Mobility impairments among the elderly in rural areas of Germany

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Abstract

Mobility is of great importance to the elderly. Physical impairments increase with age and may lead to a loss of independence. For the development of supportive measures, it is necessary to obtain a detailed picture of this age group's mobility patterns.
Using the nationwide survey "Mobility in Germany 2008" as a basis, the mobility of elderly people in rural areas will thus be examined in detail. We show that mobility varies depending on age, gender and physical impairment. Women aged over 75 are particularly limited in their mobility options in the countryside. In order to enable this group in particular to have long, independent lives in old age, it is necessary to develop solutions that will meet their needs. Measures to increase transport safety can also make an important contribution to this end.

Keywords: Elderly people, mobility patterns, mobility impairments, rural area, Germany

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1. Introduction

Demographic change and the ageing population are ubiquitous in scientific and political debate. Mobility[†] is of particular significance here, as elderly people's social participation is to a great extent facilitated by daily travel. Mobility in this context involves far more than simply getting from A to B. Alongside that functional sense, mobility has highly emotional connotations (Mollenkopf & Kloé 2011). Elderly people consistently find quality of life and satisfaction in diverse activities outside of the home, whereas the loss or restriction of mobility has a big impact on many elderly people's lives (Mollenkopf & Flaschenträger 2001). Gerontology research has been able to show that life satisfaction is decidedly interrelated "with the degree of self-determination and daily living skills enjoyed" (Lehr 2008).

Elderly mobility is being transformed. Improving health is making a lasting impact on elderly people's mobility patterns. Overall, we see constantly rising life expectancy, accompanied by improved health in old age. The consequences are a greater number of years that can be enjoyed, as far as possible, without complaints (Freedman et al 2002; Dinkel 1999; Wurm et al. 2010). Age-related loss of physical and mental capacities, affecting sensory, motor and cognitive competences, increasingly occur only in higher ages. Despite these general developments, it is important to note that the elderly are not a homogeneous group in terms of their capacities. The deterioration of physical competencies in old age affects neither all capabilities nor all people. Due to the great heterogeneousness of this age group, it is therefore important to take the specific age into account in the analysis (Tews 2012).

Physical impairments can greatly impede individual mobility and lead to a loss of independence. In this light, questions of transport safety in particular take on great significance. It is precisely elderly people with physical limitations that are placed in greater danger in traffic. Transport safety measures targeted specifically at this age group are therefore required to maintain individual mobility, and with it independence in old age, as long as possible.

As a basis for the introduction of measures targeted at the transport safety of the mobility-impaired elderly, a detailed picture of this group's mobility patterns is essential. This paper will therefore examine the impact of physical impairment on daily mobility more closely. We will analyse rural areas in Germany as it is primarily these areas that are affected by ageing populations. Due to the higher distances and smaller range of transport options compared to urban areas, it is also more difficult to alleviate mobility impairments in these areas. Mobility-safeguarding measures are thus especially significant.

2. Methods

The empirical findings used in the following are based on the data set from the nation-wide survey "Mobility in Germany 2008" (infas & DLR 2010a). The Federal Ministry of Transport, Building and Urban Development (BMVBS) tasked the infas Institute for Applied Social Sciences GmbH together with the Institute of Transport Research at the German Aerospace Center (DLR) with scientific support. The daily mobility patterns of 60,000 people on 25,000 German households were surveyed and analysed in the scope of this study (infas, DLR 2010b).

The present paper is devoted to the daily mobility of elderly people in rural areas. Following Rosenbaum (2007), everyday mobility is understood as "the daily movements from the home to the locations of any number of daily activities". Holiday travel and moving home were not taken into consideration. As a spatial variable, our analysis employs so-called compiled district types of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), which discriminate between core cities, built-up surrounding areas and rural districts. The rural areas in our statistical analysis are thus defined as districts and regions with a density of under 120 inhabitants/km^2 (BBSR 2013).

We have taken a differentiated approach to elderly people's daily mobility, due to the increasing variability of the age group. Alongside the difference between the "younger elderly" (65 to 74) and the "older elderly" (75 and older), our analysis was also differentiated according to gender. We also set out to establish the extent to which restrictions in physical mobility impact the actual mobility of elderly people. To that effect, the study group was subdivided into those who were physically restricted in their mobility and those who were not. The "Mobility in Germany 2008" study initially asked respondents whether they had any health problems, and then whether these health issues were also hindered their mobility. In the following, elderly people only count as being mobility impaired if they answered "yes" to the question about "mobility impairments due to impaired health".

[†] Mobility is to be understood here as the journeys people make using whatever means of transport. It is not solely limited to physical mobility.

Alongside descriptive statistical analysis, we have also used a binary logistic regression as an evaluation method, with the aid of SPSS statistics software. Initially, the mobility patterns of elderly people in rural districts – differentiated according to the characteristics outlined above – are examined in greater detail by means of selected parameters. Differences in mobility rates, car availability, and the modal split are looked at individually. The mobility rate denotes the percentage of people who made a journey on the survey's sample day, with a person being considered mobile if they made a trip outside of the home. Car availability indicates whether a respondent had the use of a car (as driver or passenger) on the sample day. The modal split gives the breakdown of transport volumes across various transport modes, thus giving the chosen transport mode.
The next step examines involves a binary logistic regression. Here we examine which sociodemographic and spatial-structural factors from the existing data set can be shown to influence the mobility rates of elderly women (65+) in rural areas. This will not only highlight the necessary conditions for mobility, but will also clarify which subgroups are disadvantaged in their mobility due to which specified factors. The focus on elderly women stems from this group having – as we will show – a smaller range of mobility options compared to men of the same age, and thus being more greatly impaired in their mobility.

3. Results

We will first analyse the mobility patterns of elderly people in rural areas by means of certain parameters that are laid out in more detail below.‡

3.1. Mobility rate

Figure 1 shows the mobility rate of elderly people in rural areas, differentiated according to gender and mobility impairment. We can clearly see that both observed age groups whose mobility is unimpaired are consistently more mobile than those of the same age and gender with impaired mobility. Aside from men over 75 with impaired mobility, the mobility rate is lower among the higher age group than the younger ones across the board. Additionally, the mobility rate of older women (75+) with impaired mobility is conspicuously low, with only 63% of these women making journeys outside of the home on the sample day, compared to 83% of the equivalent men.

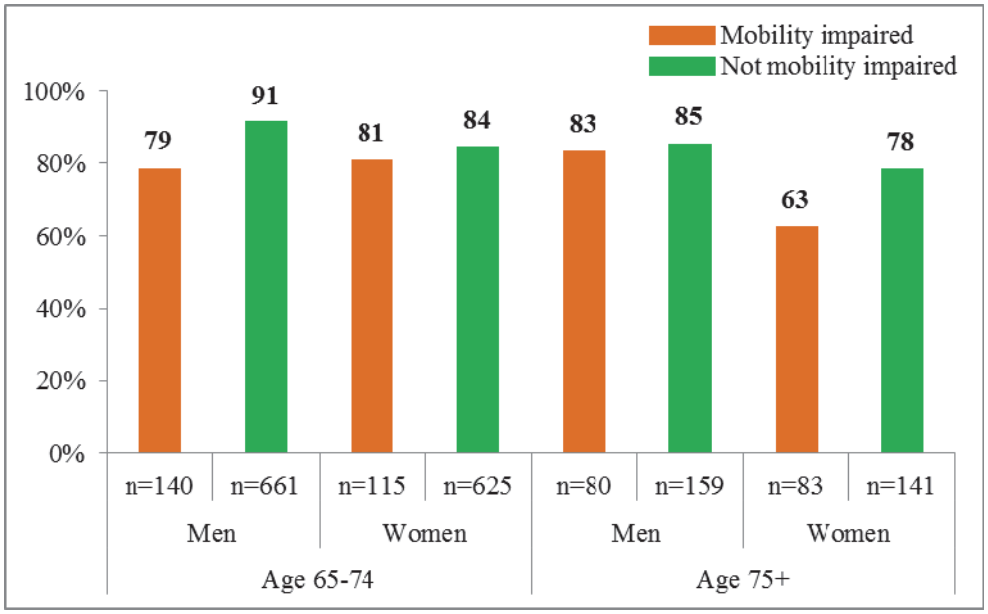

Fig. 1. Mobility rate in rural areas, differentiated according to age, gender and mobility impairments. Author's own analysis, based on data from "Mobility in Germany 2008" (infas & DLR 2010a).

‡ The results are first published in Giesel et al. 2013.

3.2. Car availability

We have also been able to discern age- and gender-related differences in terms of car availability, as shown in Figure 2. Elderly people with impaired mobility had access to a car less frequently than persons with no restriction in their transport options. This is also applies to women in comparison to the equivalent male groups. It is also noticeable that the 65-74 age group generally have a higher rate of car availability than the over-75s. Apart from 65-74-year-old women with no mobility restrictions, the rate of women's car availability differed greatly from men's. Over 80% of men across all groups have access to car; far fewer women of the same age can say the same. As few as 37% of mobility-restricted women have the use of a car.

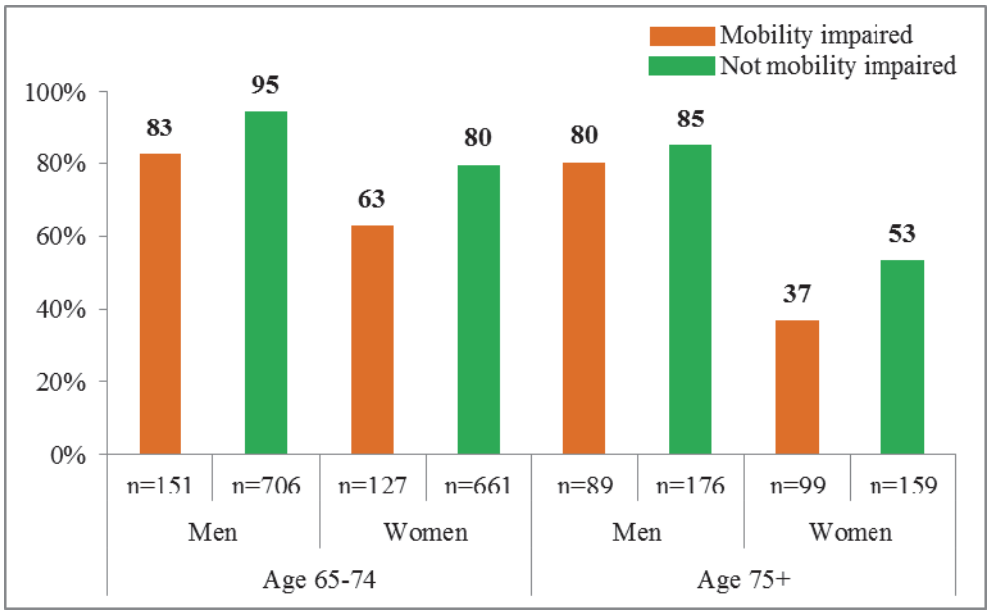

Fig. 2. Car availability in rural areas, differentiated according to age, gender and mobility impairments. Author's own analysis, based on data from "Mobility in Germany 2008" (infas & DLR 2010a).

3.3. Modal Split

The differing availability of cars between the age groups is also reflected in the choice of transport mode (Fig. 3). In general, among men of both age groups, we see that motorised private transport (MPT), particularly the car, is the most-commonly used transport mode. As a rule, around every second journey is made in a private car. Public transport is hardly used in rural areas and, overall, men are rarely passengers when on the move. Mobility impairments first make themselves felt in the 75+ age group. Men with no mobility impairments walk and cycle more frequently than men with restricted mobility.

Women's choice of mode, on the other hand, has a different complexion. Motorized private transport is used far less. Most trips are made on foot in full. Low MPT use is made up for in part by the large share of journeys made as a passenger. It is also noticeable here that public transport is only used by a small percentage. In the oldest group (75+) of women unimpaired in their mobility, the dominance of trips on foot stands out. Almost half of all journeys are walked, with 20% still being driven. In contrast, mobility-impaired women from the same age group use MPT somewhat more rarely, though a considerable number (22%) make journeys as passengers. As many as 18% cycle, the largest proportion of any of the groups we looked at.

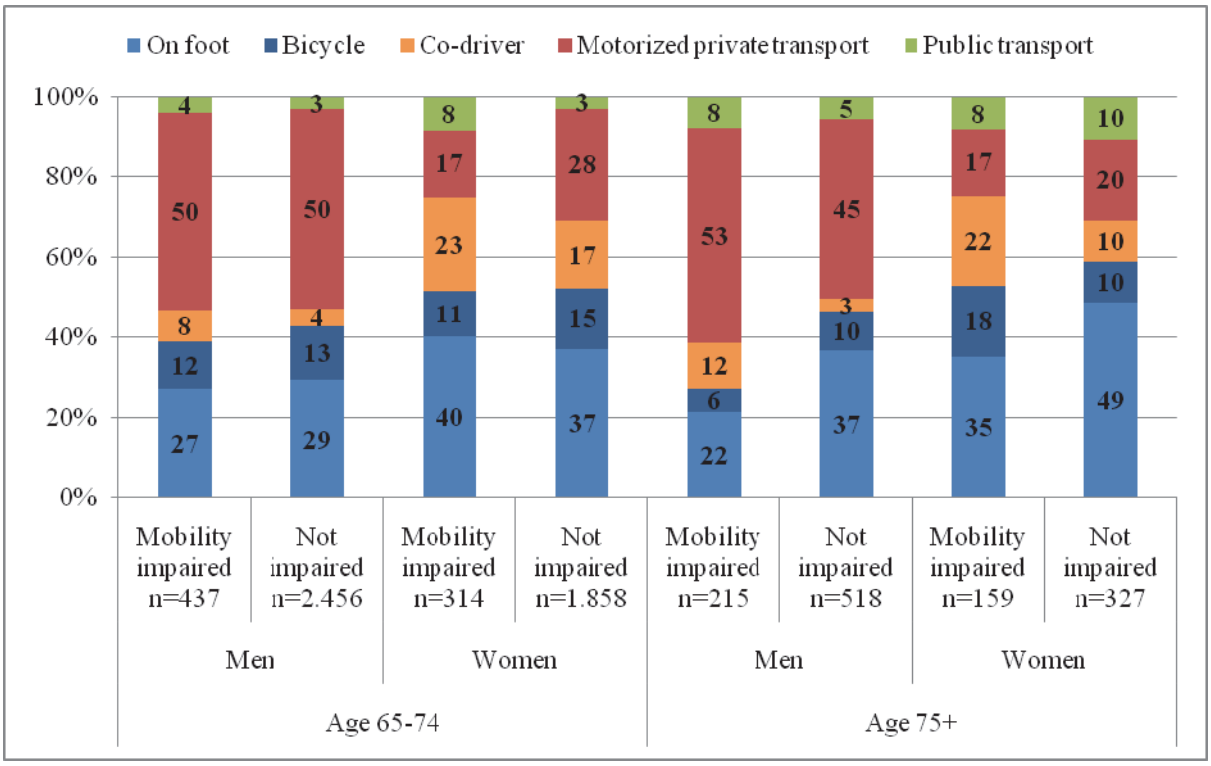

Fig. 3. Modal split in rural areas, differentiated according to age, gender and mobility impairments. Author's own analysis, based on data from "Mobility in Germany 2008" (infas & DLR 2010a).

3.4. Factors influencing the mobility rate

With the aid of a binary logistic regression, we will now examine which sociodemographic and spatial-structure factors from the existing data can be seen to influence mobility rates, particularly those of elderly women (65+) in rural areas. The model's findings are displayed in Table 1. The analysis is based on a weighted number of cases of 1,020 individuals and has a data coefficient of 0.146 (McFadden's pseudo R-squared).

Table 1. Factors influencing the mobility rates of the older women (65+) in rural areas, with the aid of a logistic regression. Author's own analysis, based on data from "Mobility in Germany 2008" (infas & DLR 2010a).*

	Reference category	B	S.E.	Wald	df	Sig.	Exp(B)
Age (65+)		-.041	.013	10.112	1	.001	.960
Access to car (yes/no)	no	1.333	.180	54.799	1	.000	3.793
High school graduate (yes/no)	no	1.072	.363	8.714	1	.003	2.922
Weather (dry/wet)	wet	.675	.188	12.917	1	.000	1.963
Shops reachable on foot (good/bad)	bad	.929	.181	26.302	1	.000	2.533
Constant		2.327	1.008	5.326	1	.021	10.247

* B = Logit-coefficient; S.E. = standard error; Wald = Wald-test statistic; df = degrees of freedom; Sig. = significance level; Exp(B) = effect coefficient

The model shows that the mobility rate of older women (65+) in rural areas depends firstly on whether a car is available (p=0.000). Beyond that, high levels of education (p=0.003), having shops and businesses for daily needs easily reachable on foot (p=0.000), dry weather (p0.000), and lower age also have a positive impact.
No correlation could be found regarding the variables of household size and distance to the nearest public transport stop. These variables were then disregarded in the model. In a bivariant view, we note a significant

correlation (p=0.000) between car availability among elderly women and driving license possession (Phi=0.444), bicycle possession (Phi=0.182), and the presence of mobility restrictions (Phi=0.229). Due to this high correlation with car availability, these variables have no place in the multivariant model and are thus explained together with car availability.

4. Discussion

The empirical results demonstrate that the mobility of the elderly in rural areas differs according to age, gender and mobility impairments. We can already see differences between the genders in terms of mobility rates and car availability in the 65-74 age group, but these are far more pronounced among over-75s. Women in this older age group made a trip outside of the house and had access to a car less frequently on the sample day than men of the same age. Rates of mobility and car availability are also lower when mobility is physically impaired. Sixty-three percent of mobility-impaired women aged over 75 were mobile outside of the home, while only 37% of them had access to a car. These findings can be traced back to a variety of causes.

In terms of the amount of required care and the prevalence of illnesses, health levels have improved in recent years (Dinkel 1999, Freedman et al. 2002). Due to this development, people are able to lead independent lives for longer, with their health only affecting this at more and more advanced ages. It is important to note here, however, that physical restrictions vary according to gender. Older women suffer more from multimorbidity than men of the same age (Ahacic et al. 2007, Wurm et al. 2010, Fuchs et al. 2012). These results show why mobility rates vary between the two observed age groups and also between genders. The mobility rate of older women (75+) can also be put down to low car availability, however, which is closely bound up with low rates of driver's license possession.

Even though more men over 65 hold a driver's license, there are currently large differences between the genders, especially at above 75 years of age. In 2008, almost 90% of men over 75 had a driver's license, but only just over 40% of women of the same age (infas & DLR 2010b). Driver's license possession also varies regionally. For historical reasons, older women in East Germany hold a driver's license far less frequently than West German women (infas & DIW 2004). The low rates of car availability are also influenced by the structure of the household, however. In 2009, 44% of elderly women, but only 18% of men, (both 65+) in Germany lived in single households. The proportion of single households increases further with increasing age. In 2009, only 35% of men, but 74% of women, aged over 85 lived alone (Destatis 2011). On the one hand, this can be traced back to women's higher life expectancy; on the other, it can be explained by the fact that the majority of men are married to younger women. Older women's low car availability is thus the result of low rates of driver's license possession and the lack of a car in the household after the death of a husband (Ottmann 2010).

Differences can also be seen in the modal split. The transport choice of men aged between 65 and 74 is not, however, determined by physical impairments. Every second trip is made using motorised private transport and almost a third on foot. MPT's significance remains constant for elderly men regardless of age due to high rates of driver's license possession. Both public transport and cycling play a minor role. Among women between 65 and 74 years of age, most trips are made on foot. Women unimpaired in their mobility drive a car for over a quarter of trips. This value is far lower among women with mobility impairments, at 11%, though they travel as passengers more often. We can see from this that mobility-impaired women are more dependent on using motorised private transport as passengers, as driving themselves is rarely possible. Among women aged over 75 with restricted mobility, the modal split remains roughly constant. It is notable that women with no mobility impairment use MPT overall less, even though they have greater access to cars. This in turn is an indication that women with impaired mobility have to make longer journeys, e.g. to medical specialists, and in doing so cannot avoid using MPT. Alongside being able to drive themselves, travelling as a passenger is also important for mobility-impaired elderly women. Attention should also be drawn here to the fact that almost half of journeys are made on foot, and that public transport plays almost no role in the daily mobility of the elderly in rural areas. This could indicate an infrastructure that is either lacking or ill-suited to this age group or the needs of the market.

Based on the binary logistic regression, we have been able to identify conducive conditions for elderly women's (65+) individual mobility, as measured in the mobility rate. It is clear that elderly women's mobility depends to a great extent on the availability of a car. School education, daily-use shops and businesses being in walking distance, the weather, and age were all also identified as determining factors. Due to the high correlation with car availability, this variable helps to explain the influence of mobility impairments. In summary, there is therefore currently a danger that women of advanced age with mobility impairments and without the use of a car are limited in their transport options. Socially disadvantaged elderly women in monofunctional residential environments are thus dependent on support in their mobility.

In light of this, it is essential to support the mobility of the elderly as much as possible, especially in such rural areas with insufficient infrastructure, to enable them to continue leading independent lives. To this end, solutions that meet the elderly's mobility requirements and are well-adapted to the market need to be developed. Alongside the creation of a small-scale supply structure and the introduction of alternative service concepts such as ride-on-demand buses or civil bus services, measures of transport safety in support of mobility can also play a role. Further examples include: senior-friendly road design, driving training courses, and providing information about the loss of physical and mental abilities and how to compensate for them. As we have seen, elderly women require particular attention here, as in rural areas it is they who are hardest hit.

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