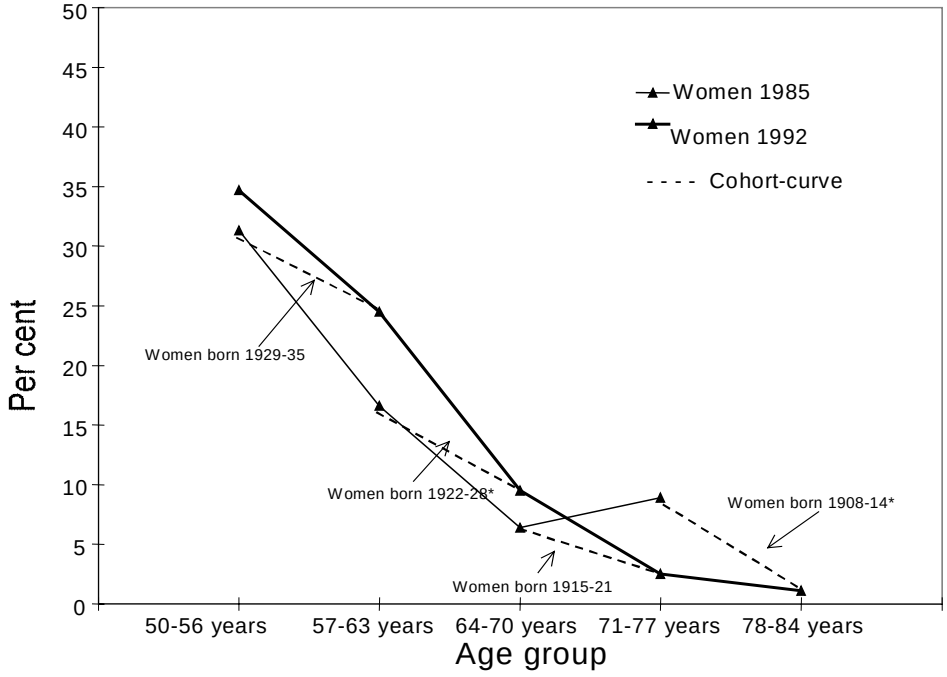
Figures 2.2a and 2.2b show the proportion of the various cohorts where the household has the disposition of more than one car. This proportion declines sharply with increasing age. The share is consistently higher throughout for men than for women. The share declines for all cohorts

Figure 2.2a. **Proportion of men belonging to a household with more than one car by age group/cohort, and year of survey**



* Significance probabilities <0.05

Figure 2.2b. **Proportion of women belonging to a household with more than one car by age group/cohort and year of survey**



* Significance probabilities <0.05

from 1984-85 to 1991-92. Here, we observe a clear age effect, but this first emerges at about 60 years of age. With increasing age there are fewer that have access to two or more cars. This may be associated both with declining income and reduced size of household. The analysis also reveals a period effect. The proportion with more than one car in the household is uniformly higher in 1991-92 than in 1984-85.

The analysis shows a tendency towards an increasing number of households with more than one car, and this also applies to the elderly although ownership of a car declines with age. There is a clear difference between the genders and the pattern is similar for the two survey periods. The gender difference is primarily caused by a larger proportion of women living alone in the elderly group.

2.2. Access to public transport

Another important aspect in the choice of means of transport is access to public transport facilities. In this analysis, we have used walking distance to the bus stop or station as an indication of access, and studied those having less than 15 minutes' walk to the nearest stop.

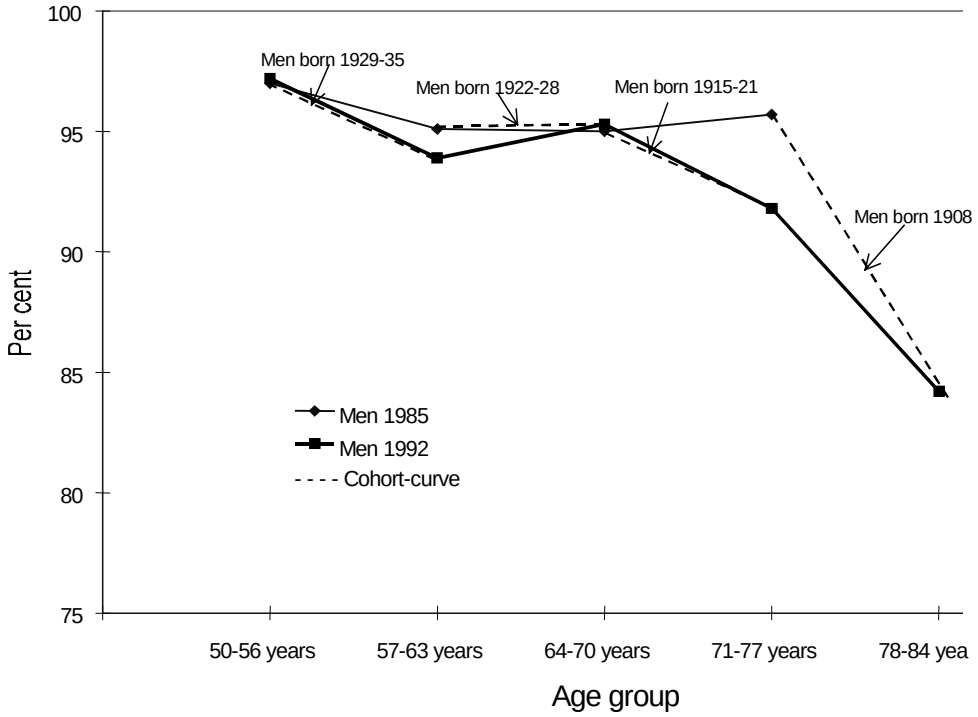
Distance to the nearest stop is a rough measure of the availability of public transport and says nothing about the relevance for the various purposes. As the purpose is to make a comparison between groups and two periods, we can take this to be sufficient as a general indicator. We assume that the relevance of the service does not vary greatly between the groups.

In Figures 2.3a and 2.3b, we have shown the proportion of the various cohorts who have less than 15 minutes' walking time to the nearest bus stop or railway station.

In the oldest cohort there is a decline among men from 1984-85 until 1991-92 in access to public transport. This decline is significant at the 0.05 level but it is difficult to find an immediate explanation for this change. For all the other cohorts, between 91 and 97 per cent have less than 15 minutes to the nearest public transport stop.

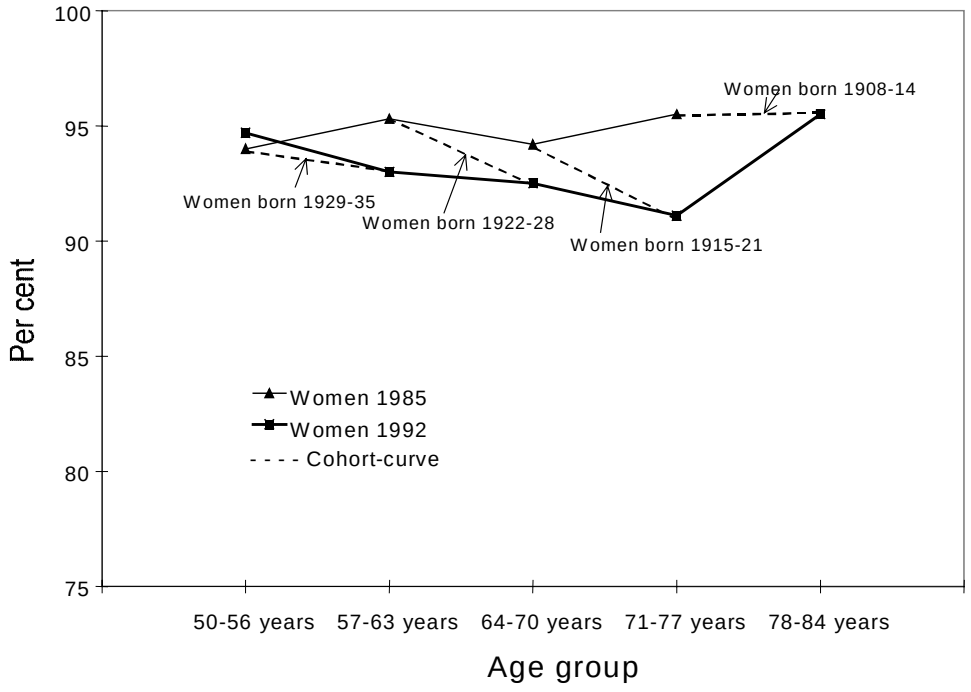
Otherwise, we do not observe any significant differences between cohorts, age groups, men and women, or between the two periods of time covered by the surveys. The public transport supply has been relatively stable in this period.

Figure 2.3a. **Proportion of men with less than 15 minutes' walk to nearest stop for public transport**



* Significance p <0.05

Figure 2.3b. **Proportion of women with less than 15 minutes' walk to nearest stop for public transport**



2.3. Aspects of health associated with means of transport

Health-related problems can be restrictive factors regarding the possibility of access to various means of transport, and it may be assumed that the proportion encountering such problems increases with age. The problems normally arise in relation to the demands of the situation. This may be the various transport means themselves, or the distance necessary to walk. As demands of mobility differ according to the particular means of transport concerned, it is not sufficient to determine a single measure of mobility in order to study the extent to which a person can utilise the different parts of the transport system. In the travel behaviour survey, the subject interviewed was asked if he/she had enduring health problems associated with the various modes of travel, as a car driver, passenger on public transport, cyclist or pedestrian. The replies provide an indicator of the age at which such problems arise and of those age groups where it is a comprehensive problem.

Such knowledge is important concerning both the improvements of the public transport system and those changes which should be made regarding road traffic.

2.3.1. Problems concerning car driving

Figures 2.4a and 2.4b show how large a proportion of persons holding driving licences in the various age cohorts have problems with driving on account of health.

The proportion stating that they have problems with driving a car varies from 3 to 12 per cent for the various cohorts, with the exception of women in the oldest age group where as much as 21 per cent have problems. For the eldest female cohort there has apparently been an increase from 1984-85 until 1991-92. However, there are very few in this group (on account of the low percentage holding a driving licence) and the change is not significant.

For men, the analysis shows that car-driving is not particularly more problematic for drivers aged 70-80 than for those aged 50-60. Among women, the eldest group is distinguished by the fact that at least a fifth state that they have problems when driving a car. Otherwise, there is no significant difference between men and women in the different age groups or between the two surveys. In other words, there is a relatively small and stable group who feel that they have problems when driving. The data do not provide a basis for stating how many of the eldest groups have previously held a driving licence and no longer possess one on account of health. Statistics in this area are lacking and it is difficult to arrive at any reliable numbers.

Figure 2.4a. **Proportion of men stating that they have problems driving a car by age group/cohort and year of survey (per cent)**

Figure 2.4b. **Proportion of women stating that they have problems driving a car by age group/cohort and year of survey (per cent)**

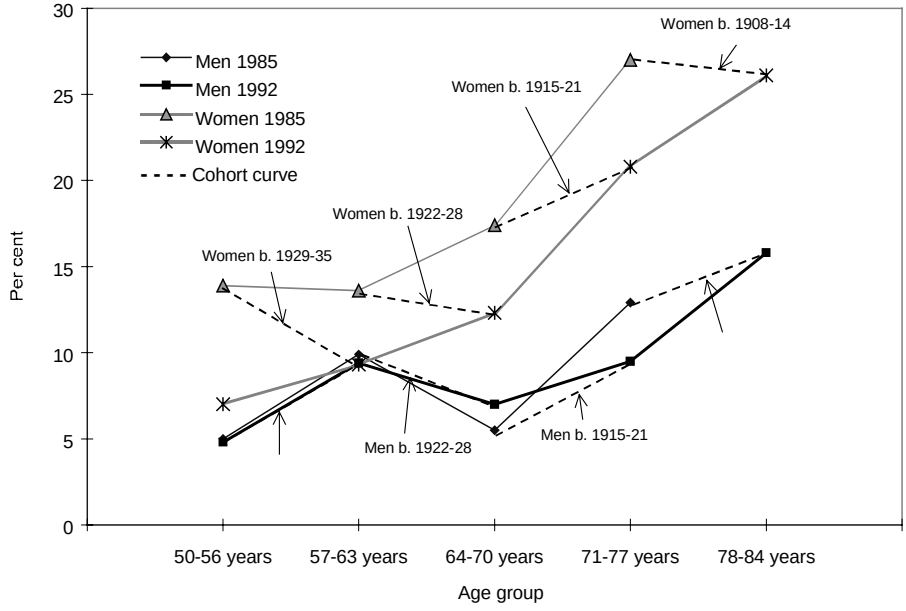
Personal reports concerning driving a car do not state the extent to which problems are associated with the ageing process. Even though the individual driver does not feel that he/she has problems with control of the car, objectively it may be seen as such. Vision, hearing and reaction are all weakened with age, and this can result in problems when driving. Traffic safety research shows that the elderly are more frequently involved in accidents than younger persons. They are particularly often involved in accidents at crossroads, indicating that they are less able than younger drivers to recognise and/or evaluate traffic situations sufficiently quickly (Hakamies-Blomqvist, 1993).

The analysis thus shows that a personal evaluation of possible problems encountered as a driver does not necessarily correspond with the actual situation, and that obligatory testing of driving skills can be necessary with increasing age.

2.3.2. Problems when travelling by public transport

The proportion of those who experience health problems when travelling by public transport varies from about 5 per cent among the youngest age groups to about 25 per cent among the eldest (Figure 2.5). It is higher among women than men and this difference increases among the higher age groups. There is no significant difference, however, over time for any of the cohorts and the effect of age is the predominant factor in this problem. It appears that the increase in the problem is greatest for those aged 70-75.

Figure 2.5. **Proportion of persons experiencing health problems when travelling by public transport, by age group/cohort, gender and year of survey (per cent)**

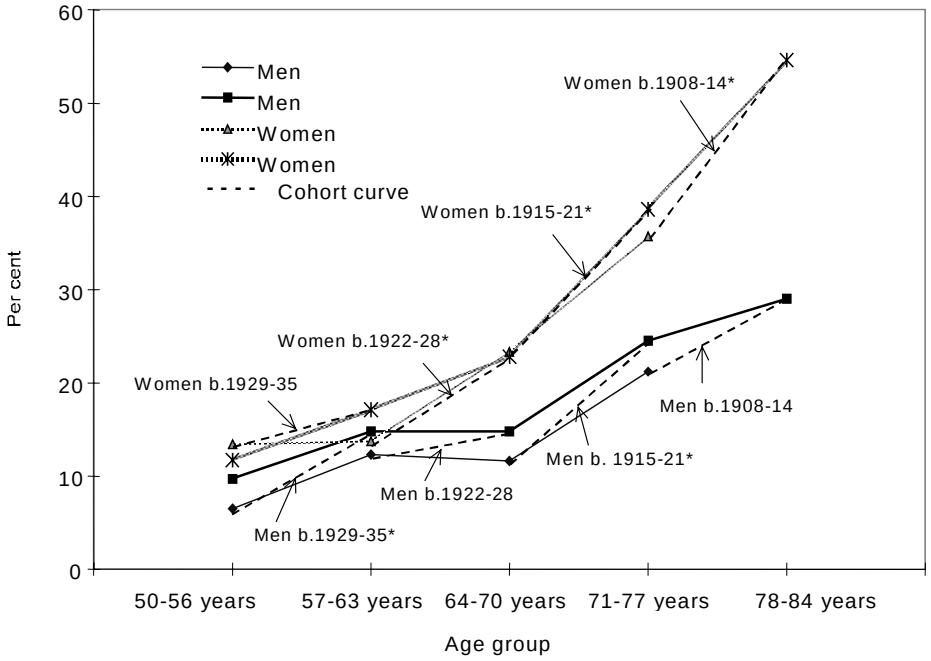


The analysis shows that it is among the eldest groups aged 78-82 years that there is a large proportion of the population who experience problems when travelling by public transport, including as much as 25 per cent of women. Public transport thus faces a challenge to provide services particularly applicable to this group.

2.3.3. Problems as cyclist and pedestrian

The association between age and those restrictions imposed by health clearly emerge when considering use of the bicycle. Figure 2.6 shows that this problem becomes very pronounced with age, particularly for women. Among women in the 64-70 age group, 23 per cent have problems with cycling; among the eldest, the proportion is 54 per cent. For the three eldest cohorts, there is a significant increase from 1984-85 to 1991-92.

Figure 2.6. **Proportion of persons experiencing health-associated problems when cycling by age group/cohort, gender and year of survey (per cent)**



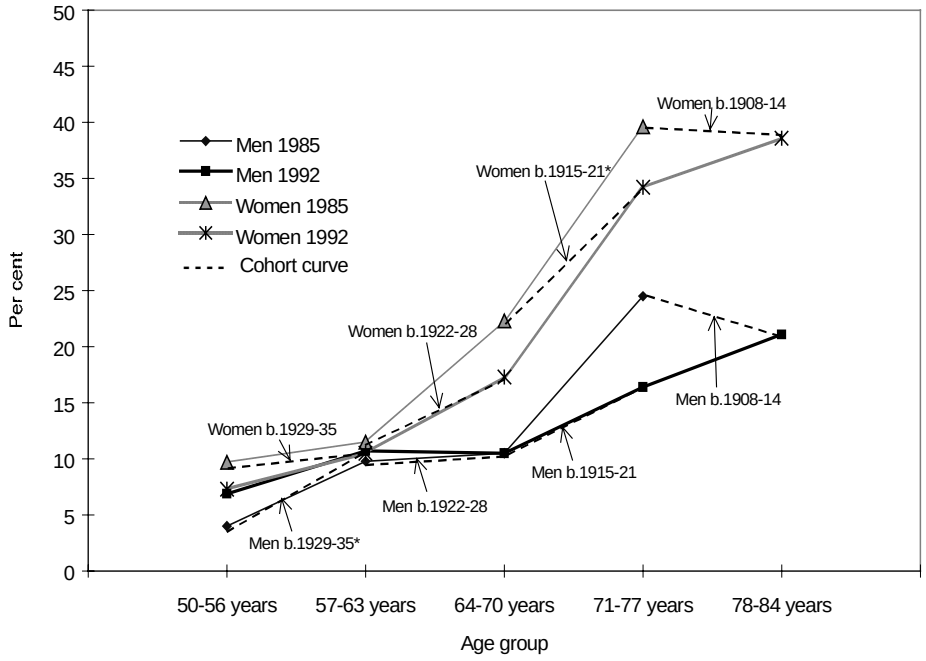
* Significance p <0.05

The increase is somewhat less for men, but here also it is significant for two of the cohorts. There is a relatively large difference between men and women in the eldest cohorts. This may be due to the low proportion of women possessing a driving licence, which necessitates a greater need for an alternative means of transport than is the case with men, and that the restrictions imposed by health are therefore more discernible.

The analysis shows that even for the age of 65 and above there is a significant proportion of the population who state that they have problems in using the bicycle, some 15 per cent of men and 25 per cent of women.

The differences in the cohorts regarding health restrictions for pedestrians are basically similar for cyclists, except for the fact that the eldest cohort is at approximately the same level in both of the surveys (Figure 2.7). However, there is no difference between the two eldest age groups.

Figure 2.7. **Proportion of persons experiencing problems as pedestrians by age group/cohort, gender and year of survey (per cent)**



* Significance p <0.05

The analysis shows that, from the age of 70, approximately a quarter of all men and up to 40 per cent of women experience health problems as pedestrians. This suggests that a large proportion in these age groups require a particular means of transport.

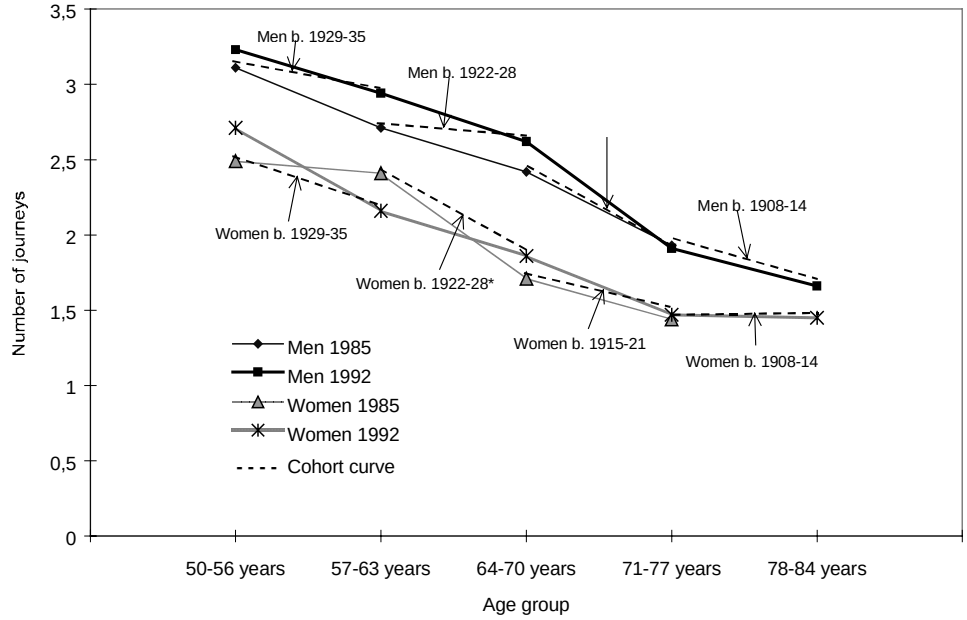
3. THE EXTENT OF CHANGE IN TRAVEL ACTIVITY

3.1. Travel activity in different ages and cohort groups

The average number of *journeys* per day for our sample (50 years and above) was 2.4 in both 1984-85 and 1991-92. This represents fewer journeys than the mean for the whole of the population aged 13 and above, 3.2 journeys per day (Vibe, 1993). Figure 3.1 shows that travel activity at both times of the surveys declines, as expected, with increasing age. Further, women travel less frequently than men.

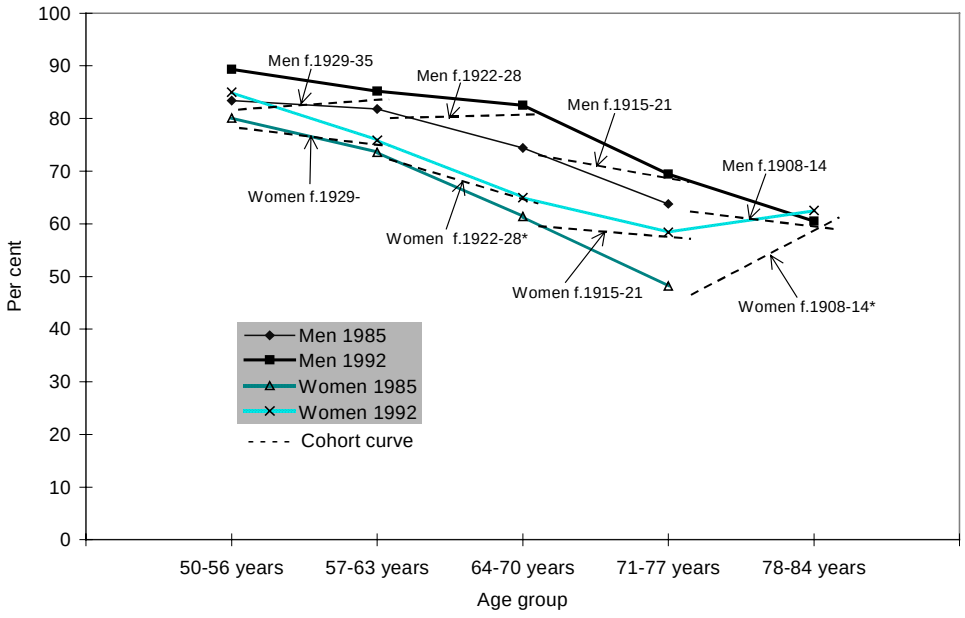
The cohort curves indicate a decline from 1984-85 to 1991-92 for each age cohort. However, this was significant for only two of the cohorts, i.e. men aged 64-70 and women 57-63 at the time of the first survey (1985). This suggests that the decline in travel activity among women occurs at an earlier age than among men. This is mainly due to a lower level of paid work among women than among men. For both sexes, the travel activity curve flattens out after the age of 70. At this stage, women undertake approximately 1.5 journeys per day while men have somewhat less than two.

Figure 3.1. **Number of journeys per day by age group/cohort, gender and year of survey**



* Significance p <0.05

Figure 3.2. **Proportion of persons travelling on the day of the survey by age group/cohort, gender and year of interview**



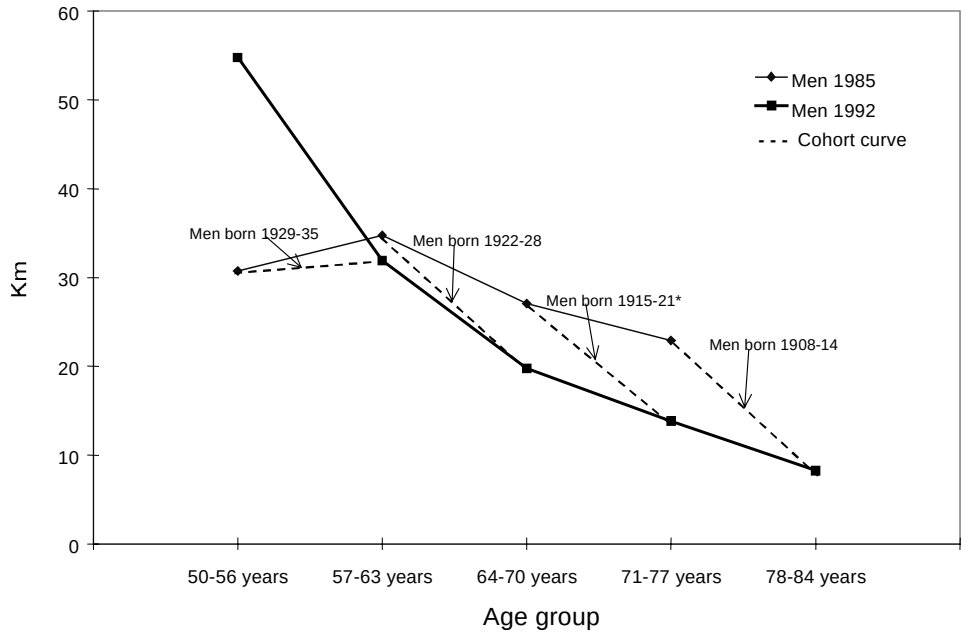
A similar picture is obtained when we examine *the proportion of persons who travelled on the day of the survey* (Figure 3.2). It nevertheless appears that the decline is less here than for total journeys. The cohort curves show a significant decline only in the case of women aged 57-63 in 1985. For the eldest age cohort there is in fact an increase from 1984-85 to 1991-92. Combined, these results can indicate that first and foremost it is the total number of journeys undertaken by each individual which has declined with increasing age, and not so much the total number of persons travelling.

The aggregated daily travel distance also shows a general decline with increasing age and that this is lower for women than for men (Figures 3.3a and 3.3b).

In 1991-92, men in the 50-56 age group travelled further than men in the same age group in 1984-85. There is also a tendency that women in most age groups also travelled further at the time of the second survey. This can be associated with the improved access to a car for women.

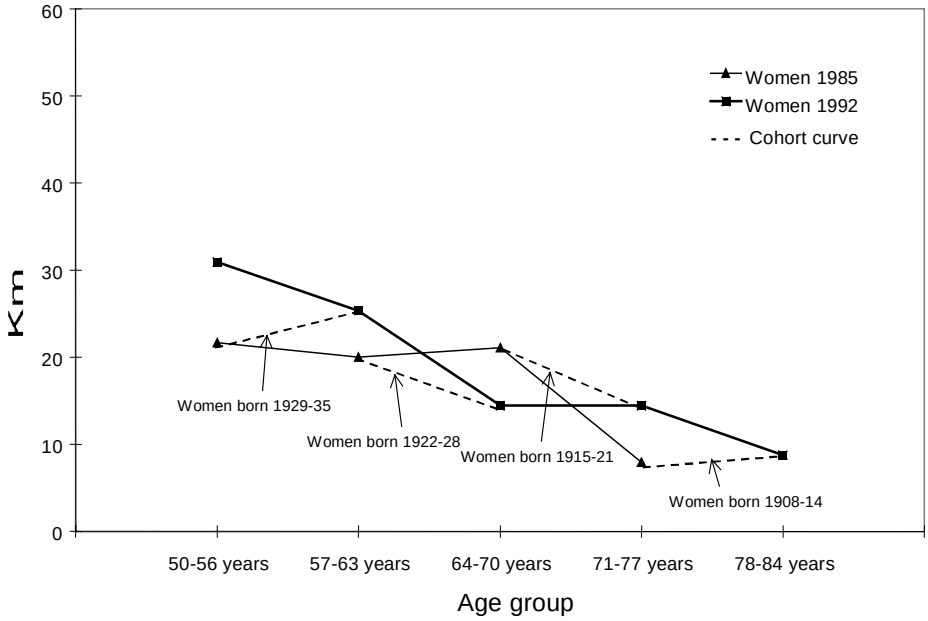
The cohort curves show that the aggregated travel distance among men born before 1929 (i.e. over 56 years in 1985) declined between 1985 and 1992; this effect is significant for men born between 1915 and 1921. The main explanation for the changes being greater for men than for women is the transition from work to retirement. Among these cohorts, the difference in working activity was greater among both men and women than it is today.

Figure 3.3a. **Daily travel distance for men by age group/cohort and year of interview (kilometres)**



* Significance p <0.05

Figure 3.3b. **Daily travel distance for women by age group/cohort and year of interview (kilometres)**



3.2. Journeys by car

There is a significant increase in the number of journeys as driver of a car between 1985 and 1992: this applies to all age groups and both sexes (Figure 3.4). This increase is due to a reduction in journeys as a cyclist or a pedestrian. (Figure 3.7).

Even though the number of car journeys declines with age, we note that all the female cohorts have maintained their level of journeys by car between the two surveys. The same also applies to the youngest and the oldest male cohorts. In other words, we note here a clear period effect (particularly for women), which shows that the use of the car increases and that the cohorts sustain their use of the car as they grow older. This points towards a slower rate of decline in the total number of journeys with increasing age than was previously the case.

Figure 3.4. **Total journeys as car driver by age group/cohort, gender and year of survey**

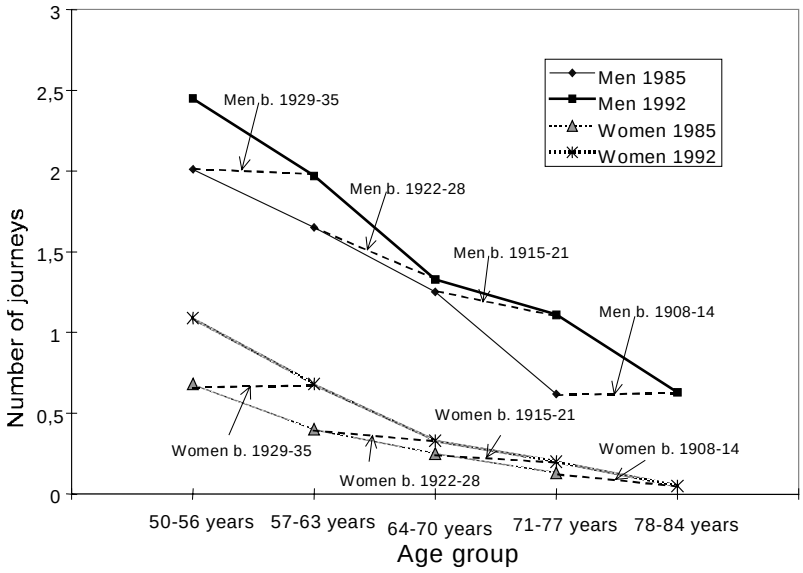
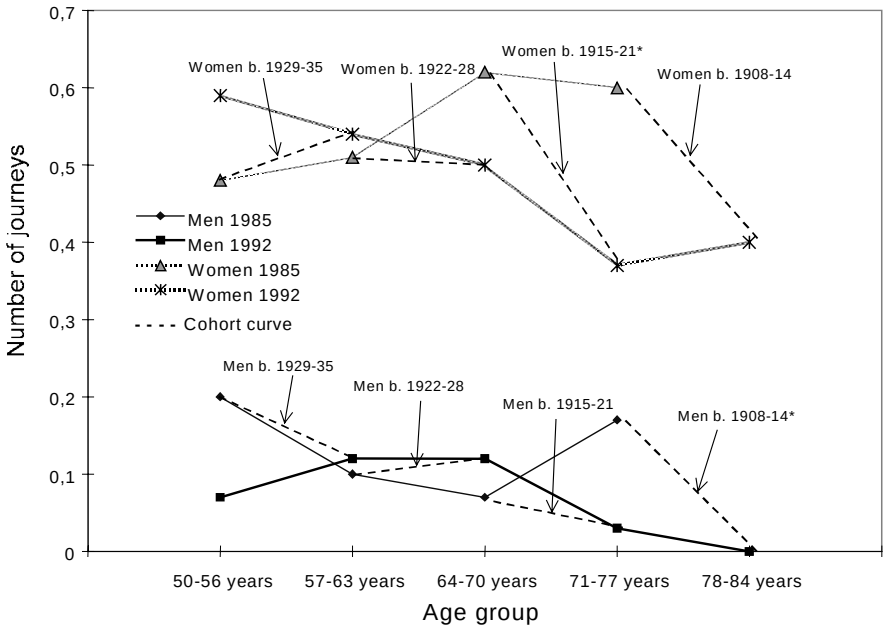


Figure 3.5. **Number of journeys as car passenger by age group/cohort, gender and year of interview**



* Significance p <0.05

Concerning the number of journeys as a passenger (Figure 3.5), we note that the average is three times higher for women than for men. These results confirm that car journeys by men are essentially as driver while for women they are as passenger, as might be expected from the differences between the genders concerning access to a car and possession of a driving licence. The phenomenon is also

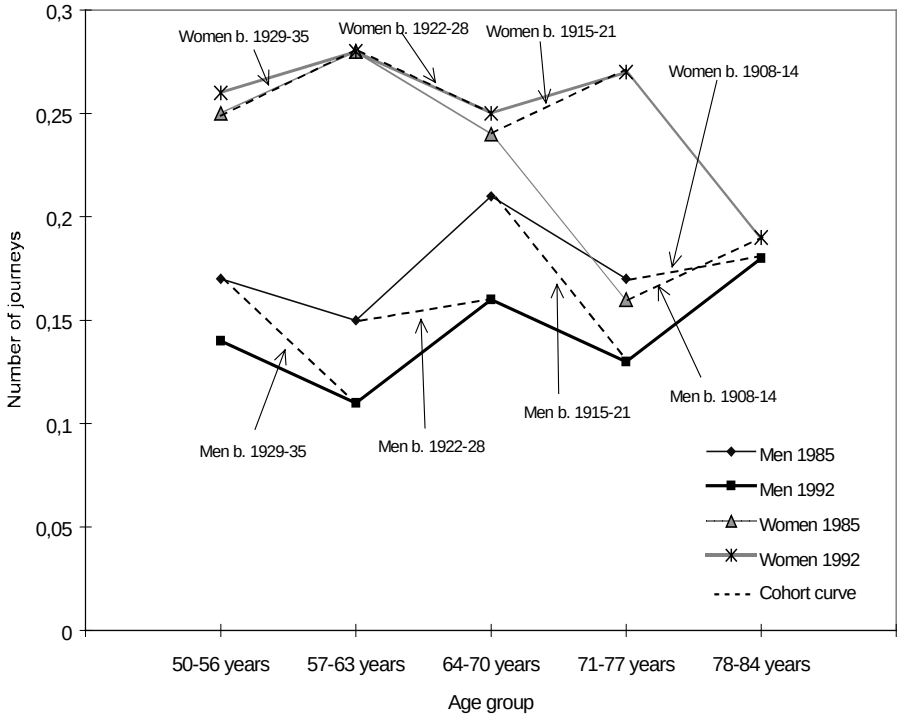
found among the younger age groups. In addition to the actual differences between these elements (access to a car and possession of a driver's licence), there is a strong component associated with gender which enters into the picture.

For the eldest cohorts, there is a decline in the total number of journeys as passenger between the two surveys. This is first and foremost the consequence of greater access to a car.

3.3. Journeys by public transport

Regarding travel by public transport, we find no systematic differences between the two surveys (Figure 3.6). However, women travel by public transport considerably more than men, with the possible exception of the oldest age groups.

Figure 3.6. **Number of journeys by public transport by age group/cohort, gender and year of interview**



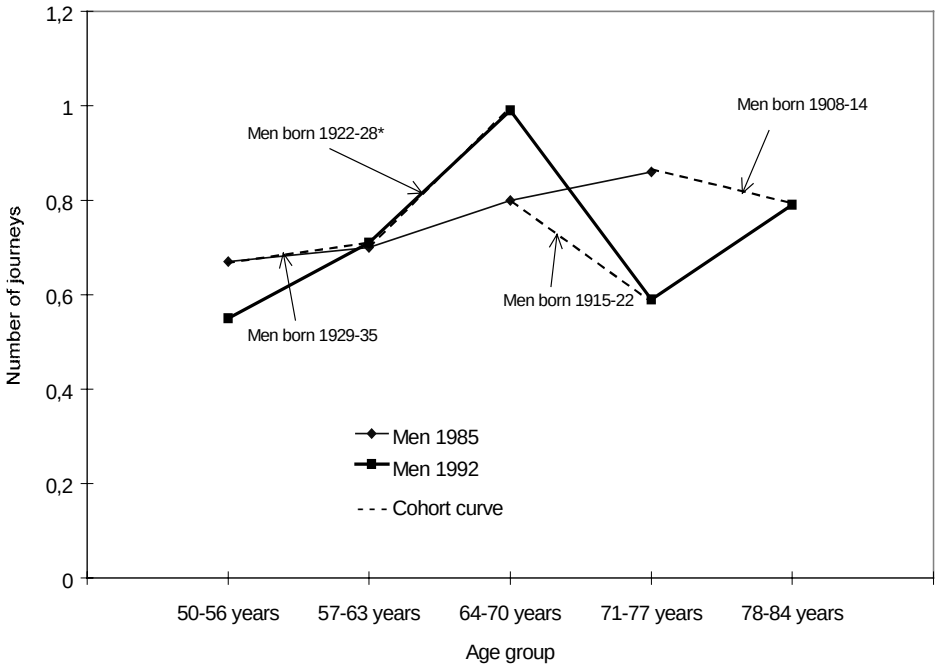
The stable use of public transport by these age groups differs from that of the younger age groups, where the decline is evident (Vibe, 1993). This suggests that the older age groups have developed habits regarding the use of public transport but it also indicates that they assumedly have less access to a car than the younger age groups. As this is undergoing change, a decline in the use of public transport may be expected even among the oldest age groups.

3.4. Journeys as pedestrians and cyclists

For cyclists and pedestrians, there has been a decline in the number of journeys between 1984-85 and 1991-92 (Figures 3.7a and 3.7b). This decline has been particularly prominent among women aged 50-63. This is presumably associated with the fact that it is also this group which has enjoyed the greatest increase in access to a car and possession of a driving licence.

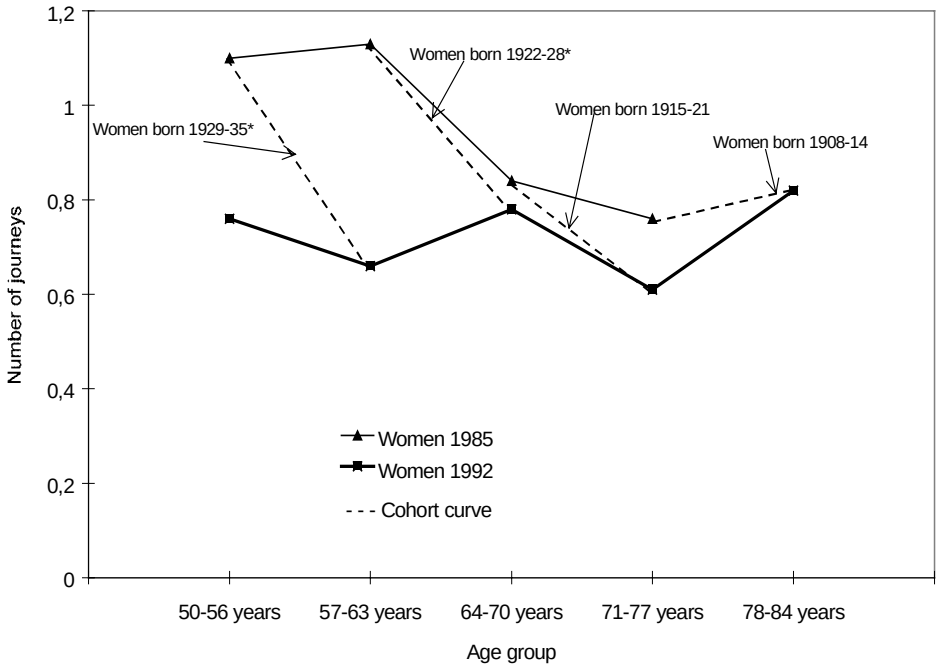
The variations between the age groups are, however, not as large as one might believe, based upon the increase in health problems related to age as shown in Chapter 2. This suggests that pedestrians in their 70s frequently continue to walk. As we observe in this analysis, there is no significant decline in the total number of journeys as a pedestrian in the oldest cohorts.

Figure 3.7a. **Number of journeys as pedestrian and cyclist for men by age group/cohort and year of interview**



* Significance p <0.05

Figure 3.7b. **Number of journeys as pedestrian and cyclist for men by age group/cohort and year of interview**



* Significance $p < 0.05$

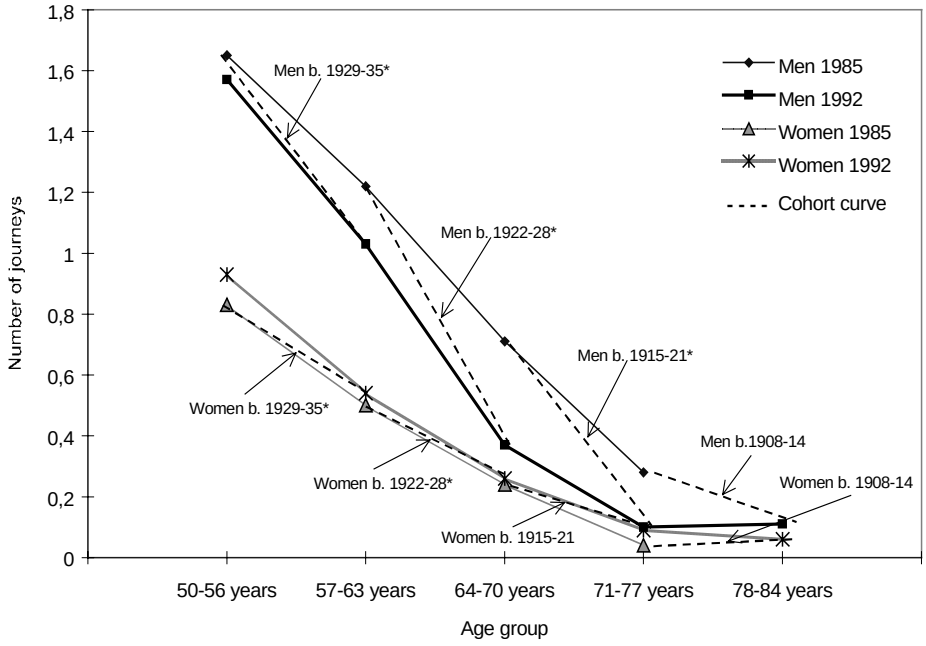
4. JOURNEY PURPOSES –- DISTRIBUTION AND CHANGE

4.1. Distribution of journey purposes between age groups and cohorts

The purpose of a journey has been grouped into three categories: *necessary journeys* include journeys to work, travel in connection with work/business and education and journeys connected to responsibility for children and other persons; *optional journeys* include leisure time travel, visits and other unspecified journeys; *shopping journeys* comprise a separate category.

As shown in Figure 4.1, there has been a very strong decline in *necessary* journeys with increasing age, particularly for men. This is naturally associated with the transfer from work to retirement in respect of this age group. In addition, there were significantly fewer necessary journeys by men in 1992 than in 1985; the decline is largest for the age group 64-70 ($p < 0.01$). For women, on the other hand, there is no significant difference between the two surveys. These results are presumably associated with the fact that men in their 60s have been increasingly affected by unemployment during this period. The cohort curves in Figure 4.1 decline more sharply than the age group curves as they capture both the decline in travel activity with increasing age as well as a period effect which encompasses fewer work journeys in 1992 than in 1985.

Figure 4.1. **Number of necessary journeys by age group/cohort, gender and year of interview**



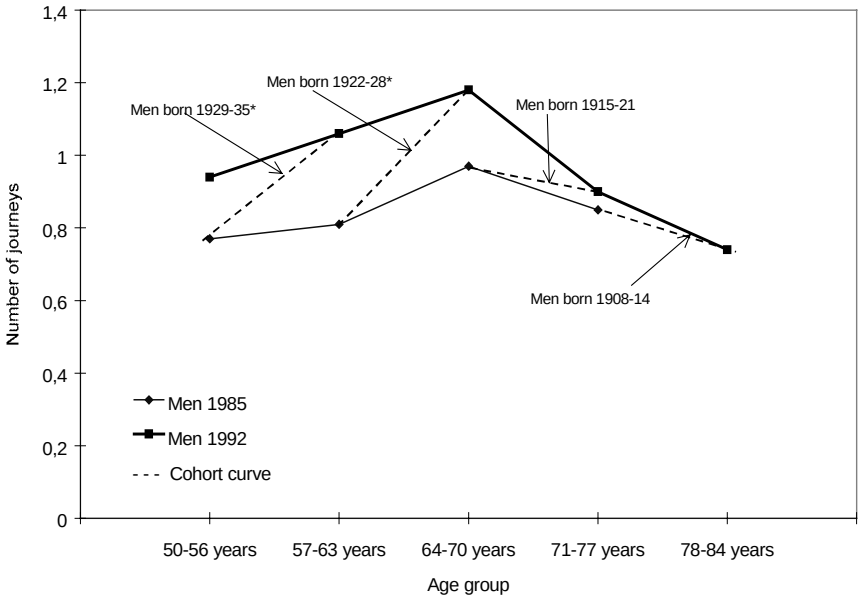
* Significance p <0.05

4.2. Optional journeys and shopping trips

There has been a notable increase in optional journeys undertaken by men (Figure 4.2a). This is significant for the two youngest cohorts. For women, however, there are no significant changes between the start and end of the period (Figure 4.2b).

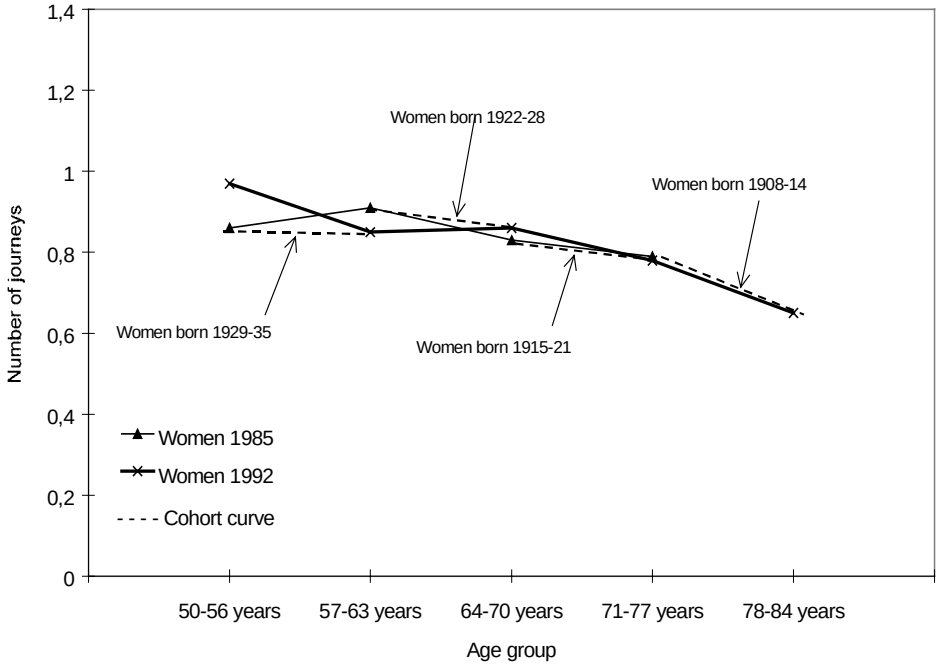
This may be associated with the fact that leisure time has increased during the period and that working men now have more time at their disposal for this type of journey. It appears also that the time men stay at home has declined, something which can indicate more outgoing forms of activity and associated travel (Haraldsen and Kitterød, 1992).

Figure 4.2a. **Number of optional journeys of men by age group/cohort and year of survey**



* Significance p <0.05

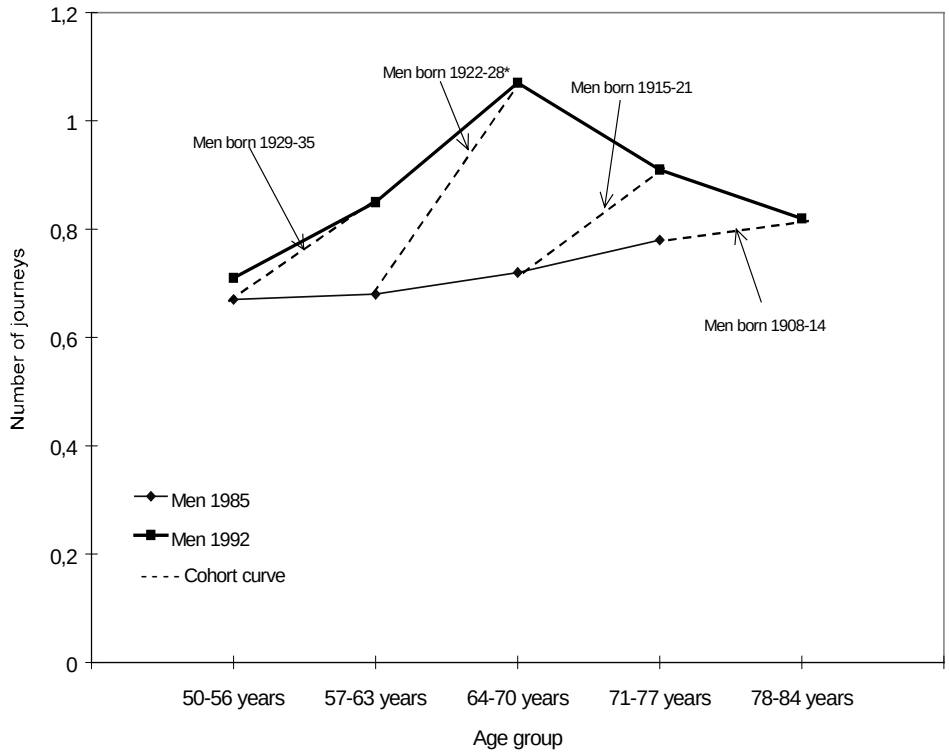
Figure 4.2b. **Number of optional journeys of women by age group/cohort and year of survey**



There has also been a marked increase in shopping trips by men, particularly for those aged 64-70 (Figure 4.3a). For women, on the other hand, the picture is more diffuse (Figure 4.3b). There is a significant decline between the two surveys for the next-youngest cohort, but otherwise there are no noteworthy differences. Among the younger age groups it is more common for the woman to undertake the shopping. The results from this analysis suggest that men participate more actively in household-related activities with increasing age and that this is a growing tendency.

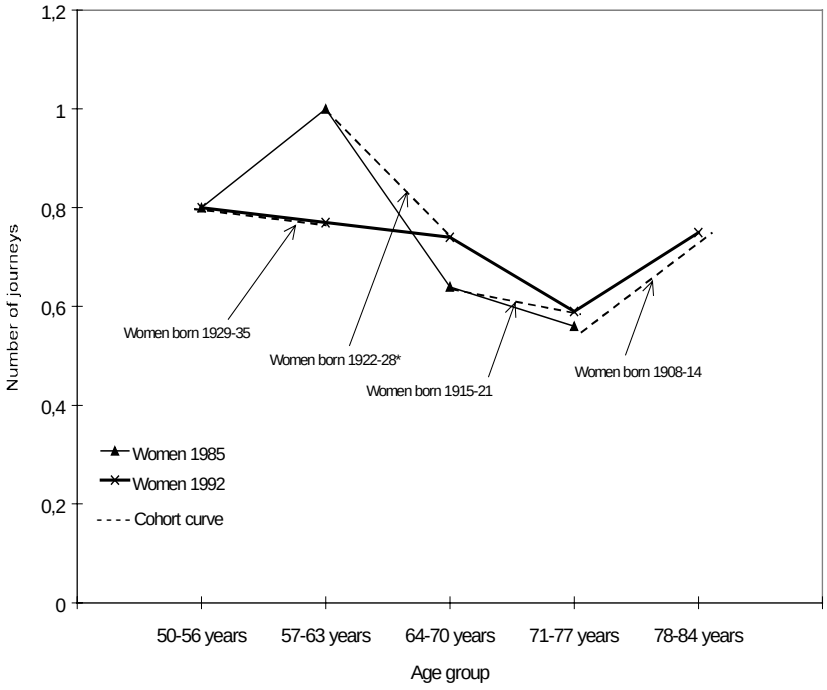
The analyses in this chapter show that travel purposes for men and women become more similar with increasing age. It is also indicated that men have acquired a greater responsibility for shopping trips over time. It may be a period effect, whereby men have been drawn into household-related activities to a greater extent. Generally speaking, men have a higher level of outward-going activity than women, which is partly associated with their greater access to a car.

Figure 4.3a. **Number of shopping trips for men by age group/cohort and year of interview**



* Significance p <0.05

Figure 4.3b. **Number of shopping trips for women by age group/cohort and year of interview**



* Significance p <0.05

5. SUMMARY AND SOME ASSUMPTIONS ABOUT FUTURE DEVELOPMENT

From the year 2000 and beyond, it is estimated that the proportion of the total population aged 67 and above will increase (Special Supplement to *Parliamentary Report* No.4, 1996-97). By the year 2020, there will be some 800 000 in these age groups. Today, these people are in their mid-40s and above. Today's 40- and 50-year-olds comprise that group with the highest car ownership and who also use a car the most. For all types of transport planning, it is of interest to know whether these cohorts will have other transport behaviour than those who are in the old-age groups of today.

The results of the analyses in this report point to some development trends which are important in connection with planning.

5.1. Increase in possession of a driving licence and access to a car

The analyses in this report have shown that there is an increase in the proportion of the elderly possessing a driving licence and having access to a car. The number of households with more than one car is also increasing. These increases are manifest in the total number of car journeys, both for women and men and in all age groups. Here, the cohort effects clearly emerge. The car-use habits are retained from the first to the second period. Simultaneously, journeys by public transport, by bicycle and as pedestrians show a decline.

As access to a car is limited and possession of a driving licence by women in these age groups remains relatively low, this represents a high potential for an increase in licences and car-use within the group. In 1991-92, less than half of all women aged 57-63 possessed a driving licence and had access to a car, while 90 per cent of men were in this situation. The difference is even greater among the oldest group.

The analyses clearly reveal that some of the travel habits are maintained through the ageing process. The challenge facing transport policy today is therefore to ensure that conditions are such that a great proportion of the younger generation utilise public transport, walk or cycle and do not only use the car.

5.2. Health problems are of little significance regarding driving a car

Some experience health problems as they grow older. The analyses in this report show that cycling can become a problem for many aged 70 and above. Movement on foot is not experienced as so problematic. But for those in their 70s there is a relatively large proportion who admit to such problems. The situation is similar for women when travelling by public transport. Concerning car driving, there is a small increase in the proportion stating that they experience difficulties. Among the oldest men with a driving licence, no more than 10 per cent experience health problems connected with driving a car.

The analyses of health problems associated with the various means of transport suggest two important challenges. First, there will be a need to structure public transport services to the increased number of elderly. Consideration must also be given to the types of activities and travel needs of these groups.

The increase in the numbers aged 80 and above will mean that a larger proportion will have a need for special transport outside of the normal public transport services, something which might be resource-demanding.

The other challenge is related to a larger number of elderly drivers with a higher risk both to themselves and other road users. Relatively few of them experience problems in driving a car, even among the higher age groups. This may necessitate a more frequent control of older car drivers, as well as alternative means of transport for this group.

5.3. Increased leisure-time journeys and shopping trips

Following the decline in necessary travel, leisure-time journeys and shopping trips will become more important in everyday life. The increase in such journeys between the first and second surveys also points towards a higher level of activity among the elderly. This is a type of journey where the car is used more frequently than with work-associated journeys, such that this will also lead to increased use of the car. The result will presumably be a decline in the demand for public transport, at least among those who are able to drive a car. The challenge is to develop a public transport service which covers other needs than work journeys, such as service lines, demand-responsive transport, etc.

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SUMMARY

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1. INTRODUCTION

This paper starts by considering the changes in the structure of the population forecast over the next twenty to twenty-five years, particularly the increases in numbers of people of retirement age. It continues with an examination of present transport use by people aged 65 and over and then discusses how this use might be expected to change in the future.

The sources used for data relating to demographic changes, life expectancy and the personal financial situation of elderly people are primarily OECD and European Commission statistics ("Eurostat"). These sources are supplemented with more specific data relating to the UK, which in common with almost the whole of western Europe, faces the challenge of dealing with a substantial increase in people of retirement age who will continue to expect to have a high level of personal mobility.

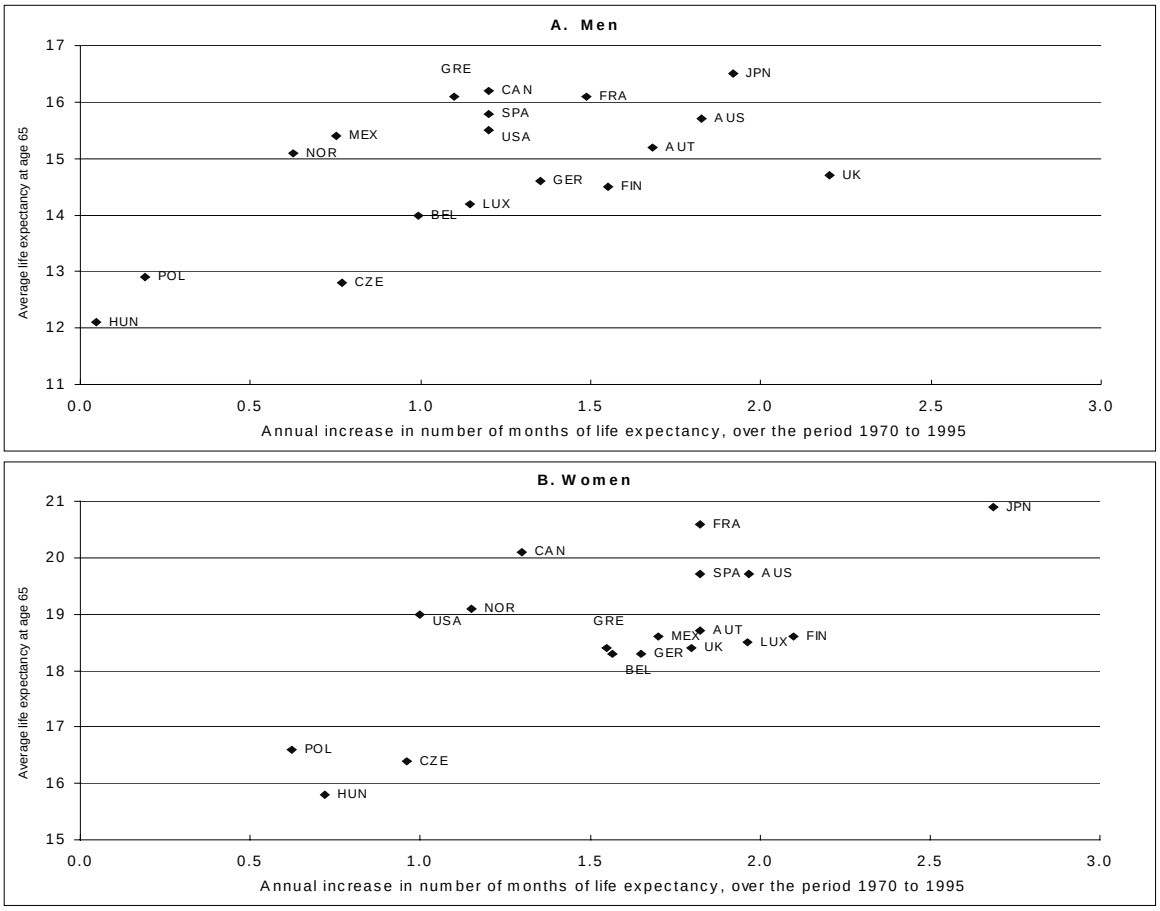
> *"It is of profound importance to the European Union and to governments at national and regional levels that all possible measures are introduced to extend the potential for independent living among elderly people."*
>
> (From COST 322 Final Report, 1995)

2. CHANGES IN LIFE EXPECTANCY AND AGE PROFILE

Over the twentieth century, life expectancy in developed countries has increased substantially and there is no indication, as yet, that this increase will not continue into the next century.

The figures below[1] show the changes over a period of 25 years in the average increase of life expectancy for men and for women aged 65. The increase is expressed as an annual increase in numbers of months of life expectancy. Thus, in the figure for 65-year-old men, UK males have shown an average of about 2.2 months increase in life expectancy per annum over the 18 years from 1976 to 1994, equivalent to a total increase of about three-and-a-quarter years. This is the highest rate of increase among males; a more usual average for western European countries is around 1.3 to 1.6 months per annum. It is also noticeable that for the three eastern European countries (Hungary, Poland and the Czech Republic), the absolute life expectancy is lower and the rate of increase is also lower.

Figure 1. **Links between life expectancy at age 65 and average increase of life expectancy**[a, b]



Notes: a. Data on the X-axis refer to the period 1970-95 except for Germany, Greece, Mexico, United States, 1970-94, Belgium 1970-93, Canada 1971-94, Denmark 1982-94, Finland 1971-95, Iceland 1979-95, Italy 1981-94, Luxembourg 1971-93, Netherlands 1986-95, Portugal 1990-95, Sweden 1987-93, Switzerland 1982-95, United Kingdom 1976-94.

b. Note that the Y-axis is differently formatted for men and women.

Source: OECD Health database (1998).

This is also true for women (see lower part of Figure 1) with most of the western European females showing average annual increases of between 1.5 and 2.0 months compared with 0.5 to 1.0 month for the eastern European women.

Given these changes in life expectancy, it is no surprise to find that European countries have an ageing demographic profile. Table 1 summarises population forecasts in total and for people of retirement age to 2020.

Table 1. **European population forecasts (’000)**

Country	1995	2020	Per cent change overall	Per cent change 65+
Austria	7 991	8 248	+3.2	+31.4
Belgium	10 145	10 535	+3.9	+40.4
Denmark	5 214	5 364	+2.9	+22.5
Finland	5 109	5 223	+2.2	+54.0
France	58 048	63 453	+9.3	+51.2
Germany	81 944	81 478	-0.6	+34.3
Greece	10 442	10 821	+3.6	+41.0
Ireland	3 580	3 795	+6.0	+47.8
Italy	57 585	53 484	-7.1	+32.0
Luxembourg	387	410	+5.9	+43.6
Netherlands	15 433	17 270	+11.9	+55.6
Norway	6 272	6 766	+7.9	+38.3
Portugal	10 519	10 629	+1.0	+30.6
Spain	39 170	36 877	-5.9	+27.9
Sweden	8 810	9 442	+7.2	+26.2
Switzerland	7 087	7 533	+6.3	+44.3
UK	58 576	62 080	+6.0	+28.7
Total (17)	386 312	393 408	+1.84	+34.1

An increasingly “old” population has a number of implications for personal mobility and transport. Before examining these issues, it is worth reiterating that the sector of the population that will reach retirement age over the next twenty to thirty years is one which is used to a high level of personal mobility, closely allied to a high level of car ownership. As it was put in the recently published report[2] by Help the Aged, the elderly are “re-cycled teenagers” with all the expectations of a continuing active life that that description implies.

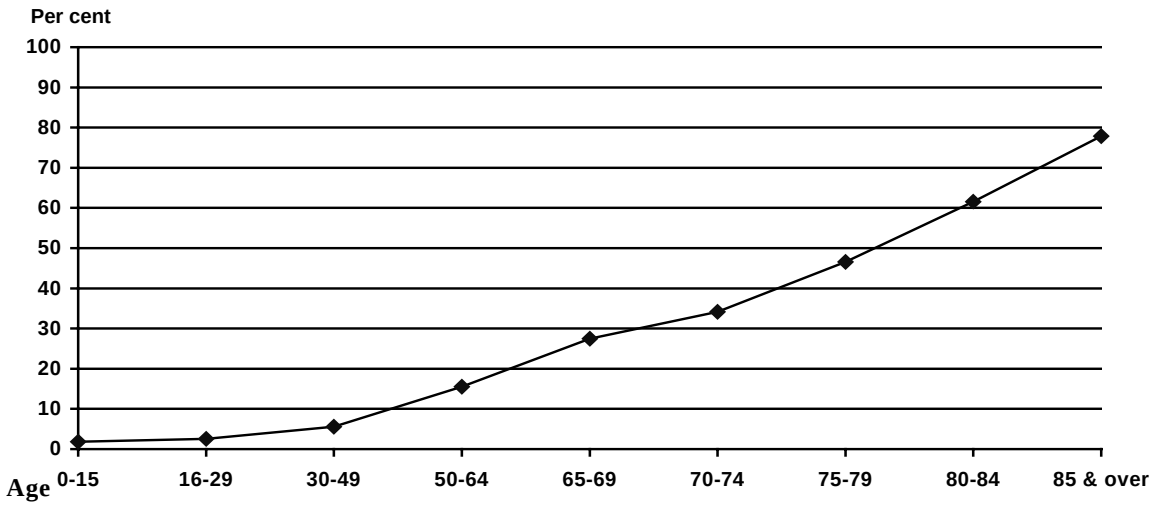
For reasons which will be discussed later, there is something of an in-built contradiction in the consequences of an ageing population and an expectation of maintaining a high level of personal mobility. Most, if not all, European countries have expressed concern over the consequences of uncontrolled growth in movement, especially by car. Policies to limit growth, at least in principle, are commonplace among European countries and there is a variety of different and more specific measures being introduced either as experiments or as demonstrations, quite often supported by European Commission funding.

Against these moves to reduce travel, there is considerable evidence that elderly (and disabled) people still have less personal mobility than younger adults and that improving that mobility can produce significant cross-sector benefits[3].

3. DISABILITY AND AGE

To return to the previous issue of an ageing population, one factor that is related to this is the incidence of disability. Definitions of disability vary from one country to another but there is broad agreement that about 12 to 13 per cent of the adult population is disabled. This proportion is, for obvious reasons, skewed towards elderly people, as Figure 2 shows. Again in general terms, about two-thirds of all people who are defined as disabled fall into the retirement age group and about one-third of all people of retirement age have some degree of disablement.

Figure 2. **Disability in relation to age: per cent disabled**



Source: OPCS Surveys of disability in Great Britain.

The relationship between disability and age then raises the question of whether an increase in life expectancy means an increase in the extent of disability. Or, expressed in a different way, how much of any increase in life expectancy will be free from disability?

Data from the OECD on disability-free life is shown in Figure 3. Health expectancy concepts are not yet harmonized between countries and time-series data is very limited; however, the data in Figure 3 suggest the following:

-- The increase in moderate disability-free life is greater than the increase in life expectancy: the only exception to this occurs among French males;

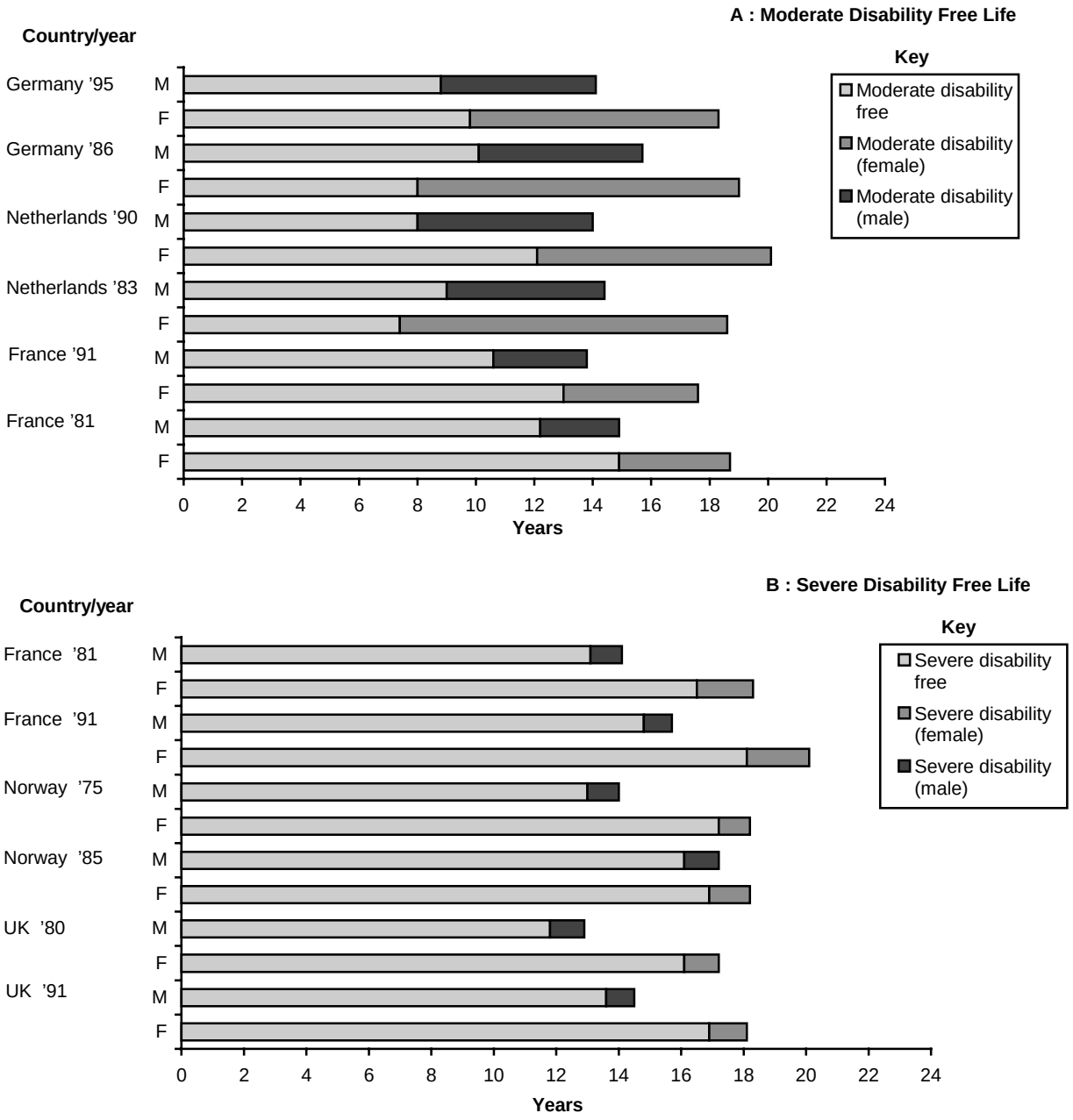
-- The onset of moderate disability is at a fairly similar age for men and for women even though there is a considerable difference in life expectancy between men and women;

-- The corollary to this is that women will, typically, have a moderate level of disability for the last ten years or so of their life compared with about five years for men. Germany appears to be an exception to this in absolute terms (much shorter periods of moderate disability) but not in relative terms between males and females;

-- The changes in the occurrence of severe disability do not show such a consistent pattern. In three cases (women in France, men and women in Finland), the increase in severe disability-free life is less than the increase in life expectancy. In the other three cases (men and women in the UK, men in France), the reverse applies but in all examples the differences are small;

-- The period of severe disability is quite short, typically about a year for men and one-and-a-quarter to two years for women.

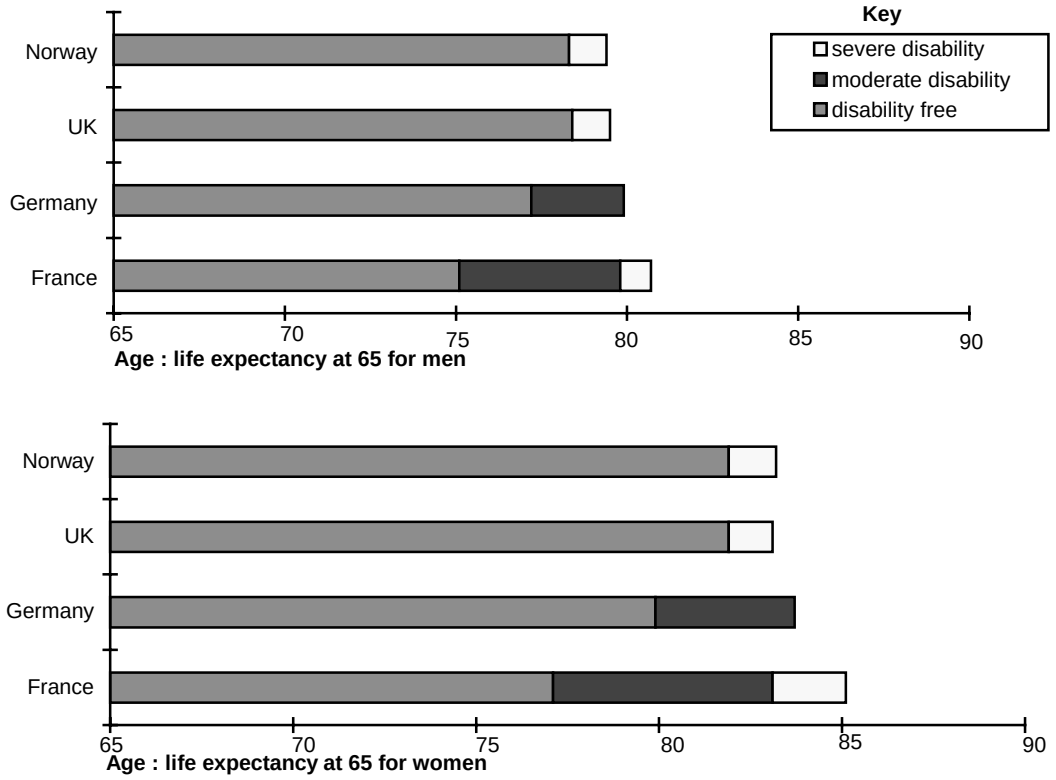
Figure 3. **Trends in total life expectancy and disability-free life. Base: life expectancy at age 65**



Source: OECD (1998), *The Caring World*.

In summary, the figures suggest that, as a generality, at present men and women can expect to maintain an active, largely disability-free life up to their mid to late seventies, with the onset of more severe disability at the end of the seventies for men and early eighties for women (see Figure 4).

Figure 4. **Life expectancy and the onset of disability**



Source: OECD.

Given that the next twenty years or so will see a substantial increase in the numbers of elderly people, the majority of whom will remain physically active into their late seventies/early eighties, it is worth considering the financial resources that this sector has at its disposal.

3.1. Financial resources

For the obvious reason that most people within this age group are no longer in paid employment, the average income will be below that of younger adults. However, apart from healthcare costs, unavoidable expenditure by this group also tends to be lower. Increasingly, people who have worked receive earnings-related pensions once they retire, the consequence of these factors being that disposable income among households of retirement age is not as low as might be expected; it has also risen in relation to disposable income across all households and can reasonably be expected to continue to do so at least in the medium term. In the longer term, this trend will be limited at the point in time at which most people in employment subsequently receive work-related pensions.

Government (public) expenditure on pensions has increased as a proportion of GDP in European Union countries but it perhaps is open to question whether this increase can be maintained in the longer term.

Table 2 shows the relative disposable income for households where the head is over 65 years old. With the exception of the Netherlands, all the countries show a relative increase in disposable income for older households; in contrast to young households (head under 30) which have all relatively fallen.

Table 2. **Relative disposable income for retirement-age household head**

Country	**Relative disposable income (average 100)**	**Point changes over period**	
Denmark	73.4	+4.7	1983-94
Finland	78.1	+1.1	1986-95
France	95.0	+0.8	1979-90
Germany	89.3	+4.3	1984-94
Italy	84.7	+2.9	1984-93
Netherlands	73.7	+4.0	1986-95
Norway	87.5	-8.9	1977-94
Sweden	89.3	+16.5	1975-95

Note: Relative disposable income is the equivalent disposable income of the household group as a per cent of the mean income of total population.

Source: OECD, Income distribution and poverty in selected OECD countries.

The problems that governments may face in maintaining state pensions can be illustrated by the forecast changes in the ratios between people of working age and of retirement age (Table 3). In the European Union countries as a whole, the ratio will fall from a little below 7:1 working age, retired to 4.5:1 by 2025. There are no exceptions to this direction of change and it clearly implies difficulties in future funding of social welfare and healthcare services.

Table 3. **Estimated ratio between adults of working age and of retirement age in EU countries in 1995 and 2020**

Country	Working aged (20-64) / retired (65 and over)		Working aged (20-64) / very old (75 and over)	
	1995	2020	1995	2020
Austria	6.7	4.7	16.5	10.4
Belgium	6.3	4.5	16.2	10.1
Denmark	6.6	4.8	14.5	10.4
Finland	7.1	4.6	17.6	10.2
France	6.7	4.7	16.0	10.3
Germany	6.6	4.4	16.2	9.9
Greece	6.3	4.2	15.5	8.7
Holland	7.6	4.5	17.9	10.1
Ireland	8.9	6.1	21.5	15.0
Italy	6.2	4.0	16.4	8.0
Luxembourg	7.1	4.7	18.5	11.3
Portugal	7.1	5.2	18.5	12.2
Spain	6.7	4.4	16.8	9.6
Sweden	5.8	4.7	12.2	9.2
United Kingdom	6.5	5.2	14.9	11.4
EU total	6.6	4.5	16.1	9.9

Source: UN data, Ageing & Technology, EC Joint Research Centre (1997).

One possible consequence of this future problem with funding of state benefits is that, even though the *average* income of retired people may rise, the spread of income will widen. Those who are in receipt of an earnings-related pension will continue to enjoy relative affluence, but those who rely wholly on state-provided pensions will find themselves increasingly (comparatively) poor.

3.2. Summary

Increases in life expectancy and the effects of the demographic structure of European countries will lead to a significant increase in the number of people of retirement age by 2020. Past changes in the average time of onset of moderate levels of disability suggest that, in the future, this time will be a little later, relative to total life expectancy, than it is at present. The onset of severe disability appears less likely to change in relation to total life expectancy.

The disposable income of households with a head aged over 65 has increased in relation to incomes across adult households in total. Because of growth in the proportion of people who receive earnings-related pensions, this trend should continue, though tempered by the possible inability of governments to continue to pay present (or future equivalent) public pensions. One possible consequence of this is that a minority of retired people relying wholly on state benefits will become relatively poorer.

However, the combination of greater disposable income and longer active life are both likely to lead to greater mobility among the majority of elderly people. In particular, these conditions are expected to produce much higher levels of car ownership among the elderly. The next chapter of this paper considers this issue.

4. ELDERLY PEOPLE AND PERSONAL MOBILITY

As the proportion of the population aged over 65 grows, their travel needs become an increasingly important element in total national transport. It was pointed out in Chapter 2 that people reaching retirement age in the next twenty years have generally been used to a high level of personal mobility; there is no reason to suppose that they will not wish and expect to continue that level of mobility as they grow older.

That said, the elderly are not a homogeneous group. As is pointed out in the 1993 to 1995 National Travel Survey[4], *"The average travel pattern of a fit 65-year-old male is very different from that of a disabled 85-year-old female living alone."* Table 4 summarises British data on journeys made by elderly people in comparison with middle-aged adults.

Table 4. **Journeys per person per year by age, sex and main mode of transport in Great Britain**

Mode	Aged 30-59	65-69		70-79		80 or more	
		Male	Female	Male	Female	Male	Female
Walk	55	81	51	69	43	43	19
Car driver	608	498	99	321	61	123	15
Car passenger	161	50	219	50	159	53	92
Other private vehicle	14	11	7	9	7	12	11
Local bus	49	63	112	88	104	61	55
Other bus	1	2	4	3	2	2	2
Rail	21	10	9	6	5	3	2
Taxi	9	5	6	5	8	6	6
Other modes	15	12	4	12	3	6	1
All modes	934	732	513	562	392	309	204

Notes: Individual figures may not sum to total all modes because of rounding; Excludes journeys of less than one mile (1.6 km).

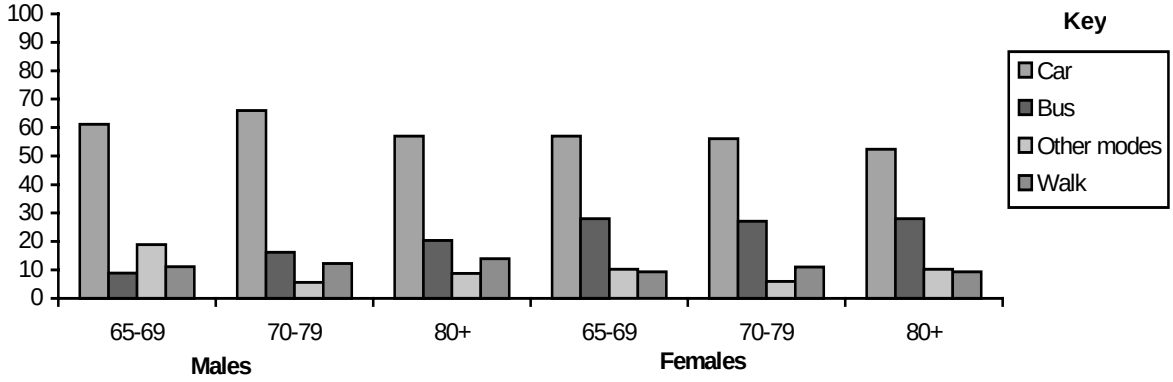
Source: National Travel Survey 1993/95.

As with all age groups, car travel dominates journeys made by elderly people, even among the over 80 age group, where it accounts for 57 per cent of all journeys made by males and 52 per cent of those made by females. It is also noticeable how the ratio of car driver to car passenger journeys changes, between the age cohorts, with car passenger journeys assuming relatively greater importance

with increasing age, and between men and women, with the former making far more trips as driver. This imbalance between elderly men and women, in terms of driving a car as opposed to travelling as a passenger in one, is likely to change in the future.

The dominance of the private car can perhaps be more clearly shown in diagrammatic form as in Figure 5. People in Great Britain on average make a higher proportion of all of their journeys by car than do people in other European countries, even though car ownership in Britain is below the levels in some other European countries. However, although the proportions may vary, the private car is a dominant mode in all western European countries, even among people of retirement age (see Table 5). Only two of the countries listed in this table show a proportionate (though not absolute) fall in car use over the ten years to 1994; all the others show an increase, with corresponding falls in proportionate bus and rail use.

Figure 5. **Modal split: journeys over one mile made by elderly people in Great Britain**



Source: National Travel Survey 1993/95.

Table 5. **Passenger transport by national vehicles on national roads**
Per cent share by mode, based on passenger-kilometres

Country	Cars & taxis		Buses & coaches		Rail	
	1984 %	1994 %	1984 %	1994 %	1984 %	1994 %
Belgium	81.2	88.3	11.1	5.2	7.8	6.5
Denmark	75.5	80.4	16.1	12.9	8.4	6.7
Finland	76.2	81.8	17.2	13.2	6.6	5.0
France	83.0	86.6	6.8	5.6	10.2	7.8
Germany	76.7	84.6	13.4	8.1	9.9	7.3
Great Britain	84.1	88.9	9.9	6.7	6.0	4.5
Italy	77.4	82.8	14.1	10.7	8.5	6.5
Netherlands	85.7	83.8	7.6	7.9	6.7	8.2
Norway	84.9	85.0	9.5	9.6	5.6	5.5
Portugal	78.5	81.1	13.1	13.5	8.5	5.6
Spain	71.0	79.1	18.4	14.7	10.5	6.2
Sweden	82.0	82.6	10.3	11.3	7.7	6.0
Switzerland	82.6	80.8	5.4	6.1	12.0	13.0
USA	98.3	95.7	4.4	3.8	0.5	0.5

Notes: Rail excludes Metro;
GB, Netherlands, Spain and Sweden: figures include passenger-kms by foreign vehicles.

Source: Transport Statistics Great Britain: International Comparisons (Department of Transport, 1996).

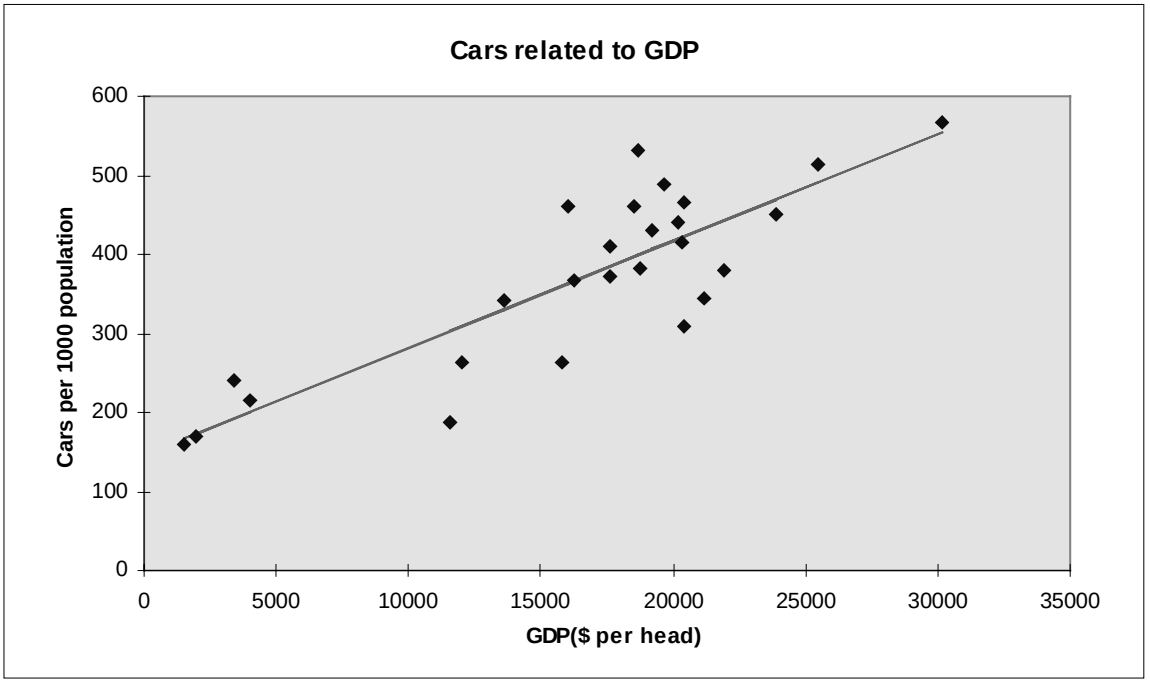
4.1. Changes in car use

No matter how much politicians may wish otherwise, there is very little indication that people who own cars will agree to use them significantly less, let alone give them up. Elderly people have a lower level of car ownership than other adult age groups, but the difference is reducing.

Although, with the single exception of Luxembourg, per capita car ownership in European countries is some way below that in the USA it has, and is, rising. Over the last fifteen years, the number of cars in use in the fifteen European Union countries has increased by about a quarter. Eastern European countries have increased very much faster, though from a far lower base, with increases ranging from 200 to 500 per cent.

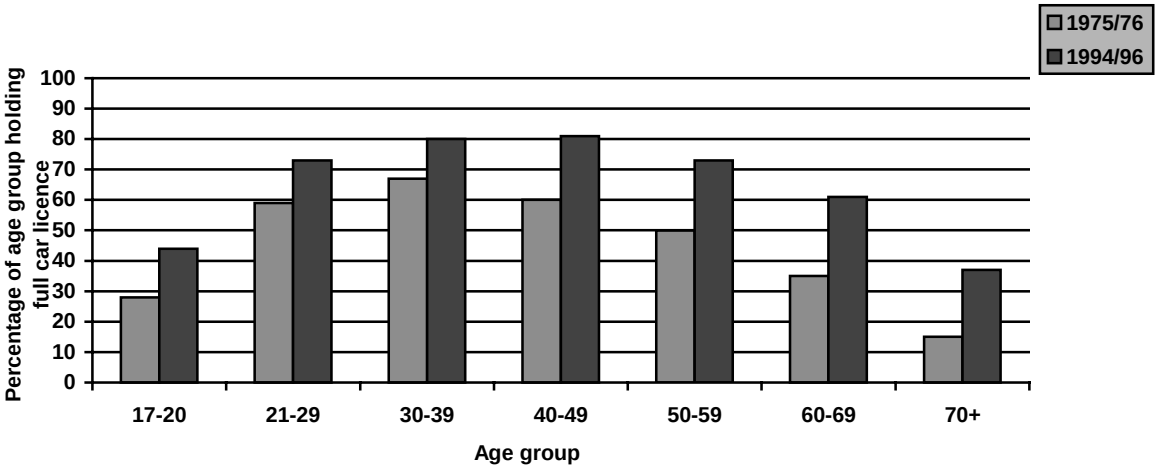
There is, obviously, a close relationship between household income and car ownership. Figure 6 shows the generalised relationship between these two factors, based on 1994 data from 26 countries (USA, Australia, New Zealand, Japan, Canada and 21 European countries).

Figure 6. **Generalised ratio of cars per 1 000 population *vs*. GDP in $US per head of population (1994 data)**



Note: Cars = 146 + .0136 GDP.

Figure 7. **Full car driving licences by age group 1975-76 and 1994-96 in Great Britain**



Within Great Britain, the changes in licence ownership over the last twenty years are very substantial, as Figure 7 shows. Even so, the ownership among those aged 70 and over is still below 40 per cent, though in these terms it has more than doubled since 1976. The comparatively low level for the 70-plus age group is largely attributable to very low rates that still apply to elderly women (see Table 6). However, the scale of change in licence holding in these age groups can be expected to

continue into the future as the high levels of ownership among middle-aged adults (approaching 90 per cent among males and over 70 per cent among females) work their way through into retirement age cohorts. The figures in the right-hand columns refer to California, 1995 and are an indication of where the UK figures might be in ten to fifteen years[5].

Table 6. **UK car licence ownership: elderly people**

Age group	Percentage owning full car licence[6]				California	
	Males		Females		Male	Female
	1985	1994-96	1985	1994-96	1995	1995
65-69	69.2	81.5	19.8	35.9	89.1	73.0
70-74	60.1	73.1	16.9	28.6	86.1	68.0
75-79	50.5	63.6	11.1	18.7	81.4	59.6
80-84	37.0	48.9	4.1	11.1	71.0	44.2
85 and older	21.0	38.5	2.4	4.2	45.8	19.6

Source: Department of the Environment, Transport and the Regions.

Forecasts of future car ownership for the UK suggest that "first car" saturation levels for households with one or more adults of working age will be reached by about 2030, by which time 92 per cent of households with two adults of retirement age will have at least one car and about a quarter (24 per cent) will have two or more cars. Single-person households, where that person is of retirement age, even then (2031) will still only have around 50 per cent car ownership -- but that is more than twice the present level (see Table 7).

Table 7**. Percentage of households at car ownership saturation level: UK**

Household type	Saturation level		Percentage owning car(s)			Percentage change
			1996	2016	2031	1996-2031
One adult, not retired	only car	1.0	56	72	81	46
One adult, retired	only car	1.0	23	37	49	113
One adult with children	only car	1.0	32	46	55	72
Two adults, retired	only/first car	1.0	67	84	92	38
	second car	0.7	7	15	24	252
Two adults, no children	only/first car	1.0	86	94	97	13
	second car	0.9	34	53	66	92
Two adults, with children	only/first car	1.0	88	95	98	11
	second car	1.0	42	62	76	82
Three plus adults, no children	only/first car	1.0	89	95	98	10
	second car	1.0	62	80	89	43
Three plus adults, with children	only/first car	1.0	87	94	97	12
	second car	1.0	58	76	87	51

Present levels of car ownership in western European countries range from around 200 per thousand population (Greece) to over 500 in Italy and Luxembourg[7]. Not only has the number of cars increased in all these countries but so too has the average distance driven per head of population per annum. The anticipated continuing increases in car and licence ownership among elderly people in the UK can equally well be expected to occur in other countries in Europe. However, even though this sort of change will happen, elderly people are and will continue to be more dependent on other modes of transport than younger adults.

4.2. Use of other modes of transport

The data given earlier in Table 4 relating to travel in Great Britain show that:

- Bus use only accounts for just over 5 per cent of all journeys made by adults aged 30 to 59 but, for elderly men, bus use accounts for 9 per cent (65 to 69-year-olds) rising to 20 per cent (aged 80 and over) and for elderly women the figures are 23 per cent rising to 28 per cent;
- Taxi use is fairly similar in proportionate terms, between 30 to 59-year-old adults and elderly people aged 65 to 69, but above this age taxi use assumes relatively greater importance though is never more than a minority mode;
- Walking only accounts for about 6 per cent of all journeys by adults aged 30 to 59, but accounts for about twice this proportion of all journeys made by the elderly;
- Train use is relatively less important among the elderly than among younger adults;
- Other private vehicles, which include social services' and voluntary services' transport, typically account for about 1.5 per cent of all trips, except for the oldest age group where it increases to account for 4 to 5 per cent: relatively more important than either taxi or rail.

Given the relative importance of the non-car modes for elderly people, the high reliance on bus (plus tram in some European countries) suggests that emphasis on improving this mode would be of greatest benefit to older people, followed by, in order of level of use, walking, other (special) transport services, taxi and rail. The following chapters consider each of these modes, the changes to them that are likely during the next ten to twenty years and the relevance of those changes to use by elderly people.

4.3. Local bus and tram services

Most of the recent changes in the design of buses and trams are the result of regulations requiring that access for disabled people, including wheelchair users, should be provided. These requirements have led to the development of low-floor vehicles, often with a boarding device (ramp) to assist wheelchair users, improvements in features such as handrails, step-edge markings and in the provision of priority seating.

Germany led the way in introducing low-floor buses, followed by the Netherlands, but there are now examples of this type of vehicle in many European countries. Regulations in the UK are expected to require all buses used in local service to be fully wheelchair accessible within the next twenty years. In Sweden, the 1975 Act on Facilities for the Disabled set the requirements that vehicles used for public transport shall be adapted for use by disabled passengers: ordinances implementing the Act were issued in 1985.

The European Commission has recognised the importance of improving access to buses and, accordingly, has included a requirement for access in its Directive[8] relating to buses and coaches with more than eight passenger seats. The Commission's view is that low-floor buses are clearly the most efficient way for Member States to improve accessibility but does allow for alternative means of access (e.g. lift) where a low-floor design would be impractical.

Although this requirement is based on an acceptance of the principle that disabled people should have equality of access (and hence mobility), the benefits of low-floor design go far beyond people with disabilities. Many elderly people, while not disabled according to standard definitions, still find climbing steps awkward, particularly if encumbered with shopping. It was noted in the report on the introduction of low-floor buses in Spain[9] that, although some wheelchair passengers were using the buses, most of the increase in patronage (up to ten per cent in some cases) arose from elderly people.

Because the driving force behind these improvements is equality for disabled people, relatively little attention has been paid to the extent to which these measures benefit the able-bodied elderly. With the ageing of Europe's population there is a strong argument for examining these effects and benefits rather more closely.

In parallel with the development of the low-floor bus, the low-floor tram has also been introduced. Modern systems are all fully accessible, although there is a back-log of older systems (Germany, Belgium, Portugal, for example) that are still inaccessible to disabled people. The changes in accessibility, as with buses, are driven by the need to provide access for disabled people, but also to provide much easier access for elderly travellers.

4.4. The pedestrian environment

As mentioned earlier, walking is an important mode for elderly people, both as access to other (public transport) modes and in its own right. However, there is some evidence to suggest that the amount of walk journeys -- certainly longer ones of one mile (1.6 km) and more -- is tending to decline among elderly people. British National Travel Survey data shows a drop of 24 and 29 per cent respectively in the number of these longer walk journeys made by men and women aged 70 plus over the last twenty years. More recent and more detailed data shows that this decline in walking applies to younger elderly people; older people, particularly those over the age of 80, have actually increased their average number of longer walk journeys (see Table 8).

Table 8. **Changes in numbers of walk journeys of 1 mile (1.6 km) or more (Great Britain)**

Age group	Sex	Walk journeys per person per annum		
		1975-76	1985-86	1989-95
70 plus	Males	83	68	63
	Females	49	31	35
65-69	Males	128	88	81
	Females	79	57	51
70-79	Males	n.a.	76	69
	Females	n.a.	39	43
80 plus	Males	n.a.	38	43
	Females	n.a.	13	19

While it is not possible to be certain, a likely explanation for these changes is the growth in car ownership and use among the younger elderly, leading to the reduced walk journeys among men aged 65 to 79 and women aged 65 to 69.

Improvements made to the pedestrian environment, such as dropped kerbs and tactile surfaces, while of obvious help to disabled people and therefore to a proportion of elderly people, are not of any particular help to the more able-bodied elderly. It seems likely that improvements to the general environment (such as vehicle-free shopping centres) and to safety (controlled road crossings, lower speed limits for vehicles in urban streets) may be of more value in encouraging fit elderly people to continue walking. There is also some evidence that elderly people are worried about personal safety when walking, especially in the hours of darkness. Better street lighting and more care in the design of residential areas, to avoid enclosed areas, could ameliorate this.

In the longer term, there may be scope for encouraging walking in general, including by elderly people, through changes in the structure and design of urban areas. A comparative study of two new towns, Milton Keynes in England and Almere in the Netherlands[10], built on different planning principles, showed that this can produce quite substantial differences in modal use. Milton Keynes was designed around a grid system of roads intended to provide ample space for the use of cars even at peak periods, while Almere was designed to provide good pedestrian and cycle access. The main differences in modal split between the two towns are high car and low bicycle use in Milton Keynes and the reverse in Almere, but the latter also has a higher proportion of walk journeys (20.7 per cent of all journeys *versus* 17.7 in Milton Keynes).

4.5. Taxis

As was said in the recent European Commission Green Paper[11], taxis are an important mode of transport for groups such as non-car-owners, the elderly and the mobility impaired and in some circumstances provide the most cost-effective means of transport.

In much the same way as with buses, disability organisations have argued strongly for improvements in the design of taxis to make them more accessible, particularly for wheelchair users. In practice, this means the development of purpose-built vehicles of "standard" taxi size or modifications to slightly larger vehicles like MPVs and minibuses.

Purpose-designed vehicles of these kinds exist in some countries (Sweden, Spain, Finland and Britain, for example) but are rare in some other countries. Developments of this kind should make taxis easier to use by all elderly people, not just those who are disabled, but the main disincentive for taxi use by elderly people is probably that of cost and, perhaps to a lesser extent, lack of integration of taxis into the general public transport structure.

Various schemes have been introduced to reduce the cost to the taxi user, notably in the Special Transport Services in Sweden and various Taxicard schemes in Britain, of which the London scheme is the largest, but these schemes are for disabled people, not elderly people. Some of these schemes are already at risk because of the high public cost and it is difficult to imagine them being extended in any way to include able-bodied people of retirement age. Encouragement of the use of taxis by the elderly may be achieved by providing shared-ride services, which would reduce the cost per

passenger and by better integration with other modes, as in the Netherlands' "Train-Taxi-Ticket" scheme which, for the payment of a fixed supplement of HFL5, allows the traveller to transfer from the train to a waiting taxi for the final leg of the journey.

4.6. Rail

Among the EU countries, it is apparent that rail passenger services have lost market to other modes of transport, notably the private car. In the 25 years from 1970 to 1995, passenger transport in Europe doubled, but the railways saw their share of the passenger market fall from ten to six per cent[12]. To reverse this process and achieve a better market share will require, *inter alia*, a better definition of rail's target market, better market segmentation and a more competitive pricing system.

The European Commission set up COST 335 on accessibility of heavy rail systems with the aim of drawing together best practice in providing for the needs of disabled and elderly people. This COST action is still at a relatively early stage in its life and has not yet produced its final, definitive recommendations. The issues that it is considering include access to and within rail carriages, design of the rail infrastructure, information, fares and staff training.

As with other modes of transport, improvements needed to provide access for mobility-handicapped people in many cases will have advantages for others, including non-handicapped elderly people. As was pointed out by Maundy Todd[13], everyone benefits from *"plenty of space; clear directional signposting; accurate and reliable information provision; good lighting; clear and larger print; freedom from hazards and danger; trained staff with knowledge and skills to deliver quality customer care; and targeted and appropriate marketing."*

Improvements of this kind should make rail travel more attractive to elderly people, with better staff assistance being probably as important as changes to physical structure; but, as with taxis, greater use of trains by elderly people is probably more dependent on fares charged than on design changes. It is worth noting that in Great Britain, where the rail services are privately operated, the train operators advertise extensively to encourage elderly people (60 and over in this case) to buy Senior Citizen Railcards which currently cost less than £20 a year and which give one-third off non-peak period rail tickets. The number of Railcard holders is not known, but this scheme is presumably judged by the operators to be commercially worthwhile. Which, in turn, suggests that train travel by elderly people may increase in the future as more mobile and more affluent people move into retirement age and can afford to travel by rail for leisure purposes.

4.7. Special transport services

By definition, these services are specially designed to meet the needs of disabled people rather than elderly people. Most services have eligibility criteria, which users must satisfy and which would exclude able-bodied, elderly people, at least in theory. In practice, some services in Great Britain have been criticised for carrying relatively able-bodied, elderly people at the expense of disabled people, though it would be wrong to imagine that this is a widespread problem.

Although special services like Dial-a-Ride are intended for the disabled, there are some types of special services that have a slightly wider focus and which can offer transport services that are helpful to many able-bodied, elderly people.

One of the best examples of this kind of service is the Swedish Service Bus system, which operates in many Swedish towns and has been adopted elsewhere in Scandinavia and North America. While open to use by anyone, this type of service, using accessible buses penetrating right into residential areas, sometimes incorporating hail-and-ride rather than fixed stops, is particularly attractive to elderly people because of the use of easy-access vehicles and short walking distances. Service routes typically have stops no more than 200 metres from any part of their catchment area, compared with 400 to 600 metres on mainstream bus services.

A recent demonstration of this type of service, but with the addition of a demand-responsive element, has taken place in the Biskopsgården and Högsbo districts of Gothenburg. The services are designed with the dual objectives of reducing the use of the Special Transport Service (STS) by disabled people and encouraging use by elderly people who would not qualify for the STS. The demonstrations have been moderately successful in that they have resulted in less use being made of the expensive STS, but they have not attracted as many elderly users as might have been expected. However, this particular form of the Service Route concept (known as FlexRoute) is still at an early stage of development and, with changes, it may prove more attractive to elderly people in the future.

Services like this that fill the gap between special services dedicated to a particular category of user and conventional mainstream bus services also include voluntary car schemes, postbuses and other forms of paratransit. They are of particular help in more rural areas where there is little conventional transport and where non-car-owning, elderly people may find travelling quite difficult. The advent of fully accessible MPV or minibus-based taxis may encourage further development of this type of service, particularly as the decline in conventional public transport services in low density rural areas seems likely to continue.

4.8. Other modes

Both coach and air transport play a part in the leisure/holiday travel of elderly people. As a general rule, for any given journey, coach is cheaper than its direct competitors, rail and air. The low cost of this mode leads to the unique "U" shaped age profile of coach passengers on interurban express services, with high proportions of young travellers (students) and of elderly people, but relatively few people in the 25 to 50 age group. The British operator, National Express, which provides services throughout Britain, has a passenger age profile in which about 40 per cent of passengers are 25 years or under and about 30 per cent are 50 and over. The main reason for travellers choosing to go by coach is the cheap fare (quoted by about 80 per cent of all passengers) and the most usual journey purpose is to visit friends or relations (55 to 60 per cent of all journeys).

People who go by coach for holidays are typically elderly -- this mode of travel for this purpose, unlike interurban express services, does not attract many young travellers. Wallace Arnold, one of the larger European holiday coach operators, has a clientele with an average age of almost 64 years: 83 per cent are over the age of 55. The social profile of holidaymakers going by coach is more evenly balanced than that of express coach users and, although cost is obviously a consideration, the whole customer care profile, including comfortable vehicles and staff on hand at all times, makes the holiday coach an attractive proposition for elderly people.

The leisure air travel market, which is the sector of air travel most relevant to elderly people, has grown very substantially in the past and is expected to continue to do so in the future. UK figures show a forecast increase in long-haul leisure passengers of 160 per cent from 1992 to 2010 and of

185 per cent in short-haul leisure passengers. At present, about eight per cent of UK airline passengers travelling for leisure purposes are aged 65 and over; this is forecast to increase to 10.5 per cent by 2015[14]. It is reasonable to assume that this pattern of growth will also apply in other European countries, particularly given the general increases in income among retired people.

4.9. Summary

In common with all other adult age groups, the elderly rely to a substantial extent on the private car for their personal mobility. That reliance will increase in the future, proportionately at a faster rate than in other younger age groups.

Apart from the car, the single most important public transport mode for elderly people is the bus (plus tram where available). Changes being made in the design of buses and trams are a consequence of the need to make these services accessible to disabled people, but there are also benefits for elderly people as a result of these design changes. There is some, admittedly limited, evidence that vehicles which are fully accessible do give rise to an increase in ridership among the elderly.

Changes in taxi and rail vehicles are also primarily concerned with enabling disabled people to use them. Common sense would suggest that some of these changes will be of benefit to elderly people (aside from those elderly who are also disabled) but the case is not as clear or obvious as it is for local bus services. It seems more likely that greater use of these services by elderly people in general will rest upon the costs to them. The British Senior Citizens Railcard scheme suggests that a significant reduction in ticket price can encourage sufficient additional travel, particularly off-peak, to make it financially worthwhile for the train operator.

Such an approach would not be feasible for taxi operation, except perhaps where (or if) there is an urban area with a very small number of taxi companies, but developments in shared rides and better integration with other services, including through ticketing, may encourage greater use by elderly people.

Future developments in what might be termed “non-specific” paratransit (in small vehicle demand-responsive services available for use by anyone) may prove to be of considerable value in the future to meet the needs of non-car-using, elderly people in rural areas.

Of the remaining modes, both air and coach travel for holiday purposes seems likely to increase, given the increasing income of most retired people. It might be thought on this basis that intercity express coach travel, where the main attraction is the low fare, would tend to lose market as the elderly become more affluent. This loss might be exacerbated if rail companies target the elderly market with greater precision and cheaper fares. However, as was pointed out in Chapter 3, a sector of the elderly, dependent on state benefits or pensions may not share in the general increase in wealth among retired people and so will still be concerned about finding the cheapest mode of travel.

5. INNOVATION IN TRANSPORT

The previous chapter has considered modal use by elderly people and some of the changes in vehicle design that are currently happening, mainly as a result of the need to give equality of mobility to disabled people. Beyond these changes, there is a range of technical innovation in both private and public transport that could be relevant to the future needs of elderly people.

5.1. Innovation in cars

Research on elderly drivers shows a number of key factors. Speed of reaction to a given situation tends to slow with age, involvement in accidents increases among very elderly drivers, visual acuity and the ability to deal with glare from on-coming vehicle headlights become poorer[15]. Gradual physical deterioration -- not to the extent of becoming "disabled" in the usual sense -- means that getting in and out of a car becomes a bit more difficult; turning round when reversing or even to look in a door-mounted mirror becomes less easy; turning the steering wheel during slow speed manoeuvres like parking becomes more of an effort.

Some of the changes being made to cars now will help elderly drivers. Already, quite a high proportion of cars have power-assisted steering and automatic transmission, either as standard or as an option. By 2020, these could be expected to be standard on virtually all cars with the possible exception of the smallest and cheapest.

Other innovations of particular relevance to elderly drivers include parking aids based on near infra-red or ultra-sound, which are currently available on some upper-range cars (as was power-assisted steering twenty years ago), rear-view mirrors electrically controlled from within the car and navigation (routeing) systems. On a more prosaic level, swivel seats can be fitted to most cars and are helpful for people who find getting into a car awkward.

Beyond this there are many more innovations which are either just beginning to penetrate the market or are at the development/prototype stage. These include night vision enhancement (based on near infra-red) vision enhancement in fog and poor visibility (far infra-red) and rear-view mirror systems combined with a warning device to alert the driver to the presence of a vehicle in the blind spot. Emergency alert systems, with vehicle location based on GPS technology and two-way radio contact, car to emergency control centre, have been developed to prototype stage. They are particularly valuable for women driving alone, the disabled and elderly people; groups who feel particularly vulnerable in the event of a breakdown or accident, especially at night or on unfamiliar roads. Longer term still, the development of the automated highway may happen; a great deal of research is being devoted to this in USA, although it is perhaps debatable whether such a system would be feasible on Europe's narrower and more congested roads.

Many of the innovations mentioned above are potentially valuable to elderly drivers because of their particular needs, but it is essential that they should be designed with these needs clearly in mind. This in turn depends upon the motor industry recognising that the elderly form an important segment of the car-buying public. There is some evidence that some major car companies do recognise this, though it has not yet shown itself in the marketing and advertising of cars, which still rely mainly on styling, performance and price rather than usability by older customers. Nonetheless, as noted in a

Help the Aged report[16], in the future, *"cars will be much easier to drive and consequently older people will probably be able to extend their drive-life by at least five to ten years compared with today."*

5.2. Innovation in other modes of transport

The principal future changes in design of public transport vehicles and services are likely to be those already foreshadowed by legislation such as the UK Disability Discrimination Act, the European Commission Transport (Bus and Coach) Draft Directive and the COST programmes. Essentially, all of these are designed either wholly or in part to provide equality of mobility for disabled people, but a secondary benefit of many of these new developments should be better access and service for elderly people. Much the same may be said about changes to the physical environment, where again, improvements made to help disabled people will also help elderly people, particularly in terms of access to transport infrastructure.

There are also innovations in vehicle fleet management and control (for example, taxi location systems based on GPS) but although these should produce more efficient deployment of resources, it cannot be said that they are of direct relevance to elderly peoples' needs.

5.3. Innovation in transport information

It seems likely that many changes in the future will be related to information systems, at home, on-street, at terminals and on-vehicle. Examples of these include:

- Travel planning information, covering both private road and public (road and rail) transport, available via the Internet in the home (at present being developed as part of the EC ROMANSE project);
- Dynamic information at bus and train stops: time to next bus/train, route, destination (prototype systems in several cities: Gothenburg in Sweden, London and Southampton in the UK);
- On-street travel information kiosks, usually using touch screen technology and providing information on public transport services in area or region (for example, the INFOPOLIS system in Madrid)
- On-vehicle (bus, tram, metro, train), providing information (visual and audible) on next stop, interchange, etc. (becoming increasingly widely available: the EC project, EUROSCOPE, covers several applications of this type);
- Smart-card developments, which will enable a single card to be used for payment by automatic debiting on a range of public transport services [for example, in the ADEPT (EC) project with demonstrations in Thessalonika and Gothenburg]. Smart-card technology will also develop in the private car area, providing a single means of paying road tolls and on- and off-street parking. Ultimately, a single smart-card, covering both public and private transport payments, can be envisaged.

These systems are, of course, developed with the public-at-large in mind, but if properly designed, could be of particular benefit to elderly people. Smart cards, especially if capable of being read at a distance rather than swiped through a card-reader, would help elderly people by removing the need to handle money when boarding a bus or tram. In-home travel information should increase

the awareness of elderly people of transport opportunities and alternatives. However, their ability to use these systems and so to benefit from them, does rest on both appropriate technology and affordability.

5.4. Appropriate technology and affordability

The pace of change of new technology is speeding up. In the USA, it took the telephone about eighty years from its inception to reach 50 per cent penetration of households. Now, a new consumer electronic technology, such as the video recorder, reaches about half the households in less than fifteen years[17]. Although the great majority of people at present aged 65 and over do not have a PC, nor experience of using one, that situation will change substantially over the next twenty years. So too will elderly people's familiarity with interactive transport information terminals on-street and at bus and rail stations.

However, elderly peoples' ability to use and benefit from such systems is not simply a matter of ensuring that the design (hardware and software) is appropriate; there is also the matter of affordability.

Section 3.1. showed that people of retirement age have in general increased their income in comparison with average income levels. This change in average values conceals wide variations. As was noted in a study published in 1995[18], there has been a *"widening of the pensioner income distribution and there is no reason to expect that to end. Incomes have been rising but they are still not high. So the general increase in living standards should not blind us to the fact that this increase has been far from uniform and from a low base."*

Even though average retirement incomes may be expected to continue to increase, the wide disparity between the lower and upper ends of the income range may well produce a seriously disadvantaged group within the elderly as a whole. These are likely to be composed of people with little lifetime experience of new technology and an inability to afford to buy it, low car ownership and greater reliance on public transport. They are also more likely to be among the "elderly elderly" and to be living alone. In parentheses, it is worth noting that although the proportion of elderly people living alone varies considerably from country to country[19], in almost all nations that proportion has increased over the last ten to twenty years. The actual proportion living alone in western European countries ranges from around 18 per cent (Spain) up to just over 45 per cent (Denmark and France).

This subset of older, poorer people are the ones who will benefit from improved public transport only if their use of it is, or continues to be, subsidised.

6. CONCLUSIONS

The principal conclusions drawn from the review described in this paper are:

- Partly through the age structure of the population and partly because of increased life expectancy, the number of people aged 65 and over in western Europe will increase by about one-third by 2020;

- The increase in life expectancy will lead to an increase in disability-free life;

- The income of people of retirement age has generally increased in relation to all incomes and, mainly because of a continuing growth in the numbers of people in work-related pensions schemes, is likely to continue to do so;

- The increase may be slowed down by governments' inability to maintain increases in state pensions; this because, *inter alia*, of the forecast fall in the ratio of working-age to retirement-age adults. One result of this may be the growth of a relatively poor minority among elderly people: those who rely wholly upon state pension schemes;

- People reaching retirement age over the next 20 years have generally been used to high levels of personal mobility, including access to a private car;

- Even at present, when car ownership among elderly people, particularly women, is comparatively low, car travel still represents the most important constituent of personal mobility;

- Over the next twenty years, the percentages of men and women holding driving licences will increase as the high licence-owning cohorts, presently aged 40 to 59, move into the retirement age group. It has been estimated[20] that, for the UK alone, this will mean an extra 2.5 million licence holders in the older age group in 2021;

- Apart from car use, the most important vehicular mode for elderly people is and is likely to continue to be the local bus. Taxi use becomes more important with increasing age, while for rail travel the opposite is true;

- Walking is also an important mode for elderly people, but the evidence suggests that it is a reducing proportion of all trips as car availability increases;

- Special transport services are designed primarily for disabled people rather than elderly people, but some types of service, like the Swedish Service Bus, bridge the gap between conventional mainstream and special services and are of particular value to elderly people;

- Innovation in vehicle design (both road- and rail-based public transport) is driven mainly by recognition of the right to equal access and mobility for disabled people. Some of these new developments will benefit elderly (able-bodied) people, particularly on buses and trains/light rapid transit, possibly to a lesser extent on taxis and heavy rail;

- Innovations in car design which are helpful to elderly drivers include a number of features that are spreading down from more expensive, top of the range cars, to medium-size and even small cars. These features include power-assisted steering, automatic transmission and parking/reversing aids;

- Beyond these, further innovations are likely to include vision enhancement (for night and bad weather), emergency alert systems, blind-spot warning and navigation aids. All would have benefits for most drivers but, given the nature of elderly drivers (less good vision, greater concern over personal safety), they are particularly helpful for the elderly;

- Future innovations in the public transport sector, so far as vehicle and infrastructure are concerned, seem likely to continue as a means of achieving better access for disabled people. As before, there will be some improvements that also benefit elderly people;

- A substantial area of future technological innovation will be in transport and travel information, including in-home information, on-street, dynamic and interactive information and in-vehicle information. Much of this has value for elderly people *provided* the systems are designed to take account of their needs and abilities;

- Although many of the developments made to date and expected in the future are relevant to the needs of elderly people, the issue of whether they can afford to use them will remain. Some, probably many, will be able to afford to, but a proportion at the bottom of the income range will not.

The expectation of continued good personal mobility and, as the major means of achieving that, increased use of the private car, highlights a dichotomy. Most European countries and the European Commission are seeking ways to control and reduce car use for all the obvious reasons of congestion, pollution, adverse environmental effects and so on. Yet there is also evidence to suggest that enabling elderly people to maintain an independent lifestyle brings a range of benefits, both to the elderly people themselves, to their families and friends and, more widely, to the State as a whole.

Much the same can be said about the benefits of enabling disabled people to enjoy a reasonable level of mobility, but with that group of people, there may be a stronger case for arguing for exemptions from some of the measures that may be introduced to limit car use: road pricing in urban areas, draconian car parking controls, etc. It would be difficult to mount such arguments for elderly people as a whole.

As with the remainder of the public, their ability to maintain a reasonable level of mobility must in part rest on making public transport more attractive and better suited to their needs. The technological developments mentioned in this paper will help this process, but the issue of the ability of elderly people to afford transport cannot be ignored. Even if the majority of the elderly can, in the future, afford to run a car, there will still be a significant minority who cannot; some because of age-related disabilities, others because of lack of money. Most countries have concessionary fares schemes available to elderly people; such schemes will have to be maintained and perhaps enhanced if the poorer group of elderly people are to have a reasonable level of mobility and those more affluent are to be encouraged to use public transport.

Given that, whatever measures are made to try and induce elderly people to use public transport, private car use will continue to be the principal mode of transport, the question also arises of how to determine when an elderly person's driving licence should be removed. This is an issue which is beginning to emerge in Europe. In the USA, with its proportionately greater number of elderly drivers, it is an issue that has been debated for some time, though without any clear guidelines emerging. The questions that need to be resolved include measurement of risk: when does an elderly driver reach the point at which he becomes an unacceptable risk to himself and other road users; what level of intervention should there be in the "right" of an individual to hold a driving licence; are there ways in which the safe driving life can be extended?; and, assuming that an elderly person eventually

loses the ability to drive, what are the consequences of that loss and how can a reasonable level of personal mobility be retained by someone who has, perhaps, spent his entire life driving and has little or no knowledge of public transport or how to use it?

In December 1995, the US Secretary of Transportation set up a long-range overview and a preliminary proactive strategy to accommodate the growing numbers of older adults[21]. Perhaps the time has come at which Europe should start a similar process.

NOTES

1. Reproduced from "*The Caring World: An Analysis*", OECD, March 1998. Based on OECD Health database.

2. Help the Aged Transport Council's White Paper, London, April 1998.

3. See ECMT (1990), "*The benefits of accessible transport*".

4. The Department of Transport (1996), *National Travel Survey, 1993/95, Transport Statistics Report*, London, July.

5. California Department of Motor Vehicles and Beverley Foundation (1997), *Teen and senior drivers*, Sacramento, December.

6. *Source:* Special tabulation prepared by Department of the Environment, Transport and the Regions.

7. Data for 1994.

8. Proposal for a Parliament and Council Directive relating to special provisions for vehicles used for the carriage of passengers comprising more than eight seats in addition to the driver's seat, Directorate-General III, European Commission.

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16. Leon Kreitzman (1996), *Licenced to Drive at 85? A Report on the Mobility Needs of Older People in the Next 25 Years*, Help the Aged, London.

17. Quoted from US data in "*Licenced to Drive at 85?"* (*op. cit.*).

18. Dilnot *et al.* (1995), *Pensions policy in the UK*, Institute for Fiscal Studies.

19. *Source:* OECD Health database (1998).

20. "*Licenced to Drive at 85?"* (*op. cit.*).

21. US Department of Transportation (1997), *Improving Transportation for a Maturing Society*, Washington DC, January.

SUMMARY OF DISCUSSIONS

SUMMARY

INTRODUCTION

It is clear from analysis of the age pyramid of the European population that the baby boom generations are going to be reaching retirement age over the next twenty years. They are gradually going to build up into a very sizeable population of elderly people used to being very mobile. With the onset of age-related handicaps, however, driving a car will no longer be that easy. The fact is that various problems can arise which are liable to reduce the mobility of elderly people. These include:

- the impossibility of driving or being a passenger in a private car because none is available;
- long distances to be covered on foot;
- a lack of information about public transport;
- spatial orientation problems;
- a hostile roadway environment;
- the consequences of a civilisation based on speed and automation (ticketing for example);
- unreliable services (including long waiting periods).

Having noted to begin with that the elderly are going to create serious problems, the Round Table concluded that the difficulties are not equally severe everywhere. There are differences between towns and rural areas. Also, some countries have introduced driving restrictions where the very elderly are concerned. It has to be recognised that it is not that straightforward for the very elderly to drive and that it does, in particular, cause road safety problems. While public transport might appear to provide a solution, it still has to be adapted to the specific needs of the elderly. As soon as handicaps become apparent, it is advisable to envisage special services to meet the needs of the elderly. All of this raises the fundamental question of the right to mobility as an essential component of the quality of life. It is by no means certain, moreover, that a sufficient amount of evidence and research is available with which to tackle the problem of the mobility of the elderly.

The Round Table considered these different points under the following five headings:

1. A large population segmented by age and where people live;
2. Driving a private car;
3. Public transport and special forms of transport;
4. Accessibility and the obligation to be mobile;
5. The need for research.

1. A LARGE POPULATION SEGMENTED BY AGE AND WHERE PEOPLE LIVE

With the advances in medicine, life expectancy will increase in years to come. The onset of disability will also come later. Even if the period of disablement is not going to increase very much, the extra years of life will be years of additional mobility. By and large, then, the population is set to age apppreciably but differ from the elderly of today in certain respects. What is certain is that, by 2020, the elderly will constitute a very substantial category of the population. Over and above that aspect, however, is the fact that those concerned lived through and took part in the events of 1968 and are used to claiming their rights, which will foster a more participatory form of democracy. They will be much more demanding than the present generation of elderly people. Also, those among the elderly who are not wholly reliant on state pension schemes will enjoy relatively high incomes. Lastly, they will be car users. Women too will hold driving licences, which is not always the case today. Because of all these changes, it is not very easy to foresee what the future holds. The effects induced by change will prevail over those due to ageing, even if the cohort effects should not be completely overestimated.

This explains why there is no point in extrapolating from current trends. Future developments will be on a new scale, all the more so in that there will be the conjunction of the post-war baby boom and that generation's low fertility rate. Questioning today's elderly people gives no indication of what the needs of future older generations will be. It is today's 50 to 60-year olds who should be asked because their demands are much greater when it comes to mobility.

Given the number of elderly people in the years to come and the growing specificity of their demands, pensioners will become a major market. Apparently, public transport companies are still unaware of this and what it entails. For instance, while public transport signing may be adequate for younger people, it will not be for the elderly. To cater for the increased number of third-age users, transport planners will have to adapt their methods and goals to a segment of the population which will be divided according to levels of disability. A distinction should, in fact, be made between pensioners who are able-bodied and those with more or less serious handicaps. Markets will accordingly be segmented into age groups, in particular the very elderly whose needs resemble those of the severely disabled. Rail transport has been losing its elderly clientele, whereas cars and buses remain the most popular means of travel. For the very elderly, there are still no genuinely suitable transport services.

Transport problems will also vary according to where people live. While the transport problems facing the elderly will be relatively easy to resolve in cities, where any benefit to the elderly will benefit the whole population, the same cannot be said for rural areas where people rely on private cars. Not having a car in a rural area often means not being able to get around. So the impact of population ageing will vary according to the region, although there will tend to be larger numbers of elderly people in certain regions, notably those with the most hospitable climate.

2. DRIVING A PRIVATE CAR

Driving life will be extended as innovation-led improvements are made in cars and driving aids. In addition to today's known technologies, such as automatic gearboxes, there are others such as the automatic highway, anti-collision radar and enhanced night-vision systems which are being extensively developed. It is vital that manufacturers improve the design of private cars, taking account of the specific needs of the elderly and also their degree of willingness to accept new technologies. It is important to understand that one of the conclusions of the Round Table is that the car will, in the future, remain a very important means of transport for the elderly.

Whatever is designed with the elderly in mind will also be used by the whole population, and this applies to every aspect of mobility. Electrically-powered cars could be the main form of transport for the elderly who, very often, travel only very short distances. This would make private car use compatible with environmental sustainability. It has to be remembered that when people stop driving, they can be faced with considerable constraints, which is what would happen if car use were to become considerably more expensive as a result of environmental protection measures.

The car will remain a vital means of transport for pensioners which, as has just been said, is in obvious contradiction with the goal of environmentally sustainable transport. It has to be understood that many households will have become used to having two cars and will keep that habit. People will only begin to cease driving their own car when they are very elderly. Another point is that the elderly tend to keep their cars longer.

Because the elderly have slower reactions than those of working age, road safety will also be a problem. There is a widely-held view, which has never been substantiated, that the elderly tend to have an above-average number of accidents. Since old habits die hard -- particularly where car use is concerned -- criteria will have to be found to judge a person's ability to drive, even if the elderly tend to decide of their own accord to drive less. Training programmes specifically for the elderly seem of dubious use in this connection. Experience shows that testing the driving ability of the elderly in the manner it is now being done in certain countries is ineffective and has not produced any convincing results where road safety is concerned. The only way to assess the real ability of the elderly to drive is to abandon the age categories habitually used because they are not relevant for this sort of test.

The elderly tend to refuse to drive in difficult situations, such as at night. There can be no doubting the existence of such self-imposed decisions, which increase safety without damaging the self-esteem of the elderly by forcing them to stop driving. So it would seem that the connection between the elderly and accident frequency is not very great and that, in particular, the accidents are less serious. There is no relationship between poor driving and having accidents because of the compensation strategies that the elderly have developed. However, some experts maintain that such self-limitation is not sufficient, in particular because there will always be people with *dementia praecox* who are not fit to drive, but who do not have the necessary judgement to stop themselves and who are thus the most dangerous. This is a major problem, and the focus must be on early detection of *dementia praecox*. In any event, if the elderly were to be banned from driving, alternative services would have to be provided.

Safety will also become a crucial issue for pedestrians, many of whom will be elderly and very elderly. Infrastructure development will have to take into account the large number of elderly people, who are frequently involved in accidents when they are on foot, being particularly fragile and having

to share certain infrastructures with cyclists. Some experts maintain that an elderly person is as much as 15 times more likely to be injured as a pedestrian than when driving a car. When designing crossroads and pavements, therefore, thought must be given to the needs of the elderly and the very elderly. In particular, the journey from the home to public transport stopping places can be dangerous, so it is important to think in terms of integrated transport systems.

The extent to which elderly women drive will depend on the habits they have acquired during their working lives. There will be a very appreciable cohort effect as regards the behaviour of women, with established habits being maintained. In the case of a couple, for example, when both the husband and the wife work, there will probably be two cars in the household and that behaviour pattern will be continued. This will enable elderly women to continue to lead independent lives for a long time. Nowadays, women are usually passengers in a car, but that is not necessarily going to be the case in the future. The proportion of elderly women drivers will depend on present female participation rates. Even in the Mediterranean countries, relations between men and women are changing and couples have two cars. This is important for the future.

3. PUBLIC TRANSPORT AND SPECIAL FORMS OF TRANSPORT

The death of a husband who is the only member of a couple to have a driving licence can pose particular problems. Here, transport solutions will have to be found for people who are still able-bodied but do not drive. This will go hand in hand with the need for services for the increasingly disabled, but it should be borne in mind that special transport provision carries very high costs, even if this is a necessity for the very elderly. As a general rule, however, segregation in transport is a bad thing and every effort should be made to avoid having specific systems. So it is important to begin devising solutions that tap every possibility -- including taxi services -- and especially the potential of new technologies to rationalise services and make them complementary, particularly since conventional public transport will be unable to cope efficiently with an ageing suburban population. Consideration should therefore be given to special demand-responsive transport services, on the basis of a formula midway between regular services and paratransit, which is much too expensive. It is inconceivable that a whole section of the population should be deprived of means of travel; society has to provide services for everyone.

As has already been emphasized, the elderly represent a sizeable market for public transport and especially buses, the railways appearing to be more limited in this respect. In view of the cost of special services, it may reasonably be asked whether the mobility of the elderly is not a problem that needs to be solved by adapting public transport -- at least where some of the problems are concerned. Moreover, what is good for the elderly in public transport systems is also good for other categories of user.

Elderly people are particularly at risk when travelling, and it will therefore be important to increase staffing on public transport. Increased staffing is all the more necessary in that the number of changes now taking place in public transport -- automatic ticketing systems, for example -- are not geared to the elderly. Ideally, the new systems ought to be usable by all. Elderly people will be sensitive to the regularity and reliability of public transport -- areas where there will need to be progress, because any waiting can generate feelings of insecurity.

Transport supply will have to be divided between rapid intercity services and carefully selected services to where people live. Demand-responsive services cost a great deal and it may be preferable to opt for a combination of public transport and taxi transfers. The problem posed by population ageing is a complex one and there is no single, ready-made solution. What are needed are multifaceted transport programmes, with a systematic effort being made to see the positive side and overcome the negative aspects.

Public transport will have to be adapted in a number of ways. It will have to be comfortable, i.e. fitted with a lot of seats, and when it is moving elderly people must not be inconvenienced by excessive speed or jolting. Likewise, at stops, the position of the bus must be in line with the infrastructure so as to make it easier to climb on board. All these factors involve driver training and cannot be improvised. The reliability of the attendant equipment (lifts and escalators in the case of the subway) must also be above reproach. It should be remembered that everything that is done to improve the mobility of the disabled will also benefit the elderly. These are far from negligible factors. In this sense, increasing breaks in the transport chain would be another obstacle that is difficult to overcome, so that what is needed is for a lot of thought to be given to intermodality and, more generally, integrated forms of transport. Emphasis must also be given to the link between vehicles and infrastructure. There is no point in improving the vehicle alone; both must be worked on at the same time. Low-platform buses are only useful, for example, if they really can reach the intended stops. Lastly, information needs to be highly developed, because what is adequate for people of working age is usually not sufficient for the elderly.

Education can help to make life easier for the elderly, with young people needing to be taught in school to give assistance to the elderly when using public transport.

Where transport is concerned, it is true to say that better quality supply generates demand. Public transport which is not very accessible tends to be used at peak times by people of working age with no mobility problems. By making public transport accessible to all users, including the non-active, people will be encouraged to use it - particularly at off-peak times when it is not crowded. This will be the time when the elderly prefer to travel. Greater use will be made of public transport, which could bring considerable economic benefits to the companies concerned.

4. ACCESSIBILITY AND THE OBLIGATION TO BE MOBILE

Because activities have become more dispersed, mobility, although clearly a basic right, is sometimes an obligation. This problem, which relates to land-use planning, will become increasingly important as the population ages and a better mix of land use has to be found. It is not conceivable that everyday activities such as shopping should systematically require a means of transport. Being more mobile does not necessarily mean covering a bigger distance: going a long way to the supermarket is not an improvement in mobility when compared with having a neighbourhood shop. If distances increase, moreover, it will be more and more difficult to give up using a car. The disappearance of neighbourhood shops and their replacement by supermarkets on the outskirts of towns is incompatible with an ageing population. Furthermore, services to the home will not suffice: it will be important for the elderly to have a social life, including visits to see friends, and this will involve travel. Enabling the elderly to live like other people, even if special services are required, will help to keep them happy. What will make the task easier is the fact that, while mobility is

increasing for the working-age members of the population, this is not obviously the case for elderly people. It is reasonable to believe, however, that each new generation of elderly people will tend to drive more than the previous generation. The fact, though, that mobility can be considered a basic right -- with all that that implies -- will make the elderly more demanding. In that sense, a distinction needs to be made between transport and mobility. Transport is a secondary phenomenon, deriving from upstream and downstream activities, whereas mobility is a cultural phenomenon. Mobility is not an end in itself: it is quality of life which requires that thought be given to what really needs to be provided for the elderly. There is a political dimension to accessibility, in addition to the economic and technical aspects. There remains a fundamental question which will prompt differing responses, that question being to determine whether the elderly should be transported to where the services are or whether services should be taken to the home.

Moving the elderly back to the city centre is not an easy matter, were it to be promoted, even though it may well be that more recent generations of elderly people have become more used to moving house than previous generations. Some people, however, will want to stay where they have always lived, and it will therefore be important to provide accessible transport (low-floor coaches, buses and trams). Access infrastructure will have to be designed with this in mind, i.e. so as to promote mobility. For those aged over 85, more than 50 per cent of all trips are made on foot. One of the advantages of the town centre is that it encourages a social mix, which prevents the existence of segregated ghettos. But there still needs to be more tolerance, bred by strong educational values, failing which, family values and the fabric of society at local level will need to be strengthened.

5. THE NEED FOR RESEARCH

With regard to research needs, there is clearly a lack of data and systematic reviews of the implications of population ageing. Certain concepts need to be clarified, such as the definition of the criteria for minimum accessibility, and these criteria must be used systematically when subsidising certain projects. By and large, what is needed is a scientific approach to the problem, an approach that takes stock of ongoing research and available resources and draws on experience. Do we, for example, know anything about the behaviour of ethnic minorities and immigrants when they become elderly? Are we able to anticipate the fact that young people are beginning to make more use of environmentally friendly forms of transport? Ageing is a slow phenomenon which is not new in itself, but it is going to take on a new dimension. Do we have any systematic analysis of the needs of the population aged over 85? What will turn out to be the most important factor: reduced mobility, increased car ownership or urban sprawl? Are any ergonomic studies being done to ensure that the new technologies are accepted by the elderly?

It might be wise to develop panel or pseudo-panel analyses in order to reconstitute the cohorts. Cross-section data are needed, even if such data are costly and are difficult to obtain. Also, a multidisciplinary approach is needed. The studies on mobility tend to overlook short trips. The options need to be reconsidered. The elderly have a diminishing field of action. It may be that they have no needs, but it is more likely that they do not have the possibility. They would no doubt like to be able to do more. So it is important to analyse the ways in which quality of life and mobility are linked. It may be that the challenge is to maintain the quality of life by ensuring mobility. However, quality of life is a concept that is very hard to grasp; a distinction has to be made between what elderly people really want to do and what they are forced to do.

Econometric models can help to forecast what the future requirements of the elderly will be. However, while the Round Table took the view that models are reliable in the short term, some participants preferred to talk about their failure in the longer term, there being disagreements about the value of time and the fact that environmental effects were not taken into account. This being the case, is it reasonable to attach a lower value to time for the elderly?

The models could be improved by taking account of cohort, period and age effects, but some experts considered it preferable to resort to scenarios.

CONCLUSIONS

The main objective of government action for the future is to improve accessibility and the mobility of the elderly and to find an institutional solution for those suffering from dementia. A review is needed of the policies pursued by different countries on questions such as screening by means of valid criteria for the ability to drive, defining minimum mobility norms and special services.

One of the lessons to emerge from recent experience is the need for measures linked with back-up policies. Action is needed in all areas (transport/land use/vehicles/infrastructure).

There will probably be a very large number of people with handicaps in the future. The objective, however, is that these people should be able to live like everyone else, i.e. as far as possible have activities and not be shut away at home. This can only be achieved by means of anticipation based on scenarios.

As the Round Table showed, different factors come into play. A distinction needs to be made between age, cohort and period effects (see Table) in order to carry out a more detailed statistical analysis. There is no single way of coping with these different factors, but it is by combining different approaches that an acceptable solution can be found.

Nor should all the decisions concerning transport and land-use planning be taken by 18 to 60-year-old wage-earners. The majority of the latter are drivers and are not particularly sensitive to the special needs of the elderly disabled. Attaching so much importance to speed creates a very hostile environment for elderly people. The way transport is organised at present stems from the fact that the planners are working-age men with private cars. A value system designed for people aged between 20 and 40 will not be viable in the future; nor, on the other hand, should the measures adopted target only young men who have cars and use them.

Lastly, research is needed in five areas: data collection, the clarification of concepts (minimum accessibility criteria, for example), analytical tools, an inventory of experiments tried, a definition of priorities and the acceptance of mobility as an important part of the quality of life.

FACTORS AFFECTING THE TRANSPORTATION PATTERNS AND NEEDS OF THE ELDERLY

AGE EFFECTS

- Declining driving skills
- Greater susceptibility to injury
- Greater ambulatory problems
- Greater potential for dementia
- Increasing fear for personal safety
- Greater sex-related differences
- Accelerating rates of decline after 80-85
- Declining physical and mental skills
- Unwillingness/inability to face new or different situations
- Slower processing times/need for greater repetition of information
- Greater occurrence of specific illnesses or conditions
- Stratification among and between older people in abilities, problems

COHORT EFFECTS

- Increased licensing
- Increased car ownership
- Increased labour force experience by women
- Decreasing labour force experience by men
- Changes in HH size and structure
- Changes in marital patterns
- Increasing longevity
- Changes in role expectations
- More female-headed older households

PERIOD EFFECTS

- Increasing income and standard of living
- Changes in societal maintenance programmes
- Educational/training opportunities, cost and price
- Healthcare availability and education
- Labour force policies
- Economic development objectives and strategies
- Immigration policies
- Transportation planning programmes and objectives
- Petrol and parking prices
- Cost and availability of private cars
- Availability, cost and price of public transport
- Roadway costs, access and availability
- Design features: cars, taxis, buses, vans
- Condition of pedestrian environments
- Land use and housing policies
- De-industrialisation of society

- Response to new technologies
- Increasing dependency ratios
- Self-regulation: continued driving
- Self-regulation: reduction/cessation of driving
- Increased dependence on family, society
- Changing accident involvement

- Lifestyle patterns: more non-work trips
- Changing activity patterns: more and longer trips
- Greater automobility: more trips in a car, as a driver
- Increasing suburbanisation
- Gap between haves and have-nots, urban and rural

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