

Demographic Change and Changing Mobility - Evidence in the German National Accident Statistics

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Population

The structure and sizes of populations are constantly changing. This is a result of changing influencing factors such as economics, political situations, health status and many other developments. One important structure that is influenced by such developments is the age structure. In Germany, as in many other European countries, strong changes have taken place in the last decades regarding the age of the population. While the older population has grown considerably the younger population gets fewer. And a look at the population pyramid suggests that the ongoing

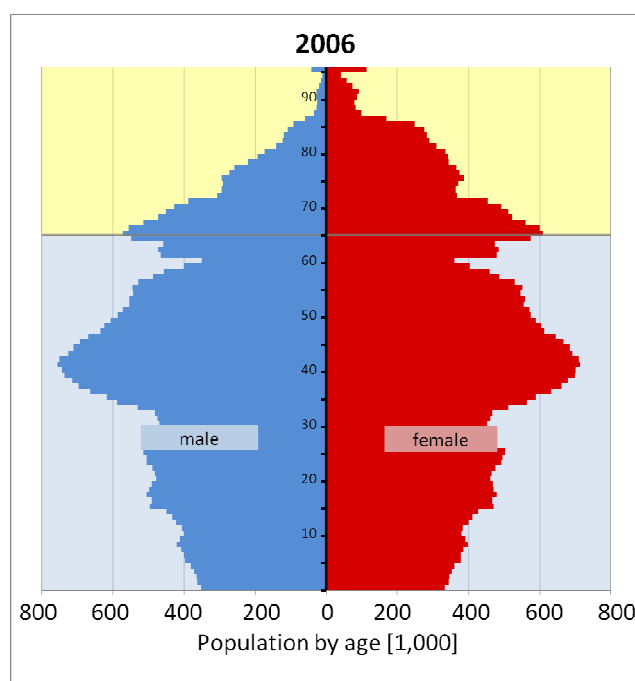


Figure 1: German population by age, 2006

development will continue to change the age structure of the population greatly in the next decades (s. Figure 1).

More than a decade ago, in 1991, Germany had nearly 80 million inhabitants of which 15% were at the age of 65 or over (s. Table 1). The average age was 39 years, the life expectancy for men 72 years and for women just below 80. Since then, the population in general has increased only slightly by 3% but the generation 65+ gained a third. It increased from 12 million inhabitants to nearly 16 million inhabitants of 65 years or over. As a result, nearly 20% of the inhabitants in Germany are in that age group. Also, life expectancy has increased for both

sexes and the average age has gone up by 3 years to 42. The German Federal Statistical Office has performed a forecast for the population until 2050. One of its scenarios expects a decrease of the population in general but a further increase for the generation 65+ by nearly 40% until 2030. According to the forecast, 22 million of the 77 million inhabitants in Germany will be 65 years or older in 2030. The share of the generation 65+ will be around 30% and the average age nearly 50.

	1991		2006		2030*
Population	79.8 Mio.	+3.4 %	82.4 Mio.	-6.3 %	77.2 Mio.
Population 65+	11.9 Mio.	+33.2 %	15.9 Mio.	+39.5 %	22.1 Mio.
Share of population 65+	15 %		19 %		29 %
Average Age	39		42		48
Life expectancy (male/female)	72 / 79		77 / 82		n.a.

* Forecast of the German Federal Statistical Office

Table 1: Population facts Germany, 1991 - 2030

Although the population of 65 years or over is growing for both sexes, there is a considerable difference between their magnitude for men and women. While the number of women 65+ has grown by only 18%, the number of men 65+ has grown by more than 60%. This reduced the strong overhang

of women that still existed for the age group of 65+ in 1991. In 1991, only one third of that age group was male, while in general nearly half of the population was male (48%). This overall distribution has not changed until 2006, but because of the large increase of the number of men 65+ since 1991 they now make up 40% of that age group.

Mobility

In the last decades, lifestyles of senior citizens have changed considerably. A better living standard for the majority has also had its effects on the mobility of that age group. Moreover, there have been large improvements in the medical sector resulting in a better health standard in general and a better health standard for senior citizens in particular. A person of 65 years of age nowadays cannot be compared to a person of the same age 20 years ago. The mobility of senior citizens has grown strongly but it is still not as high as for younger persons.

The increase in mobility can among other things be seen in the more-than-average increase of the number of vehicles registered for persons of 65 years or over but also in the number of driving licenses for that age group. The BAST has conducted research on that topic and calculated the share of persons owning a driving licence for a passenger car for three years in a row (2002 - 2004). With a straightforward forecast these shares have been extended until 2006.

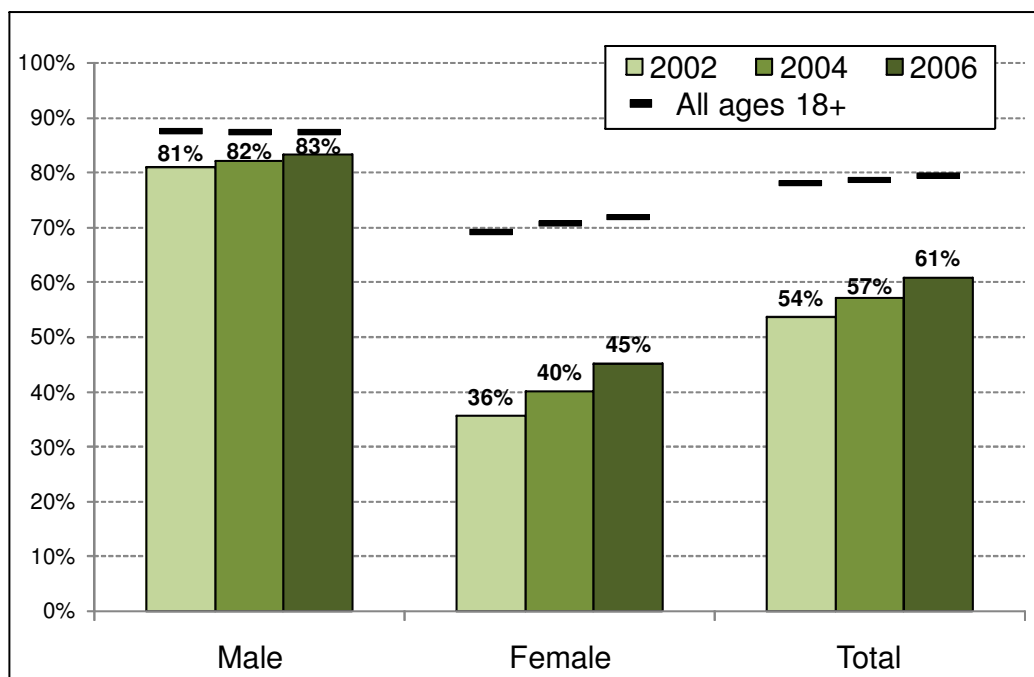


Figure 2: Percentage of persons of 65 years or over with a driving licence for passenger cars in Germany

In 2006, around 80% of the population owns a driving licence for cars (s. Figure 2). This share has increased only slightly since 2002. The share of persons 65+ with such a driving licence is much lower. Only 61% of that age group own one in 2006. Four years earlier, this share was even lower (54%).

Again, there are great differences between the two sexes. The share of men 65+ with a driving licence in 2006 is more than 80% and nearly as high as the share of men with driving licences in general. Furthermore, it has increased only slightly from 2002. The share of women with a driving licence in general is notably lower, but also increasing. In 2006, about 72% of all women had a driving licence for cars. However, the amount of driving licences for women 65+ is very low. In 2006, only 45% of the women of that age group owned a driving licence. This share has increased considerably from 39% in 2002. Those changes are a good indication that especially the mobility of women 65+ has changed markedly in the last decades.

Accident Involvement

The growing population 65+ and their growing and changing mobility become apparent in the magnitude and the structural changes of their involvement in accidents¹.

In general, the number of accidents with personal injury has been decreasing steadily for more than 30 years in Germany. The number of persons involved² in such accidents has decreased accordingly. While there were more than 750,000 persons involved in accidents in 1991 there are about



		1991	Trend	2006
Involvement in accidents with personal injury	Total	751,937	-19.3 %	634,947
	65+	40,740	+50.6 %	61,341
Share of involvement in accidents		5 %		10 %
Share of population 65+		15 %		19 %

Table 2: Trends in accident involvement in Germany, 1991 - 2006

100,000 fewer persons involved in accidents in 2006 (s. Table 2). During the same period of time, the number of persons of 65 years or over involved in an accident has increased by 50%. In 2006, there are approximately 61,000 persons 65+ involved in an accident. In 1991, there were only 40,000. While in 1991 every 20th person involved in an accident was 65 years old or older in 2006, already every 10th person belongs to that age group.

The increase occurred in both sexes, although the increase was much stronger for men 65+ (+60%, + 15,000 men). This reflects the strong increase in population for men 65+ (+63%). The increase in accident involvement for women is weaker (+34%) but still more than what would be

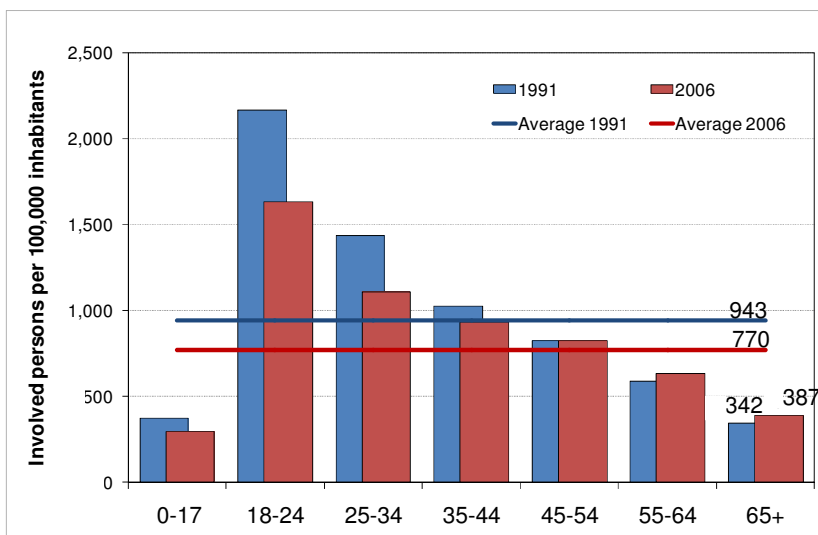


Figure 3: "Risk" of involvement in accidents with personal injury in Germany, 1991 + 2006

expected from their increase in population. For women 65+, this is a strong indication for their growing mobility.

Although the number of senior citizens involved in an accident has increased strongly as a result of a growing population and mobility, they are still under-represented compared to their share of population. While they have a share of 19% in the

¹ Although this is true in general the paper itself refers to accidents with personal injury only.

² In Germany, all drivers of vehicles or pedestrians having a part in the accident are defined as persons involved in the accident. Passengers do not belong to that group of persons.

population only 10% of all persons involved in an accident are 65 years or over (s. Table 2). Their "risk" of being involved in an accident is still far below average (s. Figure 3). Only 387 per 100,000 inhabitants of that age group are involved in an accident, in 1991 this figure was even lower (342). On average, there are 770 persons involved in an accident per 100,000 inhabitants (943 in 1991). So, although the mobility of senior citizens has already grown over the past decades, they are evidently still not as actively taking part in road traffic as younger persons. Especially women 65+ have a very low "risk" of being involved in an accident. Only 213 women 65+ per 100,000 inhabitants are involved in an accident.

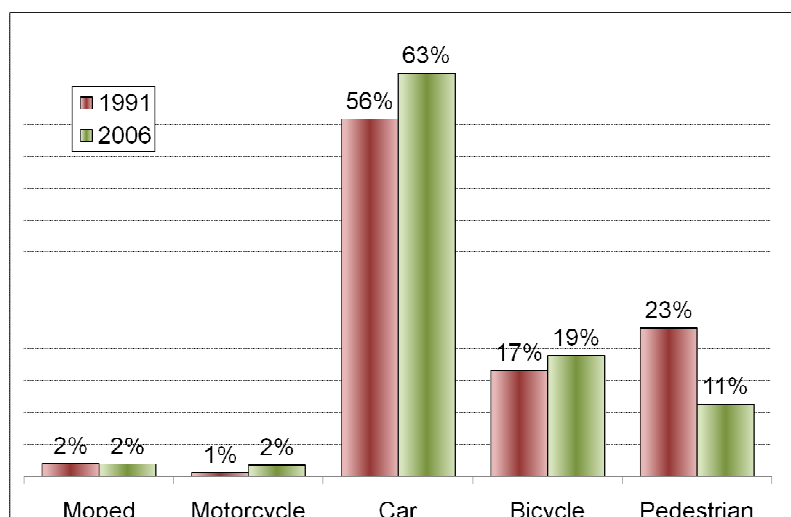


Figure 4: Distribution of accident involvement of persons 65+ in Germany

There have also been changes in the mode of transport with which senior citizens are involved in accidents. In 1991, 56% of the senior citizens were involved in the accident as a driver of a passenger car. Nearly a quarter of all senior citizens was involved as a pedestrian and 17% as a cyclist. Over all age groups the share of persons involved as a car driver was much higher (68%), the share of cyclists and pedestrians much

lower. Obviously, in 1991, senior citizens still chose other modes of transport such as cycling or walking more frequently than younger persons. From 1991 to 2006 this distribution of accident involvement of senior citizens has shifted to the involvement as a car driver and away from the involvement as a pedestrian. In 2006 63% of the senior citizens involved in accidents are car drivers but only 11% are pedestrians. This shift is mainly attributable to women of 65 years or over.

Although the changes in the mode of transport occurred for both sexes, women 65+ had the greater changes. In 1991, less than a third of the women 65+ were involved in an accident as a car driver. Most frequently, they were involved as a pedestrian - 45% of all women 65+ involved in accidents. This is reversed in 2006. Half of the women 65+ are involved as car drivers, only 22% as pedestrians.

The structural changes regarding the mode of transport reveal the strong changes in mobility that have especially occurred for women of 65 years or over. In contrast to the changing mobility, which plays a major role for women 65+, changes for men 65+ are mainly due to their increase in population.

Casualties

The development of the number of casualties³ confirms the changes that have occurred for the accident involvement of the generation 65+. Apart from that they reveal that the age group 65+ has a much higher vulnerability than younger persons.

In 1991 there were altogether nearly 482,000 casualties in road accidents in Germany (s. Figure 5). 7% of the casualties were 65 years old or older (approximately 34,000 persons). This percentage mainly reflects their share in accident involvement of 5% in 1991. Since then, the number of casualties in general has decreased considerably. It decreased by 20% to 383,880 casualties in 2006. As the population has not decreased at all in the same period of time the reduction can be mainly explained by improvements in road safety.

In contrast to the general decrease in casualties, the number of casualties 65+ has increased by nearly 30%. In 2006, there are 42,882 casualties 65+, which make up for 10% of all casualties. This is again - as it has been in 1991 - a mirror of the involvement of senior citizens in accidents (10% in 2006).

The number of fatalities gives a totally different picture.

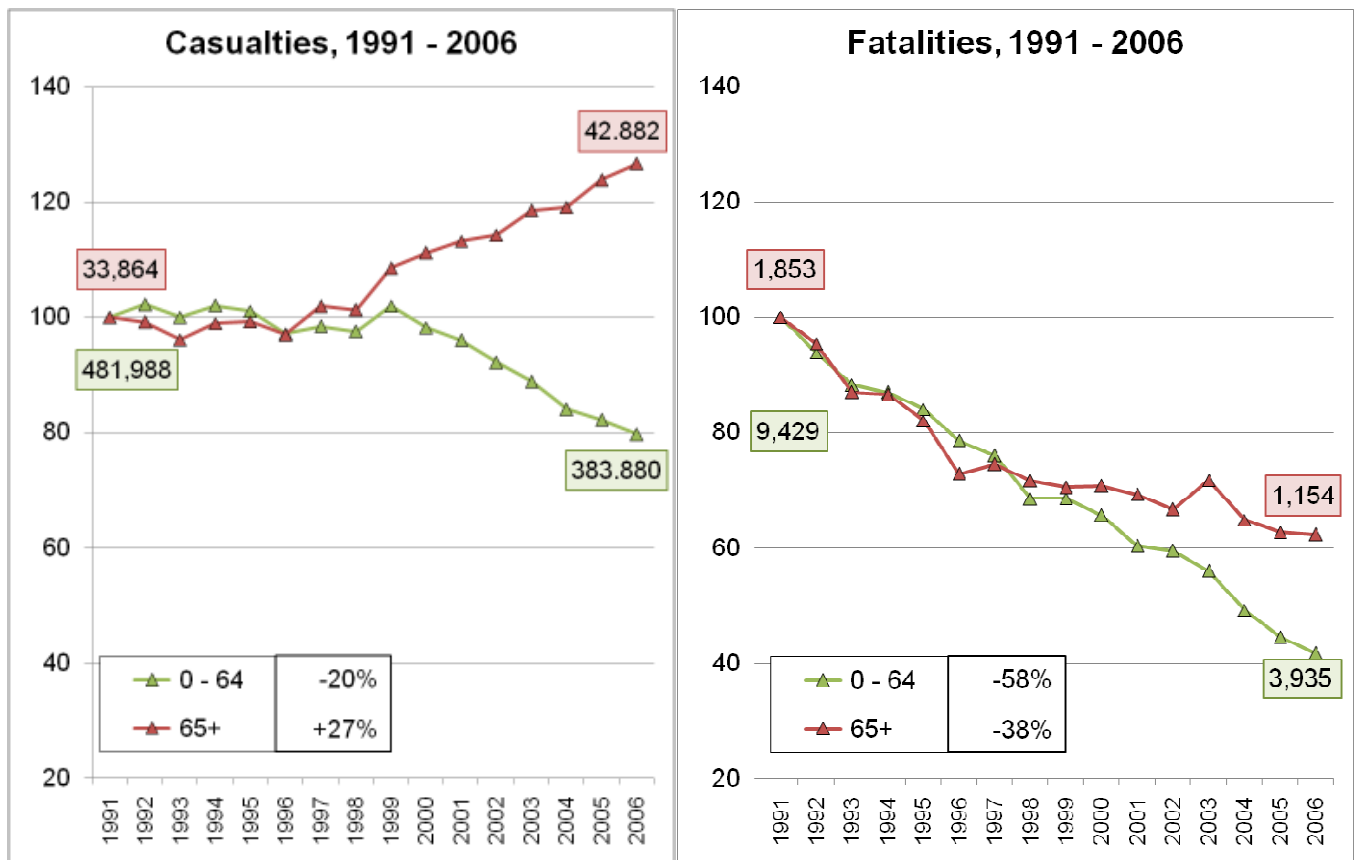


Figure 5 and Figure 6: Casualties and fatalities of road accidents in Germany by age, 1991 - 2006

³ The number of casualties includes all slightly injured, seriously injured and killed persons in an accident. It does not only include the persons involved (drivers and pedestrians), but also the passengers of vehicles.

In 1991 there were around 9,500 fatalities in road accidents in Germany. 1,853 fatally wounded persons were 65 years old or older. Their share in all fatalities was 16%. Compared to their share in accident involvement of 5% in 1991, this share in fatalities is extremely high. It is mainly an expression of the high vulnerability of senior citizens.

Since 1991, the number of fatalities has decreased in general (-58%) as well as for the age group 65+ (-38%). In 2006, 1,154 persons who are killed in an accident are 65 years old or older. As a result of the stronger general trend the share of senior citizens in all fatalities has gone up to 23%. So, in 2006, approximately every fourth person killed in an accident is 65 years old or older. Again, as in 1991, the high vulnerability is reflected - as only every tenth person involved in an accident is a senior citizen⁴.

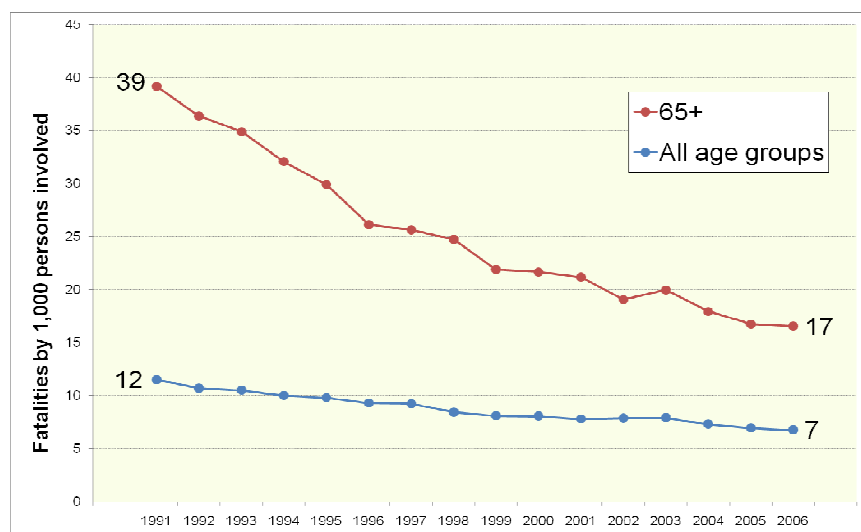


Figure 7: Fatalities by 1,000 persons involved in Germany, 1991 - 2006

A good measure for the vulnerability of senior citizens is a measure that expresses the relation between the number of persons involved and the number of those killed in the accident. In 1991, 39 per 1,000 senior citizens involved in an accident were killed in the accident (s. Figure 7). On average, only 12 persons were killed per 1,000 persons involved in the accident.

Since then this ratio has improved in general as well as for senior citizens in particular. In 2006, "only" 17 senior citizens are killed per 1,000 persons of that age group involved in the accident. Although this is a good improvement this ratio is still more than twice as high as the general ratio of 7 fatalities per 1,000 persons involved in the accident.

Even so the vulnerability is the main factor for the high and above-average amount of killed senior citizens, the choice of mode of transport also plays an important role. It is well-known that the different modes of transport are associated with different risks of being injured or killed. Modes of transport such as a bicycle or walking are linked with a higher "risk" of being injured or killed. Therefore, senior citizens who are still more frequently taking part in traffic with a "high-

⁴ Strictly speaking the figure of 23% cannot be directly compared to the share in accident involvement because it also includes passenger, which the share does not. The corresponding share for fatally wounded persons who have been involved would be x% and is still much higher than the share of involvement.

risk" mode of transport are not only more at risk because of their higher vulnerability in general but also because of their choice of mode of transport.

The distribution of the fatalities by mode of transport reflects the choices of mode of transport and also the changes that have occurred since 1991. In general, half of the persons killed in a road accident are drivers or passengers of cars (s. Figure 8). The second biggest group are motorcyclists (16% of all persons killed in accidents) and pedestrians (14%).

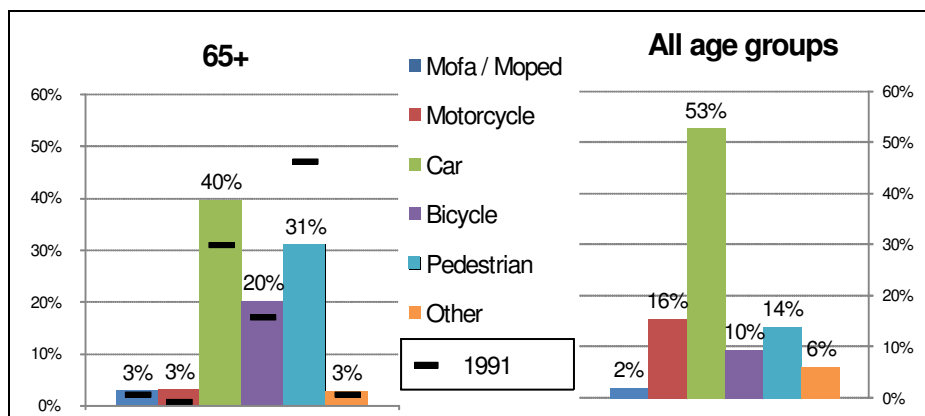


Figure 8: Distribution of involvement in accidents in Germany, 1991 + 2006

In the age group of 65+ the car is also the most frequent mode of transport of killed senior citizens. But in this age group - with "only" 40% of all fatalities 65+ - it is not as dominating as for all age groups. 31% of the fatalities 65+ are pedestrians and 20% are

cyclists. Therefore, half of the senior citizens killed in an accident are either a pedestrian or a cyclist. Back in 1991, the relevance of the car as a mode of transport has been even lower. Only 30% of the killed senior citizens were occupants of passenger cars, but nearly half of the killed senior citizens were pedestrians.

The decrease in relevance for pedestrians was mainly due to the decrease of the relevance of this mode of transport for women 65+. The ranking in Table 3 shows the four most important modes of transport for both sexes in 1991 and 2006.

In 1991, 60% of all women 65+ killed in an accident were pedestrians. This figure shows that walking was by far the most important mode of transport for killed women of 65 years or over. It was also the most important mode of transport for men 65+, with 34% of all killed men 65+ in 1991. Nevertheless, in 2006

Fatalities 65+, 1991			
Pedestrian	315 (34%)	Pedestrian	558 (59%)
Car (Driver)	292 (32%)	Car (Passenger)	186 (20%)
Bicycle (Rider)	191 (21%)	Bicycle (Rider)	125 (13%)
Car (Passenger)	49 (5%)	Car (Driver)	47 (5%)
Fatalities 65+, 2006			
Car (Driver)	249 (36%)	Pedestrian	197 (43%)
Bicycle (Rider)	164 (24%)	Car (Passenger)	107 (23%)
Pedestrian	163 (23%)	Car (Driver)	78 (17%)
Motorcycle (Rider)	35 (5%)	Bicycle (Rider)	69 (15%)

Table 3: Ranking of the most important modes of transport for fatalities 65+ in Germany, 1991 + 2006

this mode of transport is no longer the most frequent mode of transport for men 65+. Only a quarter of all killed men 65+ are pedestrians. For men 65+, the car has become the most important mode of transport. More than a third of men 65+ are killed as drivers of passenger cars. In contrast to that development for men 65+, women 65+ are still most frequently killed as pedestrians (43% of all killed women 65+) although the relevance of this mode of transport has also decreased greatly since 1991. In 1991 as well as in 2006 women 65+ are also frequently killed as passenger of cars (20% / 23% of all killed women 65+). In contrast, for men 65+ this mode of transport does not play an important role in 1991 and it is diminishing in 2006. Instead, for men 65+ the role of the motorcycle has increased but it still has no great importance (5% of all killed men 65+).

The trends for the choice of the mode of transport of senior citizens that already transpired in their way of the involvement in accidents, is again confirmed by the changes in the numbers of casualties and fatalities. Regarding female fatalities 65+ it ought to be kept in mind that they are still frequently killed as passengers of cars and therefore, as persons who are not actively involved in the accident.

Conclusions

Not only the simple fact that the age group of persons of 65 years or above is constantly increasing in numbers turns this age group into an important target group for the work in road safety. Apart from the growing population in that age group their increasing and changing mobility are important factors having an effect on their safety. While the main aspect for men 65+ lies in the growing population, for women 65+ it is the increase in mobility in combination with the changing choice of mode of transport.

These changes are broadly reflected in the growing involvement of senior citizens in road accidents and as a consequence also in their numbers of casualties and fatalities. Their "risk" of being involved in an accident is below average but increasing and the structure is changing. There are fewer pedestrians and more car drivers.

Some other aspects such as the vulnerability of senior citizens and their lifestyles are also changing and leave their footprints in the German road accident statistics.

Still, there are some aspects which change only slowly or even do not change at all and which will always make senior citizens a group that differs from other age groups regarding road safety.