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Assessing Needs of Care in European Nations

LONG-TERM CARE USE AND SUPPLY IN EUROPE: PROJECTIONS FOR GERMANY, THE NETHERLANDS, SPAIN AND POLAND

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Abstract

This report presents results of projections of use and supply of long-term care for older persons in four countries representative of different long-term care systems: Germany, the Netherlands, Spain and Poland. Using a standardised methodology, the projections show that between 2010 and 2060, the numbers of users of residential care, formal home care and informal care are projected to increase in all countries, but at different rates. The results also indicate that if current patterns of care use and supply prevail, supply of informal and formal care is likely to fall behind demand. Measures to increase LTC capacity will be needed in all countries; the key policy implications of these findings are discussed in Policy Brief No. 12 in this series.

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Long-Term Care Use and Supply in Europe: Projection Models and Results for Germany, the Netherlands, Spain and Poland

ENEPRI Research Report No. 116/April 2012

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1. Introduction

Sharp increases in the numbers of older persons and an improved survival of disabled older persons are expected to cause an increase in the demand for and use of long-term care (LTC) in the coming decades in all European countries. At the same time population ageing is likely to have a profound impact on the future availability of both formal and informal caregivers. Generally, LTC systems in Europe consist of a range of home and residential care services, and significant informal care, mainly provided by partners and children. However, as work packages (WP) 1 and 3 of the ANCIEN project and other comparative studies have demonstrated, European countries differ considerably in how they organise, finance and allocate LTC. There is considerable variation not only in levels of formal and informal care use, but also in how care use is related to disability, household composition, and other characteristics of older persons. Supply side analyses of WP 3 have also shown large country differences in the prevalence of informal caregiving and in formal care workforce participation rates. Furthermore, as has been shown in WP2, current and predicted disability levels are much higher in some countries than in others. How population ageing and other societal trends (e.g. changing living arrangements, higher female employment rates) will affect future use and supply of formal and informal care is therefore likely to differ considerably across European countries.

The aim of this report is to make projections of future use and supply of formal and informal care for different LTC systems. Projections are made up to 2060 for four countries: Germany, the Netherlands, Spain and Poland, using a standardised methodology. The countries were selected in WP 1 as representative of clusters of countries with different LTC systems, based on four indicators of use and financing of care: i) public LTC expenditure as a share of GDP and corrected for the share of persons aged 65 and over, ii) private expenditure as a share of LTC spending, iii) the share of informal care users among the 65+ population, and iv) support measures for informal caregivers (Kraus et al., 2010). The typology of LTC systems is presented in Table 1.1 below.

Cluster 1, to which Germany belongs, consists of countries in which a low level of public spending is combined with a modest share of private spending, high informal care use and high informal care support. The Netherlands belongs to a cluster of Northern European countries characterized by high public LTC spending, low private spending, low informal care use and high informal care support. Spain and the other countries of cluster 3 share the profile of cluster 1 with regard to informal care use and support, but have a much higher level of private responsibility and a somewhat higher level of public spending. Poland is allocated to cluster 4, which is characterized by a small public sector involvement, more private spending, high informal care provision but few supportive measures for informal caregivers. Cluster 2 is ranked by Kraus et al. (2010) as the most attractive from the point of view of older persons in need of care. Cluster 1 and 3 share second and third place, and cluster 4 is placed fourth in the ranking.

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Table 1.1 Typology of long-term care systems

Cluster	Country	Public Spending	Private Spending	Informal Care Use	Informal Care Support
1	Belgium Czech Republic *Germany* Slovakia	Low	Low	High	High
2	Denmark *The Netherlands* Sweden	High	Low	Low	High
3	Austria England Finland France *Spain*	Medium	High	High	High
4	Hungary Italy *Poland*	Low	High	High	Low

Source: Kraus et al. (2010).

The projections of *LTC use* focus on use of personal care (i.e. help with activities of daily living (ADLs) such as bathing, dressing, eating and getting in or out of bed) and nursing care by persons aged 65 and over, and cover different settings and types of care (residential care, formal home care, informal care). Micro models of determinants of care utilisation are developed and used to build macro-simulation (cell-based) models. These models link estimated probabilities of using different types of care by age, gender, disability, household composition and other relevant characteristics, to projected numbers of the future older population divided into groups (cells) of persons with similar characteristics. To this end, disability projections for the four representative countries from WP 2 are combined with available national socio-demographic projections on household composition and educational attainment. The report explores the sensitivity of the care utilisation projections to a wide range of alternative assumptions about trends in disability and to changes in household composition and education of older persons.

The projections of *informal care supply* relate to regular provision of personal care by people aged 50 and over. Projections of the numbers of people providing informal care are based on micro models estimating probabilities of care provision to older people, by age, gender and *de facto* marital status. The projections look separately at provision of care to the older generation (intergenerational care) and at provision of care to partners and spouses aged 65 and over (spouse care). The current probabilities of providing care are applied to the projected numbers of people in the population to generate the numbers of persons providing informal personal care in future years.

Finally, for all representative countries, projections of formal care supply are made using similar techniques. Projections of the numbers of persons working in residential and home care services are produced by combining projections of the total workforce with current fractions of LTC workers in the total workforce.

The report is further structured as follows. The next chapters describe the statistical models of residential (Chapter 2) and home care use (Chapter 3) and present estimation results. Chapter 4 discusses the projection methodology and available data for the care use projections and presents the projected numbers of future users of formal and informal care under the base and alternative scenarios. Chapter 5 reports on the projections of the future supply of informal care and chapter 6 summarizes the results on the future developments in formal long-term care workers. Both chapters include a broad measure of the future relationship between supply of care and demand for care, using projected numbers of older persons as a proxy for demand. The final chapter aims at providing a more accurate measure of

this relationship by bringing together the results of chapters 4, 5 and 6 and comparing the numbers of older persons projected to use informal and formal care, and the projected numbers of informal and formal caregivers.

References

Kraus, M., M. Rieder, E. Mot, P. Willemé, G. Röhrling and T. Czypionka (2010), "Typology of Systems of Long-Term Care in Europe - Results of Work Package 1 of the ANCIEN Project", ENEPRI Research Report No. 91, CEPS, Brussels (http://www.ancien-longtermcare.eu/node/27).

2. Determinants of institutionalisation in Europe for elderly disabled people: Evidence from Germany, the Netherlands, Spain and Poland

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Introduction

The prevalence of institutionalisation among elderly people varies widely across European countries. Many factors may explain these disparities. For example, demand factors such as disability level, availability of informal care, family income and families' preferences, naturally, play important roles. However, supply factors also directly influence how families choose to provide care for their elderly parents.

Indeed, beyond the preferences of family members and the availability of informal care, financial implications of care arrangements for an elderly parent often influence family choice. In this respect, the long-term-care schemes available in each country, in particular public subsidies for care in the community and for institutional care, have a direct impact on institutionalisation rates. Furthermore, quantitative constraints such as the availability of beds in institutions and of formal care at home clearly determine whether or not families choose to keep elderly parents in the community. Thus, analysing the determinants of institutionalisation in Europe necessitates controlling for the design of long-term-care schemes.

ANCIEN WP1 classified long-term-care schemes in Europe into four clusters, based on use and financing of LTC. Using data from one country from each category – Germany from cluster 1, the Netherlands from cluster 2, Spain from cluster 3 and Poland from cluster 4, the aim of this chapter is to measure the main factors driving institutionalisation. These estimates support the projections of long-term care use made in Chapter 4.

In the next section, we discuss methods used to evaluate data from each representative country and define key variables. We present empirical results in Section 2.2 and compare results across countries in Section 2.3. We conclude in a final section.

2.1 Methods and definitions

To tackle this issue, a natural way to proceed is to study, at a given time, the probability that an elderly person will be institutionalised at a future time point, i.e. to measure the incidence of institutionalisation. However, this method presents two obstacles. First, this approach is extremely data intensive because simulating institutionalisation rates for a specific cohort of elderly people requires both estimating the prevalence of institutionalisation and accounting for each variable (e.g., age, gender, disability intensity, availability of informal care, whether currently institutionalised or not) that may influence this probability for each cell in a transition matrix. Second, estimating institutionalisation incidence rates requires longitudinal data that are representative of the entire population aged 60 and above. Such data are rare and are not available for some of the countries included in this study.

An alternative approach consists of estimating prevalence rates of institutionalisation based on pertinent characteristics of elderly people such as age, gender and disability intensity. Cross-sectional microdata are sufficient for such estimates and happen to be available for two of the representative countries we selected. We thus choose to pursue this method of analysing determinants of institutionalisation.

A straightforward approach to work with cross-sectional microdata, which are representative of the population of elderly people, is to estimate the probability of institutionalisation using a logit model, controlling for the individual characteristics that can influence the institutionalisation of elderly people. Where possible, i.e. when the data was available, such estimations were run.

Luppa et al. (2010) and Gaugler et al. (2007) survey the literature on estimating the probability of institutionalisation. From the list of determinants identified in Luppa et al. (2010), we have selected

variables that strongly influence institutionalisation rates and that are available for the countries included in our study. Specifically, we consider:

- Age
- Gender
- Severity of functional impairment
- Cognitive impairment (dementia)
- Income
- Educational attainment
- Number of comorbidities

The main drivers of institutionalisation of elderly people are *age* and *severity of functional impairment*. Both are strongly linked with the demand for care services; a high demand for care could necessitate institutionalisation if informal care is not sufficient and if formal care in the community is too costly or unavailable. When possible, the *severity of functional impairment* is captured by the number of limitations in activities of daily living (ADL)[1].

The demand for care services is correlated with two other variables: *number of comorbidities* and *cognitive impairment*. The number of ADL limitations does not precisely capture care needs for elderly people suffering from dementia because, when cognitive impairment becomes severe, people with dementia often require permanent supervision, which can necessitate institutionalisation if such care is not available in the community. For any number of functional impairments, *cognitive impairment* a priori increases the probability of institutionalisation. In the same way, the *number of comorbidities* is expected to positively influence the likelihood of institutionalisation because the burden of care in the community is higher when elderly people suffer from comorbidities.

Choosing institutionalisation for an elderly dependent parent means renouncing community care options. This renouncement, everything else being equal, depends on the *informal care availability* for the elderly parent, i.e., on the extent to which it is possible for relatives to spend time caring for dependent parents. There are many ways to approximate *informal care availability*, including whether an elderly parent co-resides with another person and whether one or more children live in proximity to the parent. A more sophisticated definition of *informal care availability* is based on informal care before institutionalisation. However, using such data could introduce bias because the period immediately preceding institutionalisation may entail especially time-intensive care (e.g., following a change in the health and disability status of the elderly parent), which is not representative of actual *informal care availability*. As such, we use the simpler means of measuring *informal care availability* in our econometric estimates.

Income could negatively influence the probability of institutionalisation because wealthier people are better able to afford care in the community, which may be expensive. *Educational attainment* is also expected to play a role because it is a correlated with household financial resources and because empirical evidence shows that informal care increases with *educational attainment* of the elderly parent. *Educational attainment* is based on the ISCED97 classification whenever possible (see country-specific ISCED codes) and is recoded in the following broad categories: Low (0-1), Medium (2-4) and High (5-6).

[1] The ADL are based on the six following items used in SHARE with categories 2 and 5 collapsed into one:

1. Dressing, including putting on shoes and socks
2. Walking across a room *or* 5. Getting in or out of bed
3. Bathing or showering
4. Eating, such as cutting up your food
6. Using the toilet, including getting up or down.

Gender may also influence institutionalisation rates, particularly if gender interacts with other determinants of institutionalisation. Still, the effect of *gender* is not a priori clear once we control for marital status and age. Therefore, specific estimations for women and men could be relevant.

It is important to clearly define "institutions". We restrict the definition to facilities in which residents live on a permanent basis, principally due to ADL limitations, and in which they receive personal and nursing care from staff employed by these facilities.[2] This qualification is meant to exclude supported living arrangements in which older persons live alone, either without LTC or with home-based care.

2.2 Factors of institutionalisation in Europe for disabled elderly people

Representative microdata from Spain and the Netherlands facilitate estimating logit models to study determinants of institutionalisation in these countries. In Germany and Poland, administrative data are used to evaluate the prevalence of institutionalisation by gender, age and disability level (for Germany). However, logit models could not be estimated for Germany and Poland due to the unavailability of microdata.

In this section, the results are presented for each country in turn. In the next section, we discuss differences and similarities among countries.

2.2.1 Probability of institutionalisation for disabled elderly people in Spain

The Encuesta de Discapacidad, Edad y Situaciones de Dependencia (EDAD) is used to estimate the logit model. Conducted by the Instituto Nacional de Estadística (INE) and the Ministry of Health and Social Policy, the EDAD aims to provide information about disabled people and dependency in Spain. The survey was conducted in 2008 in two steps: in the first step, the survey was administered to households (96,000 households/260,000 persons); in the second step, the survey was administered to care centres, psychiatric hospitals and geriatric hospitals (800 centres/11,000 people).

Several data limitations are worth noting. First, the EDAD does not contain information about the incomes of surveyed people. Second, age in the survey administered to households is recorded as a continuous variable. However, age is recorded in discrete intervals in the survey administered to centres. To make these measures comparable, the age variable in the household survey is assigned to the same three age brackets found in the survey administered to centres: 65-74, 75-79 and 80+. Last, potential informal care availability is simply defined as whether or not the survey respondent has a spouse.

Table 2.1 presents estimates for the weighted logit models: one for females and males (pooled estimations), one for males only and one for females only. Presenting the results in this manner highlights differences in the way that independent variables influence the probability of institutionalisation for males and females. Based on the pooled estimates, females have a significantly lower probability of institutionalisation. Separate estimates for males and females demonstrate rather divergent results on some points: the estimates for age and functional impairment are lower for men than for women, while educational attainment has a smaller effect for women than for men. Otherwise, the estimates show that age, dementia, number of functional impairments and potential informal care availability all impact the probability of institutionalisation, as expected. On the other hand, the negative impact of the number of comorbidities is rather unexpected. This result may suggest that nursing homes in Spain do not easily enrol persons with severe health troubles.

[2] We use a somewhat more restrictive definition of institutional care than the one used in WP1 of ANCIEN.

Table 2.1 Probability to be institutionalised in Spain (Logit models, coefficients)

	Pooled	males	females
Age_7579	0.224***	0.103	0.368***
Age older than 80	0.721***	0.454***	0.956***
Female	-0.525***		
Dementia	1.525***	1.549***	1.507***
Potential IC available	-2.157***	-2.688***	-1.573***
Medium Educational Attainment	0.105	0.055	0.143
University Education Attainment	-0.475***	-0.670***	-0.252
Number of disorders	-0.521***	-0.534***	-0.515***
Severity of functional impairment (# ADL 1-2)	0.217***	0.161	0.263***
Severity of functional impairment (# ADL >=3)	0.900***	0.891***	0.937***
Constant	-1.388***	-1.039***	-2.202***
Observations	20,912	6,824	14,088
Pseudo R-squared	0.240	0.299	0.217

***p<0.01, ** p<0.05, * p<0.1.

Data: 2008 EDAD, population aged 65 and over.

2.2.2 Probability of institutionalisation for disabled elderly people in the Netherlands

No single Dutch dataset that includes information on both residential care and care in private households is suitable for the required analysis. Thus, following the SCP (the Netherlands Institute of Social Research) approach, we use one dataset for people living at home and one for people living in institutions[3]. Specifically, we use the *Aanvullend Voorzieningengebruik Onderzoek 2007* (AVO, Research into Supplementary Use of Services) and the *Onderzoek naar Ouderen in Instellingen 2008* (OII, Research on older persons in institutions). The AVO is a household survey conducted every four years to collect information on persons living in private households and their use of social and cultural services. The OII surveys people aged 55 and older living in residential care homes or nursing homes. More than 1500 elderly persons participated in the survey in 2008, answering questions pertaining to their use of services, living situation and health. We restricted the sample to individuals aged 65 and over for our analysis.

The variable potential informal care availability was constructed comparably for people living at home and people living in institutions: informal care is available in households consisting of more than one person. The variable measuring functional impairment is based on the number of limitations in basic activities of daily living; we include activities that can be completed with difficulty as well as those that can only be completed with help. Variables that had estimated coefficients with t-values less than 1.0 were excluded sequentially. For this reason, educational attainment and gender are not included in the final model. That gender does not influence institutionalisation in the Netherlands is one important difference with Spain. One possible explanation is that children and parents are more likely to cohabit in Spain than in the Netherlands, which could bias the results for women.

[3] The Netherlands Institute for Social Research (SCP) designs relevant surveys and regularly analyses data on the use of long-term care. The SCP offered to carry out the actual estimations for institutionalization in the Netherlands because of their expertise in the use of the datasets, programs and weighting schemes.

Weighted logit estimates are shown in Table 2.2. Older people have a higher probability of using residential care, especially when they reach 85 years of age. A larger number of limitations in the activities of daily living increases the probability of using residential care. These results are qualitatively similar to those for Spain. In the next section, we conduct simulations to quantitatively evaluate the impact of age and number of limitations.

Suffering from dementia dramatically increases the probability of institutionalisation in the Netherlands. The estimated effects are more significant for the Netherlands than for Spain (see Table 2.5 and Table 2.6 in the next section for simulation exercises).

Table 2.2 Probability to be institutionalised in the Netherlands (Logit models, coefficients)

	Pooled (males & females)
age 70-74	0.61***
age 75-79	1.21***
age 80-84	1.95***
age 85 +	3.76***
1 or 2 limitations in ADL	0.89***
3 or more limitations in ADL	1.78*
dementia	2.75***
(pot.) avail. informal care	-0.29*
income (middle of interval)	-0.0008**
number of disorders	0.07
constant	-4.30***
Pseudo R-squared	0.64

*** p<0.01, ** p<0.05, * p<0.1.

Data: AVO (2007) and OII (2008), population aged 65 and over.

Source: estimation SCP.

The availability of informal care has the expected negative effect on the use of residential care, but the effect is neither very large nor significant. This result is strikingly different from the case in Spain, where marital status appears to play an important role. The probability of institutionalisation in the Netherlands seems to be less linked with availability of informal care than in Spain. Nevertheless, we need to be cautious because it is possible that the availability of informal care in Spain captures part of the effect of age, which is imperfectly observed. Last, people with higher incomes have lower probabilities of using residential care. For Spain, this effect is possibly captured by educational attainment because income data are not available.

2.2.3 Prevalence rates of institutionalisation for disabled elderly people in Germany

With the introduction of the Long-term Care Insurance (LTCI) in 1995, a wide range of benefits for long-term care at home and in institutions became available. Since 1999, statistics on beneficiaries by sex, age groups, care level and living arrangements have been published every second year (from 1999 to 2009). Prevalence rates of institutionalisation by sex, age groups and care level are presented in Table 2.3.

The long-term care statistics are based on data for people receiving benefits from statutory or private LTCI funds. Because applicants must meet eligibility criteria to receive benefits from the LTCI funds, long-term care statistics provide information only for those who have substantial impairments and who

receive benefits. The number of people in need of care that were deemed ineligible to receive LTCI funds included 3 million in private households in 2002 and 45,000 people in institutions in 2005 (Schulz, 2011). The prevalence of institutionalisation is thus likely understated.

Benefits are made available to all insured persons irrespective of age, income or wealth. Benefit levels are based on need, where the "need of long-term care" legally refers to those who, owing to a physical, psychological or mental disease or handicap, require significant help to carry out the daily and recurring activities of everyday living over a prolonged period of time (for at least six months). Eligibility is based on whether individuals need help carrying out at least two basic activities of daily living and one additional instrumental activity of daily living (IADL). Dependency levels are based on how often assistance is needed and how long it takes a non-professional caregiver to help the dependent person[4] , as follows:

- Care level I: People who need assistance with personal hygiene, feeding or mobility for at least two activities at least once per day and who additionally need household help for at least 90 minutes per day (45 minutes of which is accounted for by basic care) several times per week.
- Care level II: People who need assistance with at least two basic ADL at least three times per day at various times of the day and who additionally need help in IADL (two hours of which is accounted for by basic care) several times per week.
- Care level III: People who need assistance with at least two ADL around the clock and who additionally need help in IADL for at least five hours per day (four hours of which is accounted for by basic care) several times per week.
- Hardship cases: People who exceed the requirements of care level III by needing assistance with ADL for at least seven hours a day, at least two of which are during the night or whose basic care may only be met by several people working at the same time[5].

Thus, we much keep in mind in the following section that functional impairment is defined differently for the German, Dutch and Spanish cases. Nonetheless, Table 2.3 demonstrates that the prevalence of institutionalisation among persons receiving LTCI benefits increases with the severity of disability and age (age being correlated with both health status and marital status). More interestingly, prevalence rates are higher for women except for care level I before age 75 and for care level II before age 70. In other words, prevalence rates increase more quickly with age for women than for men. This result can be partly explained by differences in marital status between men and women at old ages, with women being more likely to live alone.

[4] The Medical Review Boards of the Statutory Health Insurance Funds perform the assessment to determine whether an individual is entitled to benefits. Individuals are assessed for limitations in activities of daily living, such as bathing and dressing, and instrumental activities of daily living, such as shopping and cooking, as well as hours of care needed per day. These assessments have focused largely on physical needs for personal care, nutrition and mobility rather than on needs for supervision or cueing, which persons with dementia or learning disabilities often need. The new LTCI reform changed this situation in 2008. People whose competence in coping with everyday life is considerably impaired are now assessed on the basis of a special criteria catalogue. If applicants fulfil the criteria, they are eligible to receive additional benefits. Also, people who do not fulfil the criteria for care level I are now entitled to receive benefits (MDS, 2008).

[5] Because few individuals in our data were categorized as being hardship cases, we have not reported prevalence rates of institutionalization for this category of care level in Table 2.3.

Table 2.3 Prevalence rates of institutionalisation in Germany by sex, age and care level (people aged 60 and over) Percent of care dependent population and percent of total population (in brackets)

Age-groups	Total			Females			Males		
	Care level I	Care level II	Care level III	Care level I	Care level II	Care level III	Care level I	Care level II	Care level III
	15.39	24.67	40.54	11.74	21.60	41.94	18.88	27.59	39.09
60-64	(0.14)	(0.13)	(0.08)	(0.10)	(0.11)	(0.08)	(0.18)	(0.15)	(0.12)
	16.64	27.05	42.25	14.41	26.77	45.37	18.90	27.33	39.16
65-69	(0.25)	(0.23)	(0.12)	(0.21)	(0.21)	(0.13)	(0.29)	(0.25)	(0.12)
	16.16	29.95	46.65	15.45	32.45	52.82	17.06	27.24	39.70
70-74	(0.43)	(0.47)	(0.23)	(0.43)	(0.49)	(0.26)	(0.43)	(0.44)	(0.20)
	16.51	33.68	51.38	17.45	38.22	58.19	14.82	27.23	40.97
75-79	(0.93))	(1.08)	(0.54)	(1.10)	(1.26)	(0.64)	(0.70)	(0.84)	(0.40)
	20.37	40.02	57.84	21.92	44.50	63.00	16.31	30.10	44.65
80-84	(2.31)	(2.57)	(1.20)	(2.83)	(3.10)	(1.47)	(1.40)	(1.65)	(0.71)
	26.87	47.57	63.64	28.39*	50.94	66.46	20.78	35.01	49.51
85-89	(5.56)	(6.11)	(2.77)	(6.43)**	(7.06)	(3.30)	(3.19)	(3.53)	(1.33)
	32.72	51.95	65.83	34.19	54.64	68.21	26.18	38.46	48.96
90-94	(9.56)	(11.83)	(5.40)	(10.66)	(13.55)	(6.41)	(5.96)	(6.20)	(2.11)
	38.95	55.41	67.50	41.07	57.70	69.45	28.59	40.66	47.26
95+	(8.30)	(13.44)	(7.47)	(10.21)	(17.03)	(9.86)	(3.59)	(4.59)	(1.59)

Data: Administrative data from the LTCI, 2009, taken from Schulz (2011).

In brackets, the percentage of people institutionalised in whole population by age and gender.

Lectures: * 28.39% of women assessed in care level I aged from 85 to 89 are institutionalised.

** institutionalised women aged from 85 to 89 and assessed in care level I represent 6.43% of the whole population of women aged from 85 to 89.

2.2.4 Prevalence rates of institutionalisation for disabled elderly people in Poland

Institutional long term care in Poland is provided within the health sector and within the social sector, rarely cooperating. Data on the use of stationary services in each of the sectors is collected on an annual basis by the Central Statistical Office (GUS).

The presented data on the health sector are restricted to information on typical LTC facilities (ZOL and ZPO), while many types of services are also provided in hospitals and psychiatric care facilities. In the health care sector, dependency of people admitted to institutional care is measured with the Barthel scale. However, as the payment per service provided does not depend on it, information on dependency level is not collected by the central administration. Only general information on the age and sex structure of the residents is available.

Data on stationary LTC for the social sector allows for similar disaggregation of the information. In both cases the estimation of the age structure of residents is based on the volume of care provided to older persons at the end of each year, not the volume of care provided over the year. This might result in lowering the number of residential care recipients, especially in the health sector where the flow of residents is higher (there is a 6 months limit of residence), while in the social sector it should not cause

much of a disturbance. The numbers for the long-term care social sector are given for facilities run by public and private (mostly religious and non-profit) organizations with activities funded from public financial resources.

Table 2.4 Age and gender structure of the residential care population in Poland and prevalence rates of institutionalisation by sex and age (in percent)

	Health sector					Social sector				
Item	2001	2003	2005	2007	2009	2001	2003	2005	2007	2009
Age										
61-74	25.6	24.0	24.1	23.4	22.0	22.6	21.9	20.5	20.5	20.8
	(0.07)	(0.08)	(0.08)	(0.10)	(0.10)	(0.41)	(0.44)	(0.43)	(0.43)	(0.43)
75+	51.5	55.2	65.2	57.8	55.6	28.9	28.7	27.9	27.5	27.0
	(0.35)	(0.41)	(0.47)	(0.52)	(0.52)*	(1.35)	(1.34)	(1.22)	(1.15)	(1.12)
Sex										
Males	33.7	36.3	30.2	33.6	33.2	47.5	48.3***	50.5	53.5	55.2
	(0.02)	(0.03)	(0.03)	(0.04)	(0.08)**	(0.22)	(0.24)	(0.26)	(0.28)	(0.30)
females	66.3	63.7	69.8	66.4	66.8	52.5	51.7	49.5	46.5	44.8
	(0.04)	(0.05)	(0.06)	(0.07)	(0.04)	(0.23)	(0.24)	(0.23)	(0.23)	(0.23)

Data: Calculations based on "Podstawowe dane z zakresu ochrony zdrowia w Polsce 2000-2009" [Basic data on health care in Poland 2000-2009], GUS [Central Statistical Office] Warsaw 2000-2010, Rocznik demograficzny [Demographic Yearbook] 2000-2010 taken from Golinowska & Sowa (2011).

* Lectures: 0.52% of population aged 75+ is institutionalised in the health care system facilities (ZOL and ZPO) in 2009.

** Lectures: 0.08% of female population is institutionalised in the health care system facilities (ZOL and ZPO) in 2009.

*** Lectures: 48.3% of individuals in residential care in the social sector facilities are males.

Table 2.4 shows institutionalisation rates among people who benefit from LTC. Prevalence rates appear to be extremely low what contrasts with the fact that disability rates in Poland are very high, so as in other EU-12 countries. A decrease in prevalence of LTC in both sectors in the last decade was related to the introduction of changes in access to residential care (introduction of co-payment in the social sector and 40 - in place of 60 - points Barthel scale in the health sector). At the same time most of the care to the older persons is provided in the family, while residential care is of secondary importance.

However, due to the data limitations noted above, it is difficult to compare these rates with those calculated for Germany (see Table 2.3), Spain and the Netherlands (see Table 2.5 and Table 2.6 below).

2.3 Simulations of predicted probabilities

In this section, we compare the influence of age and disability level on institutionalisation rates in Germany, Spain and the Netherlands.[6] Using estimates shown in Table 2.1 and Table 2.2, we simulate the probability of institutionalisation based on age and limitations in ADL in Spain and the Netherlands. The results are presented in Table 2.5 and Table 2.6.

We note first that actual prevalence (percent of total population) in Germany is much lower than predicted prevalence in the Netherlands and somewhat lower than predicted prevalence in Spain. However, prevalence rates for Germany are calculated from administrative LTCI data (not from survey

[6] The administrative data available for Poland do not allow relevant comparisons

data) and, as noted above, some persons residing in residential care facilities are not registered in these data, as only persons with at least substantial limitations in 2 ADL and additional need for help with IADL are eligible for LTCI. Prevalence rates of institutionalisation thus tend then to be underestimated. The extent of this underestimation seems to be limited. In 2005, about 45,000 people needing care and residing in institutions were ineligible to receive LTCI funds, while about 644,000 persons received LTCI benefits for permanent residential care (Schulz, 2010 and 2011).

Comparing the predicted probability of institutionalisation for Spain and the Netherlands also requires caution. In particular, simulating predicted probability by age and number of limitations in ADL requires the modeller to assume values for other dependent variables (see legends of Table 2.5 and Table 2.6), making comparisons difficult.

Still, trends associated with age and physical limitations are evident in Table 2.5 and Table 2.6. For example, the impact of the number of limitations is quite similar in Spain and in the Netherlands: the predicted probabilities are roughly twice as high for each age group for individuals with three or more limitations in ADL than for individuals with one or two limitations.

Gradients in age are more difficult to distinguish. In particular, the huge increase in probability associated with ageing in the Netherlands (Table 2.6) is not observed in Spain (Table 2.5). Indeed, the predicted probability of institutionalisation for Spanish individuals aged 80 and over is nearly the same as that observed in the Netherlands for the group aged 80-84 (it is much higher in the Netherlands for the group aged 85 and over). This finding does not suggest that prevalence rates diminish in Spain after age 85. On the contrary, the relationship between age and institutionalisation described in Table 2.1 may stem from the unavailability of informal care, i.e., the probability that individuals live alone. Nevertheless, caution is again required given the possibility that marital status in Spain simply captures the effect of age. Again, it is quite difficult to compare the trends in prevalence in Germany with predicted probabilities in Spain and in the Netherlands knowing that, by definition, prevalence rates are calculated without controlling for availability of informal care.

Table 2.5 Predicted probabilities of institutionalisation in Spain (in percent)

	Females		Males	
Age groups	1 or 2 limitations	3+ limitations	1 or 2 limitations	3+ limitations
65-74	2.90	5.53	2.75	5.54
	(11.87)	(20.90)	(11.74)	(21.64)
75-79	4.13	7.80	3.04	6.45
	(16.29)	(27.63)	(12.85)	(23.43)
80+	7.20	13.22	4.26	8.46
	(25.94)	(40.73)	(17.32)	(30.30)

Source: Calculation based on the estimates shown in Table 2.1 (availability of informal care=1, educational attainment=0, number of disorders=0). The estimated probability for people with dementia is shown in brackets.

Table 2.6 Predicted probabilities of institutionalisation in the Netherlands (in percent)

	Pooled (males & females)	
Age groups	1-2 limitations	3+ limitations
60-69	0.70	1.78
	(10.43)	(43.78)
70-74	1.35	3.22
	(17.65)	(58.90)
75-79	2.44	5.73
	(28.09)	(72.35)
80-84	7.97	11.30
	(45.02)	(84.55)
85+	24.23	43.78
	(83.34)	(92.41)

Source: Calculation based on the estimates shown in Table 2.2
(availability of informal care =1, income=1500, number of disorders=0).
The estimated probability for people with dementia is shown in brackets.

Conclusion

Based on representative samples of elderly people, the estimated probability of institutionalisation differs between Spain and the Netherlands. First, this probability is significantly lower for women than for men in Spain, which is not the case in the Netherlands. It is not straightforward to link this divergence with differences in LTC systems. On the contrary, the significant and negative impact of comorbidities in Spain could be linked to differences in access to nursing homes among dependent people with health troubles.

However, simulating predicted probabilities (Table 2.5 and Table 2.6) shows that age, number of functional limitations and dementia increase the probability of institutionalisation in both countries. In addition, the availability of informal care has a negative effect on institutionalisation in both countries. Nevertheless, dementia appears to play a stronger role on institutionalisation in the Netherlands than in Spain, a result that may reflect differences in access to nursing homes. Unfortunately, the correlation between age and availability of informal care and the imprecision of age data for Spain make it difficult to compare the simulated results.

Additionally, institutionalisation rates for Germany and for Poland cannot be compared with each other or with estimates for Spain and the Netherlands because the administrative data used in Germany and Poland are not representative of the population with functional limitations. Indeed, elderly people suffering from incapacities and not enrolled in the long term care system are not, by definition, registered in administrative data.

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3. Determinants of use of formal and informal personal care by older persons living at home: Evidence from Germany, the Netherlands and Spain

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Introduction

Population ageing is expected to substantially increase the number of care dependent older persons and, consequently, the number of long-term care (LTC) users in future years. The impact of population ageing on formal and informal care use is, however, likely to differ considerably across European countries. Populations are, in fact, ageing to a different extent and at a different pace. Furthermore, LTC is currently being organised and financed in very different ways and the extent to which older persons rely on formal or informal carers varies widely between countries.

In making projections of future use of formal and informal care by older persons living at home, it is important to discern the main factors affecting care utilisation. Whether older persons are relying on formal or informal caregivers depends on individual level characteristics such as the level of care dependency and the potential availability of informal care, but is also determined by societal and care system level factors such as available supply and organisational characteristics of formal care services. Given the huge variation across Europe in availability and allocation of care services, one can reasonably expect there to be differences between countries not only in levels of formal and informal care use, but also in how care use is related to older persons' characteristics. For instance, in countries with strong needs-based entitlements to LTC services one would expect use of formal care not only to be higher, but also to be more strongly associated with disability and less related to potential availability of informal care than in countries where access is means-tested and services are targeted at persons without informal support.

This chapter analyses similarities and differences in determinants of informal and formal personal care use in Germany, the Netherlands and Spain, each representative of a cluster of countries with a different LTC system, as identified by Kraus et al. (2010) in work package (WP) 1 of the ANCIEN project.[7] The main purpose of this study is to estimate probabilities of informal and formal care use by relevant characteristics of older persons, which will be used in projections of future LTC care use by older people (see Chapter 4). Using multivariate models, the probabilities of different categories of care use (no care, informal care only, formal care only, formal and informal care) are linked to factors such as age, gender, health problems and household composition of older persons. The analysis is based on data of the Survey of Health, Ageing and Retirement in Europe (SHARE) and builds on WP 3 analyses of factors determining care use in European countries (Jiménez-Martín, Vegas Sánchez, & Vilaplana Prieto, 2011; Marcinkowska & Sowa, 2011), but adds to the previous findings in its focus on older persons (aged 65 and over) and on help with personal care tasks only. Help with household tasks has not been included in the present analysis as comparability of household help data turned out to be limited (see section 3.2.2 below) and the LTC projections include help with personal care only.

The next section briefly reviews studies of the determinants of home care utilisation by older persons. The aim of the analysis and the data, variables and method used, are discussed in section 3.2. Empirical results for Germany, the Netherlands and Spain are described in section 3.3, which discusses country-specific findings as well as similarities and differences between the three countries. The chapter ends with a summary of the main findings.

3.1 Determinants of home care utilisation

Determinants of formal home care utilisation have been examined in numerous studies, predominantly in the United States, but also in Europe (see Kadushin, 2004a for a review). The behavioural model of health service use proposed by Andersen and colleagues (Andersen, 1995, 2008; Andersen & Newman,

[7] An analysis of Poland, the representative country for the fourth cluster, was not possible due to data limitations.

1973) has become the dominant framework in this research field. The Andersen model identifies societal determinants (technology and norms), services system level determinants (resources and organisational characteristics) and individual level determinants of care utilisation. At the individual level, the model suggests that people's use of care services is a function of predisposing characteristics, of factors which enable or impede use, and of their need for care. Predisposing factors include demographic variables such as age and gender, as well as socio-structural variables such as education. Enabling variables include income, health insurance coverage, and in the context of long-term care use also include potential informal care resources, such as living with a partner or with others, or having children. The need component represents the most immediate cause of service use and includes different health status dimensions such as (self-reported) general health, chronic conditions, physical, mental or cognitive limitations.

Age, living alone or, more generally, a low level of informal support, and need variables – in particular limitations in activities of daily living (ADL) and limitations in instrumental activities of daily living (IADL) – have quite consistently been found to be strongly associated with utilisation of formal home care services (Geerts, 2010; Kadushin, 2004a; Larsson, Thorslund, & Kåreholt, 2006). The Andersen model has also proved useful for analysing determinants of informal care use. Health and the presence of an informal social network, in particular of a partner and/or children, have been shown to be important predictors of informal care use.

An alternative framework is that of health economics, in which utilisation of health care is related to supply and demand factors. For the purpose of studying LTC use, the classic health demand model has been altered to include informal care (Van Houtven & Norton, 2004; Norton, 2000). The main drivers of LTC use identified by empirical studies using a health economics framework are similar to the ones identified by studies relying on the Andersen framework (Van den Bosch et al., 2011).

From its earliest formulation, the Andersen model has emphasized that predisposing, enabling and need factors could have differential ability to explain use, depending on what type of service or what measure of use is examined. Indeed, with regard to LTC use, it has been shown that determining factors differ depending on the care tasks under consideration (personal care or household help) and the measure of use (e.g. type of care, number of hours) (Bonsang, 2009; Brandt, Haberkern, & Szydlik, 2009; Jiménez-Martín & Vilaplana Prieto, 2008).

While in its original formulation the Andersen model included macro-contextual factors – societal determinants and characteristics of the service system – most empirical studies have focused on a single country and have included only individual level determinants. Findings of single country studies might not be transferable to other countries however, as societal and systemic differences can be expected not only to influence use of formal and informal care directly, but also how care use is related to older persons' characteristics. Recent comparative studies, including ANCIEN WP3 analyses of formal and informal care use, have indeed found evidence of variation across Europe in the impact of care needs, socioeconomic status, household composition and other individual level characteristics on older persons' use of LTC (Broese van Groenou, Glaser, Tomassini, & Jacobs, 2006; Geerts & Van den Bosch, 2011; Jiménez-Martín et al., 2011; Kalmijn & Saraceno, 2006; Marcinkowska & Sowa, 2011).

The Andersen model and its empirical applications have been criticised for largely ignoring the dynamic nature of care utilisation. A dynamic approach is however gaining ground, also in Europe, where the number of longitudinal datasets is rapidly increasing. In recent years, several longitudinal studies have examined static and dynamic predictors of transitions in formal and informal care use. They found that need factors are important predictors of care transitions, and that factors such as age, household composition and income also play a role (Bravell, Berg, & Malmberg, 2008; Geerlings, Pot, Twisk, & Deeg, 2005; Geerts & Van den Bosch, 2011).

3.2 Study design

3.2.1 Aim

The purpose of the present analysis is to identify the main determinants of informal and formal care use in different LTC systems and to use this information to produce estimated probabilities of care use by relevant characteristics of older persons. These estimates will be combined in Chapter 4 with projected numbers of older persons by the same characteristics in order to project future numbers of LTC users. The analysis includes three countries – Germany, the Netherlands and Spain – each representative of a cluster of countries with a different type of LTC system, as identified in WP 1 of the ANCIEN project (Kraus et al., 2010). Cluster 1, to which Germany belongs, consists of countries where a low level of public spending is combined with a modest share of private spending, high informal care use and high informal care support. The Netherlands belongs to cluster 2, a cluster of Northern European countries characterized by high public LTC spending, low private spending, low informal care use and high informal care support. Spain and the other countries of cluster 3 share the profile of cluster 1 with regard to informal care use and support, but have a much higher level of private responsibility and a somewhat higher level of public spending. Poland was selected as representative of a fourth cluster, characterized by a small public sector involvement, more private spending, high informal care provision combined with few supportive measures for informal caregivers. However, due to the unavailability of care use data, Poland could not be included in the present analysis[8]. Given the considerable differences between the clusters in the organisation and financing of long-term, one can reasonably expect that the effects of predictors of care use vary across the three countries.

3.2.2 Data and methods

This study uses pooled data from Wave 1 (2004 and 2005) and Wave 2 (2006 and 2007) of the Survey of Health, Ageing and Retirement in Europe, release 2.3.1. The analytical sample was restricted to respondents aged 65 and over, living at home, and includes 2,491 observations for Germany, 2,134 observations for the Netherlands and 2,265 observations for Spain.

a. Dependent variable

The variable of interest is the type of help older persons receive with personal care (activities of daily living or ADLs) or with nursing care. The analysis does not include help with household tasks for the following reasons:

1. *Results are used to make projections of formal and informal care use, which start from projections of care needs defined as having ADL limitations.* In WP 2 of the ANCIEN project, projections of the number of older persons needing LTC care have been developed. LTC need has been defined as having '*at least one limitation in basic activities of daily living (ADL-disability), based on the Katz ADL disability scale*' and items included are: bathing, dressing, eating, indoor transferring and toileting/continence (Bonneux, van der Gaag, & Bijwaard, 2011). Projections of the number of persons needing help with household tasks have not been provided.
2. *Information in SHARE on informal help with household tasks is limited.* One could argue that ADL disabled persons generally need help with household tasks or instrumental activities of daily living (IADLs) also. Therefore, it could be relevant to include household help, all the more so as studies have shown that use of formal and informal care differs for household help and personal care, but with a huge variation between countries (see for instance Brandt et al., 2009). However, the SHARE data on help with IADL only include information on help from outside the household, not on help provided by household members. This could raise comparability issues, as for instance co-residence of older parents and their children differs considerably within Europe. By

[8] Poland participated in Wave 2 of SHARE, but due to a coding error which resulted in wrong routing the variables on home care are missing for all Polish cases.

not including help with household tasks from household members one would risk to seriously underestimate informal help in countries with high parent/child co-residence rates.

3. *Projections of informal care use will be compared with projections of informal care provision (Chapter 5), which focus on help with personal care tasks or ADLs only.*

The dependent variable '*help with personal care'* has four categories: no care, informal care only, formal care only, formal and informal care. Respondents were identified as formal care users if they had received professional or paid nursing or personal care, including care from private providers, in the last 12 months before the interview. Respondents were identified as informal care users if they had received personal care either from outside or from within the household. Informal personal care from outside the household has been defined as personal care (e.g. dressing, bathing or showering, eating, getting in or out of bed, using the toilet) during the last 12 months before the interview (wave 1) or since the past interview (wave 2) from any family member from outside the household or any friend or neighbour. For persons with a spouse or partner, SHARE questions on support from outside the household were answered by the person designated as family informant on behalf of the couple, without explicitly mentioning who the care recipient was. For the present analysis only couple members experiencing difficulties with basic activities of daily living were considered as receiving personal care from outside the household. Informal care from within the household has been defined as regular help during the last twelve months (wave 1) or since the last interview (wave 2) with personal care, such as washing, getting out or bed, or dressing from someone living in the household. The questions on help from within the household were only asked of respondents experiencing mobility limitations (e.g. difficulties walking 100 metres; climbing one flight of stairs without resting; stooping, kneeling or crouching).

b. Independent variables

The selection of determinants of care use to include in the model has been based on reviews of empirical studies using the Andersen model (Geerts, 2010; Kadushin, 2004a) and on WP 3 reports examining determinants of obtaining formal and informal care, and hours of care across European countries (Jiménez-Martín et al., 2011; Marcinkowska & Sowa, 2011). The current model differs from the WP3 modelling in that it a) focuses on personal care use only (by persons 65 and over); b) uses an identical operationalisation of ADL limitations as used for the WP 2 projections of care needs c) includes a limited selection of independent variables, as estimation results are to be used in projections, based on a cell-based model. Such models divide the population in cells or groups by combinations of characteristics (e.g. age, gender, ADL) and can only take a limited number of variables into account. Therefore, we have opted to include a limited number of key variables, for the most part variables for which projections are available of their future distribution.

Selected *predisposing* variables are age, gender and educational level. Age was included as a categorical variable, consisting of five categories: 65-69; 70-74; 75-79; 80-84; 85 and over. Educational level was coded using the International Standard Classification of Education (ISCED 97) into low (no or primary education; ISCED 0-1), medium (secondary education; ISCED 2-4) and high (tertiary education; ISCED 5-6).

Income, household composition and children were included as *enabling* variables. The income variable was constructed by calculating country-specific deciles of gross standardised (divided by the square root of the household size) household income. Household composition is a dichotomous variable distinguishing persons living alone and persons living with others. Children are a dichotomous variable also, distinguishing childless persons and persons having one or more children.

Finally, ADL and IADL limitations, cognitive functioning and chronic conditions were included as *need* variables. ADL is a categorical variable indicating the number of ADL limitations respondents were having difficulties with because of a physical, mental, emotional or memory problem (excluding any difficulties expected to last less than three months). It has been constructed based on six ADL items: 1. Dressing, 2. Walking across a room, 3. Bathing or showering, 4. Eating, 5. Getting in or out of bed, 6. Using the toilet. Items 2 and 5 have been collapsed (limitation with either walking across a room OR

getting in or out of bed). The ADL variable has been recoded into four categories: 0 limitation, 1 limitation, 2 limitations, 3 or more limitations. A similar procedure has been used to construct the IADL variable. It is based on seven items: 1. Using a map, 2. Preparing a hot meal, 3. Shopping for groceries, 4. Making telephone calls, 5. Taking medications, 6. Doing work around the house or garden, 7. Managing money) and has been recoded into the same four categories: 0 limitations, 1 limitation, 2 limitations, 3 or more limitations. Chronic conditions refers to the number of chronic diseases reported, ranging from 0 to 10. The cognitive functioning measure is based on the outcomes of simple tests of orientation in time, memory, verbal fluency and numeracy. Using principle components analysis an index of cognitive functioning has been constructed and quintile scores have been used for the present analysis. A higher score indicates better cognitive functioning.

c. Analysis

For each of the three countries, determinants of type of care have been examined using multinomial logit models. In a first step all predisposing, enabling and needs variables have been included in the models. Next, variables with a t-value below one for all care categories of the dependent variable have been excluded. Cluster robust variance estimation has been used to correct for the clustering of observations within individuals (as pooled wave 1 and 2 data have been used) and of individuals within households. Analyses have been conducted using the calibrated cross-sectional individual weights for the total sample (wgtACI).

3.3 Model results

3.3.1 Germany

Table 3.1 presents estimated coefficients of the multinomial logit model for Germany.

Age is the only significant predisposing variable. Higher age increases the chances of using both formal and informal care. Age has no significant effect on using formal care only and its effect on using informal care only is generally not significant either, with one exception: persons aged 85 and over are more likely to use informal care only than persons aged 65 to 69. Neither gender nor education is significantly associated with care use. Of the enabling variables, household composition and income are significant. Living alone decreases the probability of using informal care only and increases the probability of using formal care only. A higher income increases the likelihood of combining informal and formal care. Having children has not been included in the final model for Germany ($t<1$). Of the needs variables, ADL and IADL limitations are strongly associated with care use. Compared to older persons with no limitations, ADL and IADL limited persons generally have a higher probability of using any of the care categories. The number of limitations is, however, not linearly associated with utilisation categories. Chronic conditions and cognitive functioning have no significant impact on formal or informal care use.

Table 3.1 Determinants of care utilisation, Germany (Multinomial logit model, coefficients)

(No care=ref)		Informal care		Formal care		Informal and formal care	
		Coeff.	t-value	Coeff	t-value	Coeff	t-value
Age (65-69=ref)	70-74	-0.156	-0.559	-0.221	-0.248	0.796	0.637
	75-79	0.0570	0.174	0.248	0.305	2.421**	2.134
	80-84	0.188	0.466	0.691	0.779	2.553**	2.207
	85+	1.222**	2.570	0.845	0.987	2.801**	2.110
Gender (male=ref)	Female	0.181	0.861	0.639	1.158	-0.251	-0.447
Education (low=ref)	Medium or High	0.410	1.474	0.295	0.456	-1.001	-1.110
Household composition (with others=ref)	Alone	-1.450***	-4.305	1.361**	2.505	0.159	0.289
Income		-0.00139	-0.0318	-0.0354	-0.476	0.223***	2.809
ADL limitations (no=ref)	1 ADL	1.424***	4.985	0.911	1.117	3.118***	3.659
	2 ADL	1.610***	3.830	1.537**	2.083	3.080***	3.334
	3+ ADL	2.352***	5.364	2.807***	3.033	3.872***	3.731
IADL limitations (no=ref)	1 IADL	1.134***	3.441	1.138	1.244	2.474**	2.176
	2 IADL	2.220***	6.159	1.406	1.434	3.725***	3.660
	3+ IADL	1.983***	4.824	2.223**	2.123	2.943**	2.476
Chronic conditions		0.0284	0.361	0.159	1.101	-0.176	-1.333
Cognitive functioning		-0.105	-1.199	-0.0380	-0.173	-0.277	-1.387
Constant		-3.340***	-7.238	-6.893***	-5.608	-9.385***	-5.241
Sample size (n)		2,491					
Pseudo R^2		0.3696					

*** p<0.01, ** p<0.05, * p<0.1; Children were not included (t<1).

Data: SHARE Wave 1 and 2, pooled data, weighted results, own calculation.

3.3.2 The Netherlands

Estimated coefficients of the multinomial model for the Netherlands are presented in Table 3.2.

Higher age increases the chances of using formal care only. The effect of age on using informal care only or combining informal and formal care is generally not significant, with two exceptions: persons aged 80 to 84 are less likely to use informal care only and persons aged 70 to 74 are more likely to combine both types of care than persons aged 65 to 69. Gender is not significant for any of the care use categories and education does not seem to make much difference either. Persons with an intermediate educational level have a higher probability of combining formal and informal care than low educated older persons. Unavailability of potential informal caregivers – living alone or being childless – strongly increases the likelihood of using formal care only, but the household composition and children variables are not significantly associated with using informal care, either alone or combined with formal care. A higher income increases the likelihood of using informal care only, but decreases the likelihood of combining informal care with formal care. Both ADL and IADL limitations are strongly associated with

care use and contrary to the findings for Germany, number of chronic conditions and cognitive functioning are also significant. Suffering from more chronic conditions increases the probability of using formal care only and better cognitive functioning decreases the risk of using informal care, either alone or in combination with formal care.

Table 3.2 Determinants of care utilisation, the Netherlands (Multinomial logit model, coefficients)

(No care=ref)		Informal care		Formal care		Informal and formal care	
		Coeff.	t-value	Coeff	t-value	Coeff	t-value
Age (65-69=ref)	70-74	0.0571	0.136	0.802*	1.738	1.329*	1.679
	75-79	-0.0610	-0.136	0.845*	1.873	0.815	0.920
	80-84	-0.947*	-1.677	0.934*	1.836	0.320	0.288
	85+	-0.277	-0.402	1.726***	3.252	1.121	1.054
Gender (male=ref)	Female	0.0823	0.297	-0.206	-0.691	-0.816	-1.375
Education (low=ref)	Medium	0.0626	0.187	-0.267	-0.962	1.206**	2.147
	High	0.689	1.345	-0.750	-1.543	-1.253	-0.797
Household composition (with others=ref)	Alone	-0.663	-1.439	1.241***	4.156	-1.171	-1.635
Children (no=ref)	Yes	0.0972	0.151	-0.891***	-2.642	-0.853	-1.094
Income		0.120**	2.081	0.0415	0.888	-0.170**	-2.175
ADL limitations (no=ref)	1 ADL	0.775*	1.933	0.569	1.560	-0.220	-0.243
	2 ADL	1.873***	2.864	2.522***	4.962	3.688***	4.416
	3+ ADL	1.300*	1.726	1.981***	3.198	3.427***	3.770
IADL limitations (no=ref)	1 IADL	1.293***	3.454	1.019***	3.264	1.897**	2.226
	2 IADL	1.142**	2.071	0.850	1.548	2.477***	3.469
	3+ IADL	1.166**	1.990	1.713***	3.685	3.064***	3.555
Chronic conditions		0.116	1.035	0.221***	2.845	0.0985	0.803
Cognitive functioning		-0.420***	-2.701	-0.00308	-0.0289	-0.429*	-1.838
Constant		-3.561***	-4.442	-4.333***	-5.563	-4.257***	-3.037
Sample size (n)		2,134					
Pseudo R^2		0.2840					

*** p<0.01, ** p<0.05, * p<0.1

Data: SHARE Wave 1 and 2, pooled data, weighted results, own calculation.

3.3.3 Spain

Table 3.3 presents estimated coefficients of the multinomial logit model for Spain.

Table 3.3 Determinants of care utilisation, Spain (Multinomial logit model, coefficients)

(No care=ref)		Informal care		Formal care		Informal and formal care	
		Coeff.	t-value	Coeff	t-value	Coeff	t-value
Age (65-69=ref)	70-74	-0.248	-0.895	-0.142	-0.285	-0.656	-0.978
	75-79	0.283	0.990	-0.362	-0.643	-0.670	-0.986
	80-84	0.175	0.575	0.797	1.547	-0.237	-0.337
	85+	0.756**	2.341	0.383	0.633	0.527	0.819
Education (low=ref)	Medium	-0.201	-0.641	0.335	0.705	0.0348	0.0494
	High	-1.095	-1.394	-0.201	-0.191	1.514*	1.741
Household composition (with others=ref)	Alone	-1.053***	-3.694	0.105	0.288	-1.101*	-1.786
Children (no=ref)	Yes	-0.285	-0.982	-0.495	-1.044	0.00427	0.00657
ADL limitations (no=ref)	1 ADL	1.919***	7.895	0.507	0.996	2.018***	3.934
	2 ADL	1.931***	5.858	0.247	0.292	1.794***	2.799
	3+ ADL	2.326***	6.073	0.727	1.039	3.261***	5.787
IADL limitations (no=ref)	1 IADL	1.010***	4.513	-0.0781	-0.160	1.962**	2.398
	2 IADL	1.035***	3.276	0.0715	0.0846	1.791*	1.808
	3+ IADL	1.831***	5.834	1.701***	2.828	3.592***	4.176
Chronic conditions		0.127**	2.119	0.355***	4.158	0.175*	1.808
Cognitive functioning		-0.333***	-2.606	-0.139	-0.748	-0.449	-1.350
Constant		-2.684***	-5.880	-4.344***	-5.992	-5.764***	-6.100
Sample size (n)		2,265					
Pseudo R^2		0.3203					

*** p<0.01, ** p<0.05, * p<0.1, Gender and income are not included in the final model (t<1)

Data: SHARE Wave 1 and 2, pooled data, weighted results, own calculation.

Gender and income have not been included in the final model for Spain (t<1). None of the predisposing variables seem to make much of a difference. The only significant association with age is that persons aged 85 or over have a significant higher probability of using informal care only than persons aged between 65 and 69 years, and the only significant association with education is that high educated older persons have a higher probability of combining informal and formal care than low educated older persons. Of the enabling variables, only household composition is significantly associated with care use: living alone decreases the likelihood of using informal care, either alone or in combination with formal care. Both ADL and IADL limitations are strongly associated with care use. Compared to older persons with no limitations, ADL and IADL limited persons have a higher probability of using informal care either alone or in combination with formal care, but probabilities of use do not increase linearly with numbers of (I)ADL limitations. Having ADL limitations does not significantly increase the likelihood of using formal care only, while for IADL limitations only the most severely limited persons (those having difficulties with 3 or more IADLs) have a significantly higher probability of using formal care

only than persons without IADL limitations. Number of chronic conditions and cognitive functioning are significantly associated with care use. Suffering from more chronic conditions increases the probability of using all types of care, but the association is strongest with using formal care only. Cognitive functioning significantly decreases the risk of using informal care only.

3.3.4 Country comparison

In all three countries use of formal and informal care is significantly associated with ADL and IADL limitations. Remarkably, in Spain, use of formal care only is not related to the degree of ADL limitations, while there is a steep ADL gradient in Germany and the Netherlands. In the latter countries persons with 2 or more ADL limitations are at least 1.5 times more likely to use formal care only than persons with no ADL limitations. Other need variables – chronic conditions and cognitive functioning are not significantly associated with use of formal or informal care in Germany, while they do make a difference in the Netherlands and Spain. After controlling for the other independent variables, in none of the three countries is gender significantly associated with formal or informal care use, while education does not seem to make much difference either. Age is the only predisposing factor that is strongly associated with care use. However, age gradients differ considerably between the three countries and this suggests that the impact of population ageing on future numbers of formal and informal care users might differ considerably, all the more so as there are considerable country differences in the age gradient of ADL limitations (Bonneux et al., 2011). The impact of potential availability of informal care, as measured by household composition and having children also differs between the countries. While in the Netherlands living alone and having no children increase the likelihood of using formal care only, but have no impact on use of informal care (neither alone or in combination with formal care), living alone decreases the likelihood of using informal care alone or in combination with formal care in Spain, but has no impact on the use of formal care only. Having children is not significantly associated with any of the care use categories in Spain. In Germany, having children is not significant either, while older persons living alone have a lower probability of using informal care only and a higher probability of using formal care only. Finally, how care use is related to income also differs. Income is not significant in Spain for any of the care use categories. Use of formal care only is not significantly related to income in the Netherlands and Germany. A higher income increases the likelihood of using informal care only and decreases the likelihood of combining formal and informal care in the Netherlands, while it increases the likelihood of combining both forms of care in Germany.

The finding that use of formal care only is strongly associated to care needs and living alone in Germany and the Netherlands, but not in Spain, can be explained by characteristics of the respective LTC systems. In Germany and the Netherlands, strong needs-based LTC entitlements are in place. Benefit eligibility depends on a threshold level of care needs and benefit levels vary with severity of care dependency. In Spain, national universal based entitlements are non-existent or limited. In 2006, a new law (ley de dependencia) was passed, introducing an entitlement to claim benefits based on grade of dependency. Thus far, its implementation has been highly fragmented across regions, and harmonisation with respect to entitlements has been lacking (Gutiérrez, Jiménez-Martín, Vegas Sánchez, & Vilaplana, 2010). In Germany, the allocation criteria of the LTC scheme are based on care needs only. Why then is the use of formal care only strongly related to informal care unavailability? This may be due to Germany's rather strong familialism (Haberkern & Szydlik, 2009) in combination with the cash option of the LTC insurance. There are no spending restrictions on cash benefits, except that the level of care must be appropriate and the recipients' circumstances are periodically monitored. Benefit recipients can use the money to pay informal caregivers. This combination of factors may imply that if informal care is an available option, older people will tend to make use of it. For the Netherlands, the introduction of more restrictive allocation practices, with stronger targeting of severely care-dependent older people and persons without informal support (Schut & Van Den Berg, 2010), could be part of the explanation for the strong association of formal care use and living alone. Another reason could be that, as in other countries, co-resident carers (most often partners or spouses) are reluctant to ask for external help (Male, Duimel, & de Boe, 2010). The weak association found for Spain, could be related to the inadequacy of

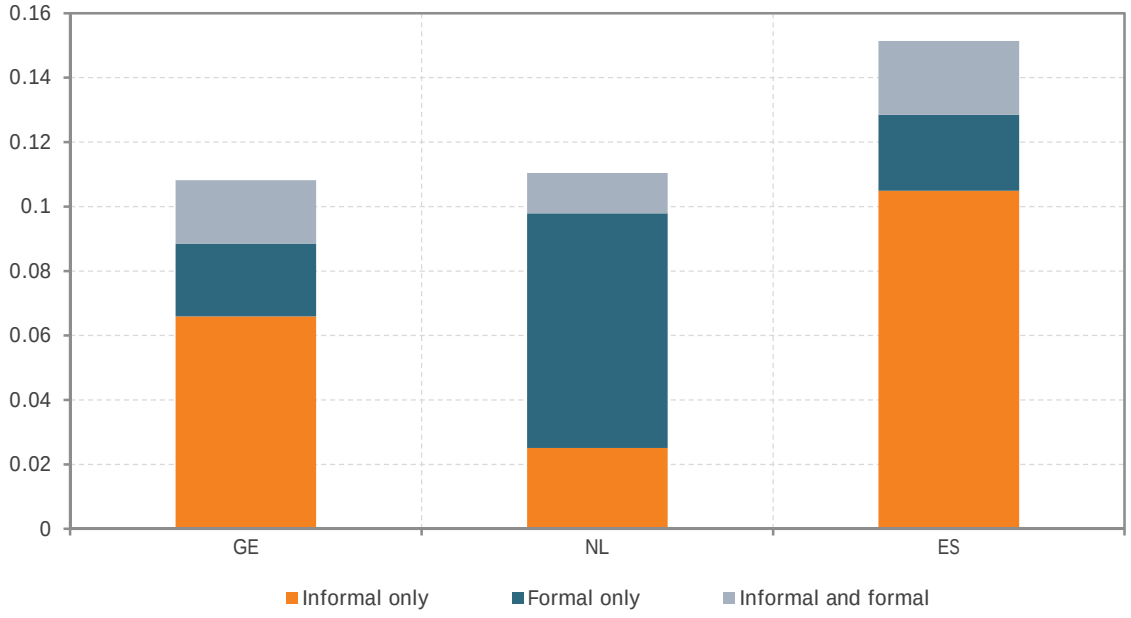
formal home care. The supply of services is insufficient to support substantial numbers of care dependent persons living alone.

3.3.5 Predicted probabilities of care use

a. Total population aged 65 and over

Figure 3.1 shows the predicted probabilities of using different types of personal care based on the multinomial models for the total population aged 65 years and over.

Figure 3.1 Predicted probabilities of care use, total population aged 65 and over



Data: SHARE Wave 1 and Wave 2, pooled data, weighted results, own calculations.

Probabilities of using formal care, either alone or in combination with informal care, are much higher in the Netherlands than in Spain and Germany, while probabilities of using informal care, either alone or in combination with formal care, are much higher in Spain and Germany. These results are consistent with results of care use by persons aged 65 and over reported in WP 1 and WP 3 of the ANCIEN project and with results of other recent comparative studies (Colombo, Llena-Nozal, Mercier, & Tjadens, 2011; Geerts & Van den Bosch, 2011; Jiménez-Martín et al., 2011; Kraus et al., 2010).

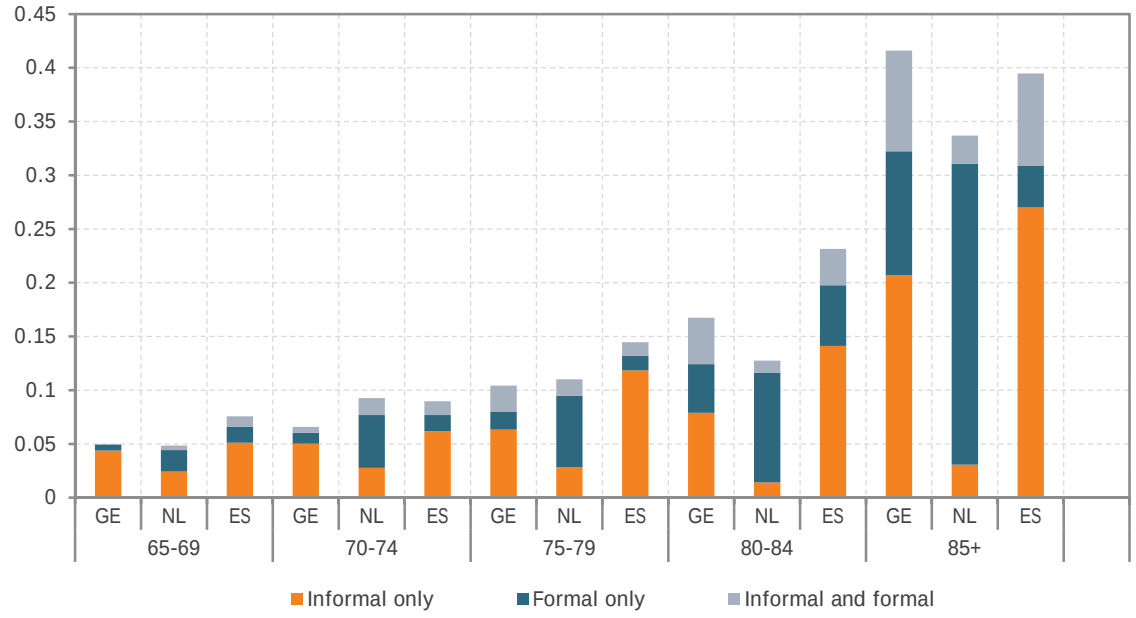
b. Predicted probabilities by age, household composition and ADL limitations

The literature on determinants of home care use suggests that age, household composition and limitations in activities of daily living are strongly associated with home care use (see section 3.1), and our findings broadly confirm the results of previous studies. This section further examines differences between Germany, the Netherlands and Spain in the use of formal and informal care by those characteristics. Using results of the multinomial models, average predicted probabilities have been calculated for the categories in question, averaging over all relevant cases in the sample. For example a predicted probability of informal care use of 0.12 in the 75 to 79 age category means that the average of the probabilities of informal care use as predicted by the multinomial logit model for all cases in the sample aged 75 to 79 is 0.12.

Figure 3.2 shows that across age categories, country-specific patterns of formal and informal care use are very similar: higher use of formal care and less use of informal care in the Netherlands, and the

reverse for the other countries. Another relevant finding is that use of formal care increases much less steeply with age in Spain than it does in the Netherlands and Germany. By contrast, use of informal care hardly increases with age in the Netherlands, while it does steeply rise with age in Spain and Germany. The different age gradients suggest that the impact of population ageing on the numbers of formal and informal care users can be expected to differ considerably between the three countries.

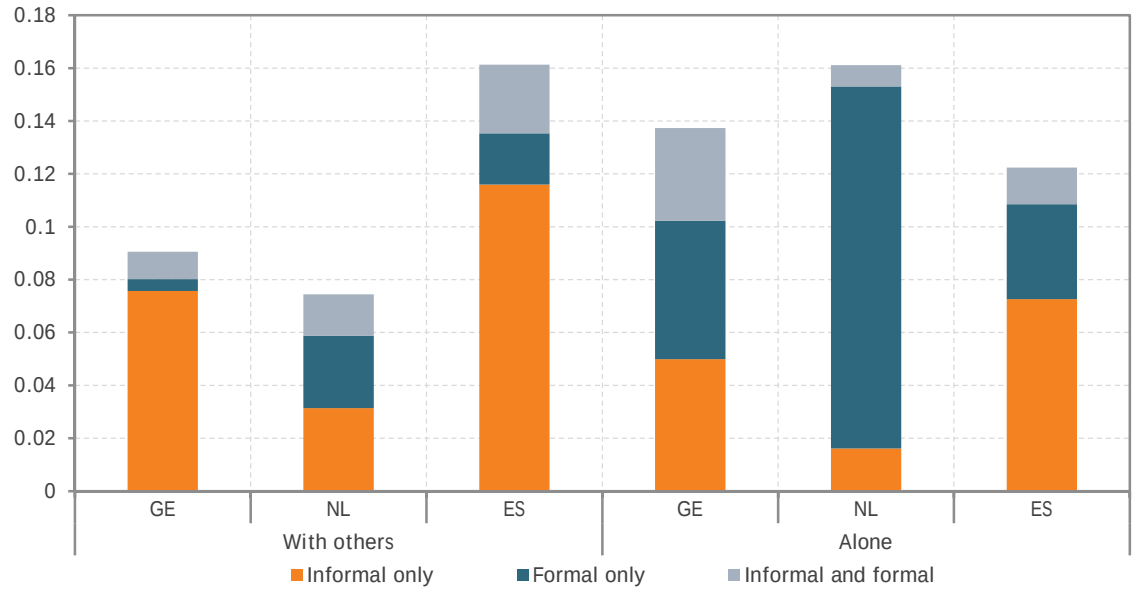
Figure 3.2 Predicted probabilities of care use, by age



Data: SHARE Wave 1 and Wave 2, pooled data, weighted results, own calculations.

Figure 3.3 shows care use probabilities by household composition. While in the Netherlands and Germany persons living alone have a higher predicted probability of using any form of care than persons living with others, the reverse holds for Spain. This could be a reflection of compositional differences. In all three countries both the probability of becoming widowed or losing one's partner and the probability of care dependency rise with age. Hence, on average, older persons living alone can be expected to need and use more care than persons living with their partner. In Spain however, this tendency could be offset to a certain extent by the high co-residence rate of older dependent persons and their adult children. Another relevant finding is that, in Spain, probabilities of using formal care are not much higher for persons living alone compared to persons living with others, while in the Netherlands and Germany, older persons living alone have a much higher probability of using formal care than persons living with others.

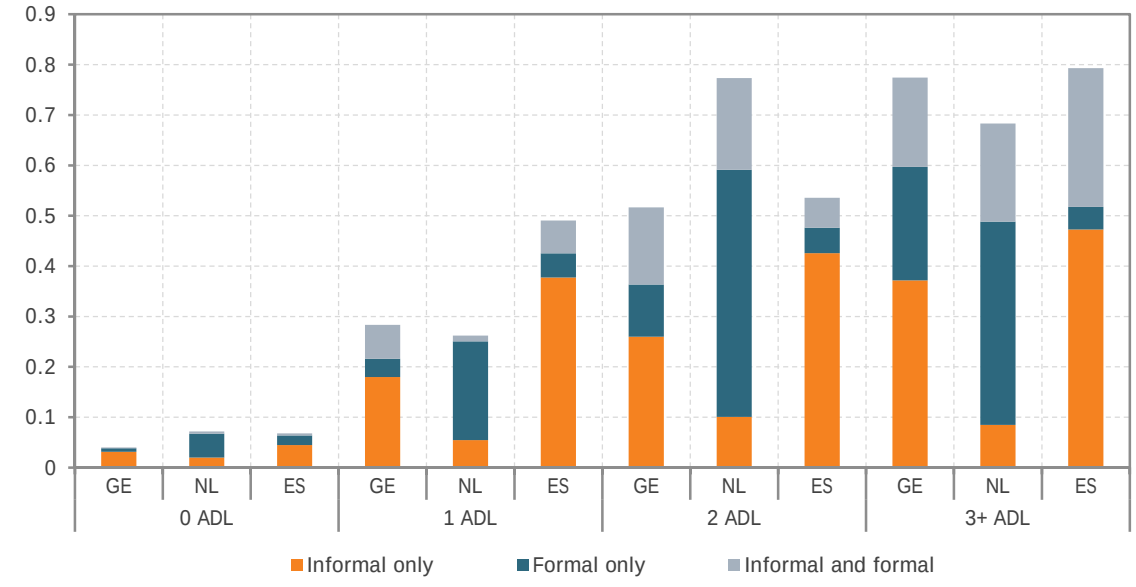
Figure 3.3 Predicted probabilities of care use, by household composition



Data: SHARE Wave 1 and Wave 2, pooled data, weighted results, own calculations.

As expected, in all three countries, probabilities of care use generally increase with increasing needs, as is shown in Figure 3.4. A relevant finding is that while shares of formal care users are very low in Spain up to 2 ADLs, the share of persons combining formal and informal care nevertheless rises substantially in the most severely disabled category (3+ ADL). This suggests that the formal home care system is very selective, with access to the scarcely provided home care services restricted to the most severely care dependent persons. The share of formal care only does not rise in the most severely disabled category, and this could indicate that home care services are not able to provide adequate care to severely care dependent persons in the absence of informal care.

Figure 3.4 Predicted probabilities of care use, by ADL



Data: SHARE Wave 1 and Wave 2, pooled data, weighted results, own calculations.

Conclusion

Using SHARE data, factors affecting current use of formal and informal care by persons aged 65 and over, living at home, have been examined for Germany, the Netherlands and Spain, countries representative of different LTC systems. The analysis has focused on help with personal care tasks or activities of daily living. Help with household tasks has not been included. Probabilities of using formal personal care, either alone or in combination with informal personal care, have been found to be much higher in the Netherlands than in Spain and Germany, while probabilities of using informal personal care, either alone or in combination with formal personal care, are much higher in the latter countries. Multinomial regression models have further showed that age, household composition and ADL or IADL limitations are important determinants of personal care utilisation in all three countries. The same factors have consistently been found to be strongly associated with home care use in previous studies.

However, model results have also shown that age gradients of care use differ considerably between the three countries, as does the impact of potential availability of informal care. While in Germany, higher age significantly increases the chances of combining formal and informal care, with no or little effect on using formal or informal care only, in the Netherlands, higher age predominantly increases use of formal care, but has less influence on using informal care, either alone or in combination with formal care. In Spain, age is significantly associated with using informal care only, but not with the other categories of care use. Looking at household composition, living alone increases the likelihood of using formal care only, but has no impact on use of informal care in the Netherlands. In contrast, in Spain it decreases the likelihood of using informal care, but has no impact on use of formal care only. In Germany, older persons living alone have a lower probability of using informal care only and a higher probability of using formal care only. Finally, some evidence has been found for country differences in the association of care use and need factors.

Given the generally strong association of personal care use with ADL limitations and the fact that numbers of ADL dependent persons are projected to increase considerably in future years, one can expect considerable increases in future numbers of informal and formal care users in all three countries. However, the present analysis suggests that the impact of demographic ageing and other societal trends, like changing living arrangements of older people, might well be different, as the association of care use with age and household composition varies across countries. Using results of the analysis of determinants of formal and informal care use, projections have been made of the numbers of older persons using formal and informal care between 2010 and 2060. The projection model and projection results are discussed in Chapter 4.

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4. Long-term care use in Europe: Projection model and results for Germany, the Netherlands, Spain and Poland

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Introduction

Population ageing is expected to have a significant impact on the number of long-term care (LTC) users in the coming decades in all European countries, as disability rates steeply increase with age. Unless radical shifts occur in the prevalence of age-related disability, rising numbers of older persons, and particularly of the oldest old, will inevitably lead to growing numbers of persons in need of care.

Generally, LTC systems consist of a range of home and residential care services, often complemented with payments for care or care allowances, and significant informal care, mainly provided by partners and children. However, as work package (WP) 1 of the ANCIEN project and other recent comparative studies have demonstrated, LTC is currently being organised, financed and allocated in very different ways in European countries (Colombo et al., 2011; Huber, Rodrigues, Hoffmann, Gasior, & Marin, 2009; Kraus et al., 2010). There is considerable variation not only in levels of formal and informal care use, but also in how care use is related to disability, household composition, and other characteristics of older persons (Broese van Groenou, Glaser, Tomassini, & Jacobs, 2006; Geerts & Van den Bosch, 2011; Jiménez-Martín, Vegas Sánchez, & Vilaplana Prieto, 2011; Kalmijn & Saraceno, 2006; Marcinkowska & Sowa, 2011; see also Chapters 2 and 3). How population ageing and other societal trends (e.g. changing living arrangements, higher female employment rates) will affect future numbers of LTC users is therefore likely to differ considerably across European countries.

The aim of this chapter is to present projections of the future numbers of LTC users for different LTC systems. Projections have been made up to 2060 for four countries: Germany, the Netherlands, Spain and Poland, using a standardised methodology. These countries were identified as representative of different LTC systems by Kraus et al. (2010) in WP 1 of the ANCIEN project. The projections rely on the cross-nationally harmonized data of the Survey on Health, Ageing and Retirement in Europe (SHARE) and on improved projections of LTC needs as developed in WP 2 of ANCIEN by Bonneux et al. (2011). The projection model covers different settings and types of care (residential care, formal home care, informal care) and focuses on personal care or help with activities of daily living (ADLs) and nursing care. The proposed projection methodology is based on estimates of care use probabilities, using the statistical models described in Chapters 2 and 3. These models link the probabilities of using different types of care to demographic, health and socio-structural determinants. Using a base and different alternative scenarios, the sensitivity of the projections to changes in the assumptions about future trends in these determinants is explored. Due to the unavailability of home care use data, a simplified model has been used for Poland.

The chapter is further structured as follows. Section 4.1 presents the general model structure. The base scenario and alternative scenarios are discussed in section 4.2. Section 4.3 gives an overview of the data sources used for each of the four countries. Results of the projections of future numbers of LTC users under the base and alternative scenarios are discussed in section 4.4. Finally, a summary of the main findings and some conclusions are presented.

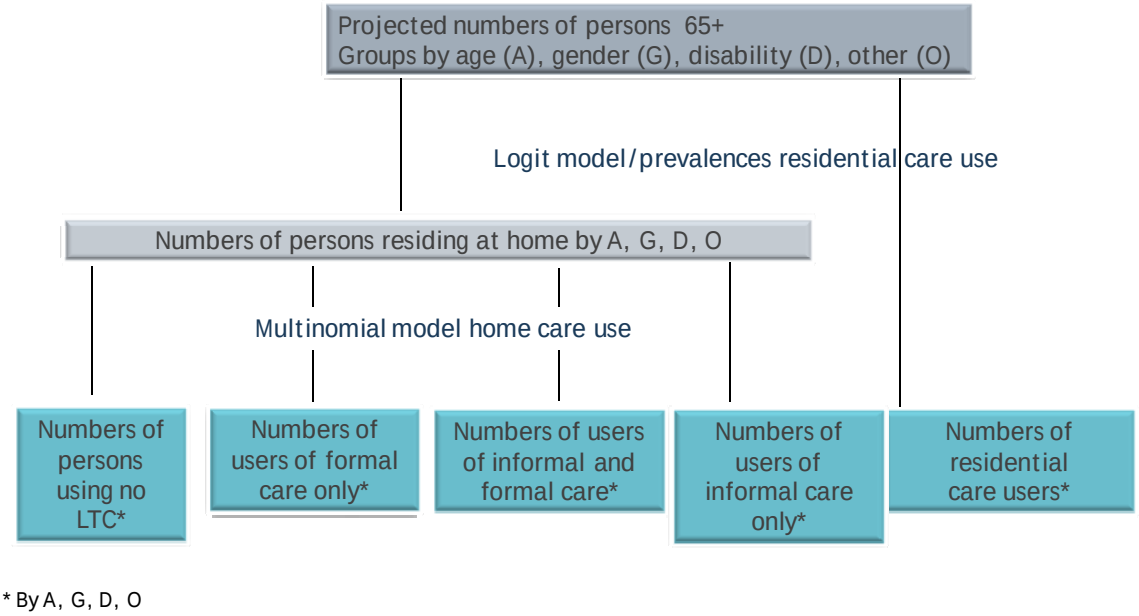
4.1 Description and structure of the model

This section describes the methodology behind the projections of LTC users. The projection model is a cell-based or macro-simulation model, broadly comparable to the PSSRU LTC projection model (Comas-Herrera & Wittenberg, 2006; Comas-Herrera et al., 2003; Wittenberg, Pickard, Comas-Herrera, Davies, & Darton, 1998). A macro-simulation model divides the population into groups (or cells) of persons with similar characteristics (e.g. age, gender, level of disability, household composition) and

applies estimated probabilities of the variable of interest (e.g. type of care) to the cell numbers, which are changing over time. The present model is static, in that it uses prevalence rates of LTC use (rates that indicate the probability to use a particular type of care at a given moment in time) rather than incidence rates (rates that indicate the transition probability between types of care). The model takes account of variables that have been identified in Chapters 2 and 3 as the main drivers of LTC utilisation: age and gender, the level of disability (number of limitations in activities of daily living), household composition and a limited number of other relevant characteristics.

The projection model broadly consists of two parts: 1) the distribution of the future numbers of older persons by age, gender, disability and other relevant characteristics (see section 4.1.1); 2) the application of estimated probabilities of using different types of LTC care to the projected population numbers in each group, to produce projected numbers of care users (see section 4.1.2). The projections are made for the 2010-2060 period at 5-year intervals. Figure 4.1 provides a schematic overview of the projection model.

Figure 4.1 Schematic overview of the projection model



The current report is not the first to produce projections of LTC use for different European countries, using a standardised projection methodology. The 2003 European Study of Long-Term Care Expenditure, (Comas-Herrera et al., 2003 and 2006) presented projections of future numbers of LTC clients and future expenditures for Germany, Spain, Italy and the United Kingdom, using cell-based or macro-simulation models. Based on a similar methodology, the European Commission and the Ageing Working Group have jointly conducted LTC projection exercises for the EU Member States, reported in the successive reports on the budgetary impact of population ageing (Economic Policy Committee and European Commission, 2005, 2006, 2008, 2009). At the time of writing, new projections, using the 2006 projection exercise model, are being prepared, to be presented to the ECOFIN Council in May 2012 (Economic Policy Committee and European Commission, 2011).

The projection methodology proposed in the present study offers some advantages over the methods applied in the above-mentioned European studies. *First*, it is based on cross-nationally harmonized survey data (SHARE), using identical definitions and measurements of the different types of care in all countries involved. In contrast, the existing projections mostly rely on administrative care utilisation data. Despite major efforts to improve the comparability of the LTC use data, the applied boundaries of

different LTC types may still diverge between countries, due to differing administrative, financing and provision practices (OECD, Eurostat, & WHO, 2011) *Second*, the use of individual-level data allows a more realistic modelling of formal and informal care use. Most existing models are based on age- and gender specific profiles of formal care utilisation. Out of necessity, the model specifications rely on implicit assumptions that are sometimes not very realistic. Most models for instance assume that all those receiving home or institutional care have difficulties with one or more ADLs. However, eligibility criteria for home or residential care services and needs assessment instruments vary across countries (Colombo et al., 2011; Genet et al., 2011; Rostgaard et al., 2011) and shares of non-disabled users differ accordingly. For example, while in the Netherlands a considerable share of all persons living in residential care facilities report to experience no ADL disabilities (according to de Klerk et al. (2011) 10% experience no or little difficulties in performing ADL activities), in Germany, nearly all residents of LTC institutions have at least 2 ADL limitations (Schulz, 2010). Another limitation of the existing models is that, with some exceptions, informal care is considered as a residual category. The models assume that all ADL disabled persons receive some kind of care and that the difference between the number of disabled persons and the numbers of formal care users (at home and in institutions) equals the number of people who rely exclusively on informal care. While, with some exceptions, the existing models generally do not make projections of total use of informal care, the present study offers the advantage of explicitly modelling use of informal care, distinguishing between persons relying on informal care only and persons combining formal and informal care. Furthermore, probabilities of using different types of formal and informal care are not only linked to age, gender and being ADL disabled, but also to level of disability, household composition, educational level and other relevant variables. *Third,* this study explores the sensitivity of the projections to a wider range of alternative assumptions about trends in demography, disability and social structure than the existing projection models. Sections 4.1.1 and 4.1.2 below provide a detailed description of the general structure of the projection model.

4.1.1 Projected numbers of older persons by age, gender, disability and other relevant characteristics

In this part of the model, for each projection year, the total population aged 65 years and older is distributed by age (five categories: 65-69, 70-74, 75-79, 80-84, 85 and over), gender (male, female), level of disability (four categories: 0, 1, 2; 3 or more ADL limitations) and other relevant characteristics.

a. Age, gender and disability

Literature reviews (Van den Bosch et al., 2011; Gaugler, Duval, Anderson, & Kane, 2007; Kadushin, 2004b; Luppa et al., 2010) have consistently identified disability as one of the most important predictors of LTC use, both in residential care facilities and at home.

In a first step, for each projection year *t* projected numbers of persons aged 65 and over are produced, classified into groups according to age category *a*, gender *g* and disability level *d:* $N_{a,g,d,t}$. For this purpose, the population projections by age, gender and disability level, made by NIDI in WP 2 of ANCIEN (see Bonneux et al., 2011) are used. The NIDI disability projections are based on SHARE disability prevalence data, adjusted for disability of the residential care population, and EUROPOP2008 mortality forecasts. Disability is defined as self-reported difficulty with any of the following items: 1. Dressing, 2. Walking across a room or getting in or out of bed, 3. Bathing or showering, 4. Eating, 5. Using the toilet. Six disability levels are discerned, ranging from 0 (no ADL difficulties) to 5 (difficulties with all 5 ADLs). For the care use projections, results of the NIDI projections are aggregated into five age categories (65-69, 70-74, 75-79, 80-84, 85 and over) and four disability categories: 0, 1, 2, 3 or more ADL limitations.

b. Household composition

Another key determinant of formal and informal care use is the potential availability of informal caregivers. A main indicator of potential informal care availability, and a factor rather consistently identified as an important correlate of care use (Van den Bosch et al., 2011; Gaugler et al., 2007; Geerts,

2010; Kadushin, 2004b), is household composition. In the next step, projected numbers of older persons by age category, gender and disability level are further divided according to household composition (*h*) into persons living alone and persons living with others ($N_{a,g,d,h,t}$). For each age x gender x disability group, the shares of persons living alone and with others in the base year t0, $Ph_{a,g,d,t0}$, have been derived from national survey or SHARE data. The shares have been adjusted to match base year official national statistics of the population by household composition, if available. Age and gender specific adjustment factors $Adj_{a,g}$ have been calculated as follows:

$$\mathrm{Adj}_{a,g} = \frac{\mathrm{Ph}_{a,g}}{\mathrm{Ph}'_{a,g}} \tag{1}$$

with $Ph_{a,g}$ being base year proportions of persons living alone or with others by age and gender as derived from survey data and $Ph'_{a,g}$ being the 'official' base year proportions. These adjustment factors are applied to $Ph_{a,g,d,t0}$, so as to obtain adjusted proportions:

$$\mathrm{Ph}_{\mathrm{adj}\ a,g,d,t0} = \frac{\mathrm{Ph}_{a,g,d,t0}}{\mathrm{Adj}_{a,g}} \tag{2}$$

In the base scenario, it is assumed that the base year household composition distribution by age, gender and disability will remain constant over the projection horizon. The sensitivity to this assumption is explored in an alternative scenario. The projected numbers of persons aged 65 and over by age category, gender, disability level and household composition are thus calculated as follows:

$$\mathrm{N}_{a,g,d,h,t} = \mathrm{N}_{a,g,d,t} \times \mathrm{Ph}_{\mathrm{adj}\ a,g,d,t0} \tag{3}$$

c. Education

The older population by age, gender, disability and household composition is further split by educational level. In several countries, education has been identified as a significant determinant of LTC use, although the effects are generally not very strong (Van den Bosch et al., 2011; Gaugler et al., 2007; Geerts, 2010). For each age x gender x disability x household composition group, the distribution by educational level in the base year $Pe_{a,g,d,h,t0}$ has been derived from national survey data or SHARE data. Three educational levels are distinguished, using the International Standard Classification of Education (ISCED 97): low (no or primary education; ISCED 0-1), medium (secondary education; ISCED 2-4) and high (tertiary education; ISCED 5-6).

The base scenario assumes constant proportions of low, medium and high-educated older persons by age, gender, disability and household composition. The projected numbers of persons aged 65 and over by age category, gender, disability level, household composition and educational level are calculated as follows:

$$\mathrm{N}_{a,g,d,h,e,t} = \mathrm{N}_{a,g,d,h,t} \times \mathrm{Pe}_{a,g,d,h,t0} \tag{4}$$

d. Other characteristics

Finally, projected numbers of older persons by age, gender, disability, household composition and education, have been further split by characteristics that have been identified in Chapters 2 and 3 as significant drivers of residential or home care utilisation. Variables included in the models are: number of limitations with instrumental activities of daily living (IADLs), suffering from dementia or having

cognitive limitations, having children. The base year distribution has been derived from national survey data or SHARE data and has been kept constant over the projection horizon.

4.1.2 Projected numbers of care users by age, gender, disability and other relevant characteristics

The second part of the model projects numbers of users of different categories of long-term care by age, gender, disability and other relevant characteristics. Therefore, the projected numbers of older persons in subgroups by age, gender, disability and other characteristics (part 1 of the model) are combined with functions relating use of care to these characteristics. Five care use categories are included in the model. Besides using no care, the model distinguishes use of residential care and three home care categories: informal personal care only, formal personal care only, both informal and formal personal care. For reasons explained in Chapter 3, use of formal or informal help with household tasks is not included in the model. Estimated probabilities of care use have been derived from the binary (residential care) and multinomial (home care) models, described in Chapters 2 and 3, with age, gender, disability and the other relevant characteristics as independent variables.

The projection of care users proceeds in two stages (see figure 1). First, $N_{a,g,d,h,e,o,t}$, the projected numbers of older persons by age *a*, gender *g*, disability level *d*, household composition *h*, educational level *e* and other characteristics *o* in year *t*, are split into persons residing at home *Nhome* and persons using residential care *Nres*, using fitted values of the logistic regression models of residential care use described in Chapter 2. For each projection year *t,* cell numbers $N_{a,g,d,h,e,o,t}$ are multiplied with estimated probabilities of residential care use $Pres_{a,g,d,h,e,o}$ to produce numbers of older persons in residential care $Nres_{a,g,d,h,e,o,t}$:

$$Nres_{a,g,d,h,e,o,t} = N_{a,g,d,h,e,o,t} \times Pres_{a,g,d,h,e,o} \tag{5}$$

The numbers of persons in residential care are subtracted from total cell numbers to yield numbers of persons residing at home $Nhome_{a,g,d,h,e,o,t}$:

$$\mathrm{Nhome}_{\mathrm{a,g,d,h,e,o,t}} = \mathrm{N}_{\mathrm{a,g,d,h,e,o,t}} - \mathrm{Nres}_{\mathrm{a,g,d,h,e,o,t}} \tag{6}$$

In the second stage, projected numbers of older persons residing at home by age, gender, disability and other characteristics are further split into persons using no care, users of informal care only, users of formal care only, users of both informal and formal care, using fitted values of the multinomial logistic models described in Chapter 3. For each projection year *t*, cell numbers $Nhome_{a,g,d,h,e,o,t}$ are multiplied with estimated probabilities of using different categories of home care *i* $Phcare_{i,a,g,d,h,e,o}$ to produce numbers of older persons in different home care categories $Nhcare_{i,a,g,d,h,e,o,t}$:

$$\mathrm{Nhcare}_{\mathrm{i,a,g,d,h,e,o,t}} = \mathrm{Nhome}_{\mathrm{a,g,d,h,e,o,t}} \times \mathrm{Phcare}_{\mathrm{i,a,g,d,h,e,o}}$$

with i=home care category: no care (NC), formal care only (FC), informal care only (IC), both formal and informal care (IFC) (7)

Total numbers of *formal home care* users by age, gender, disability and other characteristics $Nhform_{a,g,d,h,e,o,t}$ are calculated by summing the numbers of persons using formal care only and the numbers of persons combining formal and informal care:

$$\mathrm{Nhform}_{\mathrm{a,g,d,h,e,o,t}} = \mathrm{Nhcare}_{\mathrm{FC,a,g,d,h,e,o,t}} + \mathrm{Nhcare}_{\mathrm{FIC,a,g,d,h,e,o,t}} \tag{8}$$

Total numbers of *formal care users* by age, gender, disability and other characteristics $Nform_{a,g,d,h,e,o,t}$ are calculated by summing the numbers of persons using formal home care and the numbers of persons using residential care:

$$\mathrm{Nform}_{a,g,d,h,e,o,t} = \mathrm{Nhform}_{a,g,d,h,e,o,t} + \mathrm{Nres}_{a,g,d,h,e,o,t} \tag{9}$$

Total numbers of *informal care users* by age, gender, disability and other characteristics $Nhinf_{a,g,d,h,e,o,t}$ are calculated by summing the numbers of persons using informal care only and the numbers of persons combining formal and informal care:

$$\mathrm{Nhinf}_{a,g,d,h,e,o,t} = \mathrm{Nhcare}_{IC,a,g,d,h,e,o,t} + \mathrm{Nhcare}_{FIC,a,g,d,h,e,o,t} \tag{10}$$

The total number of LTC users for a certain care category *j* and a given year *t* is calculated by summing the numbers of users over all cells.

$$\mathrm{N}_{jt} = \sum_{a,g,d,h,e,o} \mathrm{N}_{a,g,d,h,e,o,j,t}$$

with j=category of care: no care (NC), residential care (RES), formal home care only (FC), informal home care only (IC), both formal and informal home care (FIC) (11)

4.2 Base and alternative scenarios

The future number of care users will be affected by future trends in determinants of care utilisation. This section first describes the assumptions of the base scenario about trends in disability, household composition and other driving factors. Next, alternative scenarios, exploring the sensitivity of the projections to alternative assumptions about disability and socio-demographic trends, are discussed. Eleven alternative disability scenarios have been formulated by NIDI as part of WP 2 of the ANCIEN project (see Bonneux et al., 2011): Four bio-demographic scenarios, exploring the effect of different relationship between the incidence of disability and mortality, and seven risk factor scenarios, exploring the effect of obesity and smoking. Furthermore, in this chapter, two alternative socio-demographic scenarios are formulated, one exploring the effect of household composition changes, another one exploring the effect of a higher educational level in future cohorts of older persons.

In all scenarios, probabilities of care use by age, gender, disability and other relevant characteristics, as estimated for the base year, are assumed to remain constant over the projection horizon. This implies that use of care will be constrained by supply factors (including availability and accessibility of services, the funding system, and the policy incentives or disincentives to provide informal care) to a similar extent in the future than it is in the base year (Comas-Herrera et al., 2003).

4.2.1 Base scenario assumptions

The base scenario uses the WP 2 projections of the older population by age category, gender and disability level from the NIDI DELAY scenario. This scenario assumes that disability incidence is delayed to older ages with the same amount of time as mortality is delayed (see Bonneux et al., 2011). It has been chosen as base scenario, as it is an intermediate scenario between more pessimistic scenarios assuming constant prevalence (PREV scenario) or constant incidence (CHRON scenario) of disability and the more radical optimistic BIOL scenario (see 4.2.2).

With regard to household composition the base scenario assumes the baseline proportions of older persons living alone or with others by age, gender and disability to remain constant over the projection horizon. Likewise, the estimated base year distribution over educational level, by age, gender, disability and household composition, is assumed to remain constant over the projection period, as is the further distribution of the older population over the other model characteristics (IADL limitations, cognitive functioning, income, having children). Assuming household composition and educational levels to

remain constant might not be a very realistic assumption for most European countries. The reason why the base scenario uses these assumptions is that household composition and educational level projections are not available for all representative ANCIEN countries (see section 4.3 below).

4.2.2 Alternative disability scenarios

The probability of being disabled sharply increases with age. Larger cohorts of older persons in combination with higher disability risks at older ages, will inevitably lead to increasing numbers of care dependent persons. However, the impact of population ageing on future demand for care and on LTC use, also depends on trends in healthy or disability-free life expectancy. Whether increased life expectancy will be accompanied by an increase or a decrease in unhealthy or disabled life years is uncertain. The question of compression or expansion of morbidity is the topic of a continuing debate among demographers, epidemiologists and gerontologists. For this reason, most LTC projection models present several scenarios, based on different assumptions about trends in disability (Van den Bosch et al., 2011). The present projection model utilises eleven alternative disability scenarios, developed in WP 2 of ANCIEN (Bonneux et al., 2011). A first set of scenarios explores the effect of different relationships between the incidence of disability and mortality (bio-demographic scenarios). A second set explores the effects of two risk factors: obesity and smoking (risk factor scenarios). A detailed discussion of the assumptions of the disability scenarios can be found in Bonneux et al. (2011).

While previous cross-nationally comparative LTC projections also perform such a sensitivity analysis, it is generally based on a more limited number of alternative assumptions. The latest projections of the European Commission and the Ageing Working Group will consider one alternative demographic and one alternative disability scenario (Economic Policy Committee and European Commission, 2011). The base case scenario uses the base EUROPOP2010 population projections and assumes constant prevalence of ADL-dependency. The alternative 'high life expectancy scenario' replaces the base EUROPOP2010 population projections with the high life expectancy variant. The alternative 'constant disability scenario' assumes that the profile of age-specific disability rates shifts in line with changes in life expectancy. The study by Comas-Herrera et al. (2003) used the base Eurostat 1999 population projections and constant dependency rates by age and gender for the base case scenario. The Eurostat high and low population projections and official national projections were used as variant population projections scenarios. Two alternative disability scenarios were investigated: one assuming that dependency rates shift by one year for every year of life expectancy gained, and a second assuming a one year shift in dependency rates where two years of life expectancy have been gained.

a. Bio-demographic scenarios

Projections of disability have been produced under four alternative bio-demographic scenarios, two more pessimistic and two more optimistic with regard to the future numbers of disabled older persons than the DELAY scenario.

CONST: This scenario assumes constant mortality and disability incidence. It assesses what the effect of the ageing of the large baby boom cohorts would be under the hypothesis that mortality rates would not decrease in future years. With regard to mortality it is much more pessimistic than the other scenarios, which assume declining mortality incidence in line with the EUROPOP 2008 forecasts. In consequence of the higher mortality rates, the CONST scenario projects fewer numbers of older persons and therefore fewer numbers of disabled older persons. In that sense, it could be labelled 'optimistic' with regard to disability.

PREV: The 'prevalence' scenario assumes constant age and gender specific prevalence rates of disability. This is a very simple way to model future numbers of disabled persons, used in many projection models. It is more pessimistic than the DELAY scenario, as it assumes that extra years of life gained through increased longevity result in more years spent in disability.

CHRON: This 'chronology' scenario assumes that age and gender specific incidence rates remain constant. It is more pessimistic than the prevalence scenario.

BIOL: The 'biology' scenario is more optimistic than the DELAY scenario. It assumes a similar *relative* disability incidence decline as the mortality incidence decline. DELAY assumed a same *absolute* decline (in number of life years) in disability and mortality incidence. BIOL yields higher incidence declines at younger age, but lower declines at older ages, while the reverse holds for the DELAY scenario.

b. Risk factor scenarios

The second set of disability scenarios makes assumptions about trends in two important risk factors with regard to disability: smoking and obesity. For all risk factor scenarios, background assumptions on mortality and disability incidence are based on the DELAY scenario.

Smoking

The disability incidence of smokers does not differ much from that of non-smokers (see Bonneux et al., 2011). A main cause of disability in smokers is chronic obstructive pulmonary disease (COPD), but only a fraction of smokers is affected by (severe) COPD. As smoking strongly increases the risk of dying, therefore, all things equal, it tends to decrease age-related disability. The scenarios with regard to trends in smoking are the following:

SMOK: This scenario projects the (still high) prevalence of smoking of younger cohorts into the future and assumes they will continue smoking. This is a 'worst case' assumption.

TREND: The 'TREND' scenario starts from the 'SMOK' scenario but adds the assumption that in future cohorts smokers will successfully quit at a rate of 2% per year. This seems a rather realistic scenario, the assumption of quitting being close to recent observations.

NOSMOK: This scenario modifies the 'SMOK' scenario by assuming that none of the future 55 year olds will be smoking, but remaining smokers in the older population will continue smoking. In this assumption, the large smoking cohorts will only be extinct around 2055. In 2040, many smokers still survive at high age, which can cause paradoxical results in the disability projections.

NOSQUIT: This scenario adds high quit rates to the 'NOSMOK' scenario. It is an extreme 'no smoking' scenario, as smokers die or quit and are not replaced by new cohorts of smokers. Compared to the 'TREND' scenario it projects increased disability, but also decreasing smoking related mortality.

Obesity

With regard to obesity, mortality does not differ much between obese people and the non-obese, but prevalence of disability is higher for obese persons (see Bonneux et al., 2011). Obesity causes wear and tear of joints of knees, hips and back, leading to loss of mobility. The scenarios with regard to trends in obesity are the following:

BMI: This scenario assumes an increased prevalence of obesity in inflowing future cohorts of older persons. These prevalences are kept constant over the projection period.

LEAN: The 'lean' scenario is an extremely optimistic scenario. It halves the prevalence of obesity for all inflowing future cohorts of 55 year old.

FAT: This is an extremely pessimistic scenario. It assumes that the prevalence of obesity for all inflowing future cohorts of 55 year old is doubling.

4.2.3 Changing household composition scenario

The household composition of older persons is changing in many European countries, as widowhood is postponed to higher ages, divorce rates are increasing and co-residence rates of older parents and children are decreasing (Bernard, 2000; Herce, 2003; Lowenstein, 1999). The 'changing household composition' scenario (DELAY HH) takes account of future trends in household composition of the older population, based on existing projections of household composition (see 4.2). Therefore, for each

projection year, base year proportions of older persons living alone or with others by age, gender and disability have been rescaled to match projected trends in household composition. It is assumed that within age and gender categories, trends in household composition will not differ by disability level.

4.2.4 Better education scenario

Future cohorts of older persons will be better educated than is the case today. Both mortality and disability rates are lower among people with higher levels of education. These effects are implicitly incorporated in the disability scenarios that assume declining mortality and disability rates. However, several studies have found evidence of significant differences in use of LTC care between older people with different levels of education, controlling for disability. The explanations that are suggested for this finding relate to differences in health and care seeking behaviour, in access to information about services, in preferences with regard to informal and formal care, and in health and labour market participation of potential informal helpers (Broese van Groenou et al., 2006; Pinquart & Sörensen, 2002).

To take account of the impact of better education on care utilisation a 'better education' scenario (DELAY EDU) has been developed, using projections of the future educational level of older persons made by the International Institute of Alternative Systems Analysis (IIASA) (Kc, Barakat, Goujon, Skirbekk, & Lutz, 2010). For each projection year, base year proportions of low-, medium- and high-educated older persons by age, gender, disability and household composition have been rescaled to match projected trends in educational level, using the IIASA 'fast track' scenario. It is an optimistic scenario, assuming that, in countries with below average expansion trajectories, educational expansion will converge on a trajectory based on the historical global trend. It further assumes that if stated targets in attainment are not reached by certain years, an accelerated rate of growth is applied that meets these targets. Within each age, gender and disability group it is assumed that the (rescaled) educational level proportions do not differ for persons living alone and persons living with others.

4.3 Data sources

One of the main advantages of the present model compared to earlier cross-national comparative LTC projections, is that it relies, for as much as possible, on cross-nationally harmonized micro data to estimate care needs and care use. This section provides a detailed overview of the data used in the modelling and projecting.

4.3.1 Population and disability projections

The population projections by age, gender and disability for the four countries are those provided by NIDI in WP 2 of ANCIEN. These projections are based on SHARE and Eurostat's EUROPOP2008 data, and give the future number of older persons by age, gender and number of ADL limitations under the different bio-demographic and risk factor scenarios discussed in section 4.2.2 (See Bonneux et al. (2011) for a detailed description of the data and data sources).

For the further distribution of the population by household composition, educational level, and other relevant characteristic, national survey data (stage 1 of the model, see section 4.3.4a for a description of the surveys) and SHARE data (stage 2 of the model, see section 4.3.4b) have been used to estimate the base year distribution. In the base scenario, it is assumed that the estimated base year distribution will remain constant over the projection period.

4.3.2 Household composition projections

Projections of the older population by household composition (living alone or with others), used for the changing household composition scenario, are available for Germany and the Netherlands. For Germany, household composition projections for the 2010-2050 period, by ten year intervals, have been obtained from DIW (Schulz, 2008). Household composition rescaling factors for the intermediary years (2015, 2025, 2035 and 2045) have been interpolated. After 2050, no further change in household

composition is assumed. For the Netherlands, projections have been obtained from Statistics Netherlands for the 2011-2060 period, by five year intervals. For Germany, projections of household composition have been used for the projections of home care use only, as household composition was not included in the residential care model (see 4.3.4a). To the best of our knowledge, no household composition projections are available for Spain and Poland.

Projected trends in household composition of the older populations differ for males and females (see Table A4.1 and Table A4.2 in Appendix), in great part due to changes in the differentials in life expectancy between males and females. In Germany, the shares of single persons are projected to decrease among females between 2010 and 2050 in all age categories, while among males the shares of single persons are projected to increase. In the Netherlands, the shares of single persons are projected to rise substantially among males between 2010 and 2060, particularly at younger ages. At older ages, the shares of single persons will slightly decrease initially. Among females the share of single persons is projected to decrease between 2010 and 2060 for the 75-79, 80-84 and 85+ age categories. At younger ages, the share of single persons is projected to slightly increase, after an initial decrease.

4.3.3 Educational level projections

Projections of the older population by age, gender and educational level have been made by the International Institute for Applied Systems Analysis (IIASA) for many countries, including Germany, the Netherlands and Spain (see Kc et al. (2010) for more details). For the 'better education' scenario, IIASA projections under the 'fast track' scenario for the 2010-2050 period have been used. After 2050, no further change in educational level is assumed. For Poland, no educational level projections have been used, as data on care use by educational level was not available (see section 4.3.4).

The educational level of the older population is generally projected to increase (see Table A4.3 to Table A4.5 in Appendix for details of the educational level projections). In Germany, where very few older persons are in the lowest educational category in 2010, the shares of persons in the lowest category are projected to increase slightly over the projection period.

While in all three countries base year educational levels are lower for women than for men, the educational level of women is projected to increase faster than that of men, resulting in decreased gender gaps in future years. In Spain, the educational level of women is projected to surpass that of men.

4.3.4 Care use models

a. Residential care models

For the Netherlands and Spain logit models have been estimated to examine the determinants of institutionalisation, using national cross-sectional microdata representative for the population of persons aged 65 years and over (see Chapter 2 for a detailed description of the residential care models). Using the results of the logit models, predicted probabilities of residential care use have been calculated by combinations of age category, gender, ADL disability level, household composition, educational level and cognitive functioning (significant variables only), keeping income and number of chronic conditions (if significant) at their mean values (cell means). For the Netherlands, data of the Aanvullend Voorzieningengebruik Onderzoek 2007 (AVO, Research into supplementary use of Services) and the Onderzoek naar Ouderen in Instellingen 2008 (OII, Research on older persons in institutions) have been used to estimate the residential care model. For Spain, the Encuesta de Discapacidad, Autonomia Personal y Situaciones de Dependencia (EDAD, Survey on disability, independence and dependency) has been used.

Due to the unavailability of micro level data for Germany and Poland, no logit models have been estimated for these countries. Instead, prevalences of institutionalisation by age, gender and disability have been calculated. For Germany data from the Long-term Care Insurance scheme (Statistisches Bundesamt, 2009) have been used. Data for Poland have been obtained by gathering information from a number of sources with the help of CASE (Golinowska & Sowa, 2011) and of Etienne Sail from DG

ECFIN. The key references are 'Podstawowe dane z zakresu ochrony zdrowia w Polsce [Basic data on health care in Poland] 2000-2009', GUS [Central Statistical Office) (2000-2010a) and 'Rocznik demograficzny [Demographic Yearbook] 2000-2010', GUS (2000-2010b).

b. Home care models

For Germany, the Netherlands and Spain, multinomial logit models have been estimated to study the determinants of formal and informal care use by persons aged 65 and over residing at home, using representative cross-sectional microdata of the Survey on Health, Ageing and Retirement in Europe (SHARE) (see Chapter 3 for a detailed description of the home care models). For each of the countries, SHARE wave 1 and wave 2 data have been pooled to estimate the models. The home care variable is a categorical variable with four categories: no care, informal care only, formal care only, formal and informal care. Care has been defined as personal care (help with activities of daily living) or nursing care. Help with household or administrative tasks has not been included. Formal care includes professional or paid nursing or personal care, including care from private providers. Informal care includes personal care from outside and from within the household. Based on the model estimates, predicted probabilities of the different home care categories by age category, gender, ADL disability level, IADL disability level, household composition, having children and educational level (significant variables only) have been calculated, keeping income, number of chronic conditions and level of cognitive functioning (if significant) at their mean values (cell means).

Due to the unavailability of data on home care utilisation, from SHARE or other sources, no projections of home care use have been made for Poland.

Table 4.1 provides an overview of data input for the projections of LTC use.

Table 4.1 Data availability

		Population projections				Care use probabilities, by							
		Base scenario	Alternative disability scenarios	Changing household composition scenario	Better education scenario	Age	Gender	Disability	Household composition	Education	IADL	Dementia/ Cognitive functioning	Children
Residential care	DE	■	■			■	■	■					
	NL	■	■	■		■	■	■	■			■	
	ES	■	■		■	■	■	■	■	■		■	
	PL	■	■			■	■	■					
Home care	DE	■	■	■	■	■	■	■	■	■	■	■	
	NL	■	■	■	■	■	■	■	■	■	■	■	■
	ES	■	■		■	■	■	■	■	■	■	■	■
	PL												

4.4 Projection results

This section describes the results of the projection of LTC users between 2010 and 2060 for Germany, the Netherlands, Spain and Poland. The projected numbers of older persons using residential care under different bio-demographic, risk factor and socio-demographic scenarios are presented in section 4.4.1. Section 4.4.2 and section 4.4.3 provide the projection results for formal and informal care use by older persons residing at home. Next, section 4.4.4 summarizes projection results for all types of care in the total and disabled population. More detailed projection results are provided in Table A4.6 to Table A4.15 in Appendix.

4.4.1 Projected numbers of residential care users

Table 4.2 shows that, under the base DELAY scenario, the numbers of residential care users in Germany are projected to increase from approximately 650,000 in 2010 to around 1,300,000 in 2060, an increase of 102%. The numbers of residential care users are projected to increase gradually to the end of the projection horizon, peaking at approximately 1,360,000 in 2055 and then declining to 1,310,000 in 2060. The base year estimate of around 650,000 residential care users closely matches the number of persons receiving benefits from the long-term care insurance scheme for residential care (650,262 in 2009).

Table 4.2 Projected numbers of residential care users, in Germany, the Netherlands, Spain and Poland, 2010-2060,DELAY scenario (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DE	648	729	814	906	978	1028	1108	1218	1321	1360	1310	102%
NL	142	160	180	206	245	299	339	375	408	429	426	200%
ES	364	400	426	465	522	593	680	777	858	918	954	162%
PL	59	67	77	88	98	110	121	129	136	141	149	152%

Source: Own calculations based on Bonneux et al. (2011), Chapter 1, Statistisches Bundesamt (2009), Schulz (2008), Statistics Netherlands (2011), Golinowska and Sowa (2011), GUS 2000-2010a, GUS 2000-2010b.

In the Netherlands, the projected increase in the numbers of residential care users amounts to 200%, from around 140,000 in 2010 to approximately 425,000 in 2060. The numbers of residential care users are projected to increase gradually to 2055 and to decline afterwards. The estimated base year number of residential care users is slightly less than the number of 155,560 residential care users reported for 2009 by Statistics Netherlands, based on administrative records of the Algemene Wet Bijzondere Ziektekosten (AWBZ, Exceptional Medical Expenses Act; latest available figure). The latter figure includes persons temporarily staying in residential care facilities. For Spain, the numbers of residential care users are projected to increase from around 365,000 in 2010 to almost 955,000 in 2060, an increase of 162%. The rate of increase is projected to be relatively low until 2025 but to accelerate considerably afterwards. The base year number of residential care users is higher than the number of residential care users (222,521 in 2008) reported in the WP 1 country report for Spain (Gutiérrez et al., 2010). The latter figure includes dependent residents only and, as is illustrated in Table 4.3 below, in Spain a considerable share of residential care users is not ADL dependent. For Poland, the numbers of residential care users will increase from about 59,000 in 2010 to about 149,000 in 2060, an increase of 152 %. There is no single data source covering the total numbers of people in residential care in Poland and the figures published vary substantially. We are grateful to colleagues at CASE (for providing us with an estimate. Please note that the baseline figure for number of people in care homes in Poland is expected to grow fast in the next few years, which means that projections assuming that numbers in care homes grow at the same rate as numbers of older disabled people may result in an underestimate.

Table 4.3 Residential care population by ADL disability, in Germany, the Netherlands, Spain and Poland, 2010 and 2060, Delay Scenario (absolute numbers (in thousands) and %)

2010	DE		NL		ES		PL	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
Disabled	648	100%	95	67%	149	41%	59	100%
Non disabled	0	0%	47	33%	215	59%	0	0%
Total	648	100%	142	100%	364	100%	59	100%

2060	DE		NL		ES		PL	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
Disabled	1310	100%	267	63%	393	41%	149	100%
Non disabled	0	0%	159	37%	561	59%	0	0%
Total	1310	100%	426	100%	954	100%	149	100%

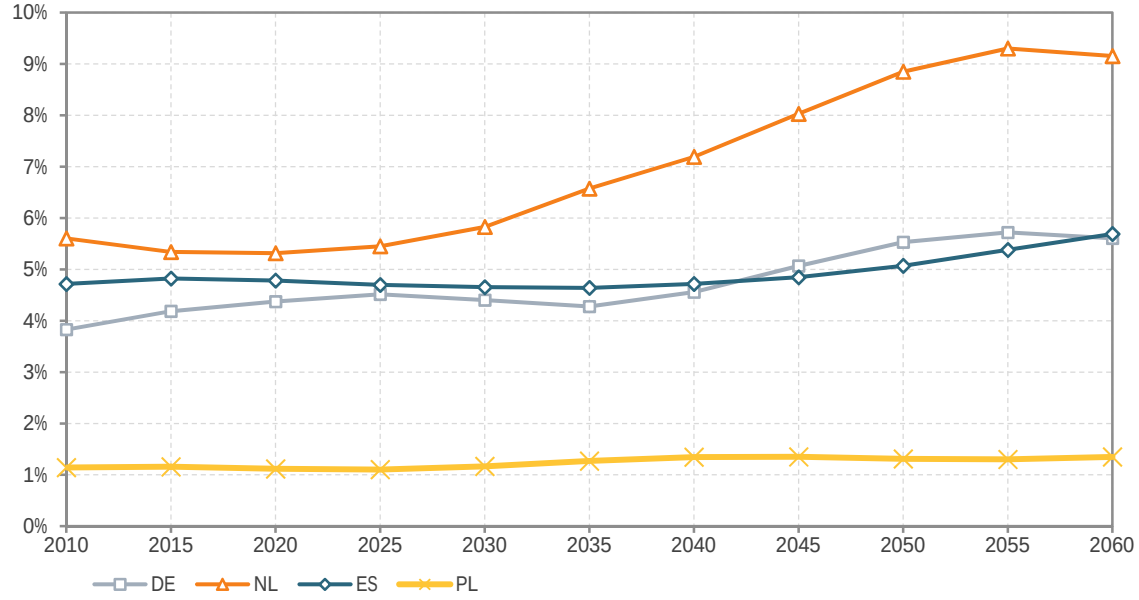
Source: see Table 4.2.

Spain has a larger share of non-disabled residents than the Netherlands and, under the assumption of constant disability-specific utilisation rates, these shares remain basically constant over the projection period. For Germany and Poland the model assumed that all residents are ADL disabled. This assumption seems reasonable for Germany. For 2005, it was estimated that the number of people in institutions not receiving benefits from the LTC insurance was about 45,000 (Schulz, 2011). However, in the meantime nearly all residents are getting benefits from the LTC insurance (that is to say they are limited in at least two ADL activities) (Schulz, personal communication). For Poland, no information is available on the ADL disability of the residential care population.

The projected relative increase of residential care users is largest in the Netherlands (+ 200%), followed by Spain (+ 162%), Poland (+ 152%) and Germany (+102%). The differences can be explained by demographic (size and tempo of the baby boom; mortality rates), epidemiological (age dependency of disability) and care-system related factors (determinants of care use). The strong increase in the Netherlands, for example, can be related to a large baby boom cohort moving into old age, in combination with a strong age dependency of disability (Bonneux et al., 2011) and a strong association of residential care use with age and disability (Wittwer et al., 2011). Furthermore, it is important to note that because the number of people in care homes in Poland is currently very low, it is likely that the numbers will rise much faster than projected due to policy changes.

Figure 4.2 compares the trends in the prevalence of residential care use for the four countries, as projected under the DELAY disability scenario and assuming constant age, gender and disability specific institutionalisation rates. In the base year, prevalence of residential care is highest in the Netherlands and lowest in Poland. While over the total projection period demographic shifts produce small changes in the overall prevalence rate of residential care in Spain and Poland, and a somewhat more considerable rise in Germany, prevalence is projected to rise steeply between 2025 and 2055 in the Netherlands.

Figure 4.2 Prevalence of residential care use, in Germany, the Netherlands, Spain and Poland, 2010-2060, DELAY scenario (% of total population aged 65 and over)

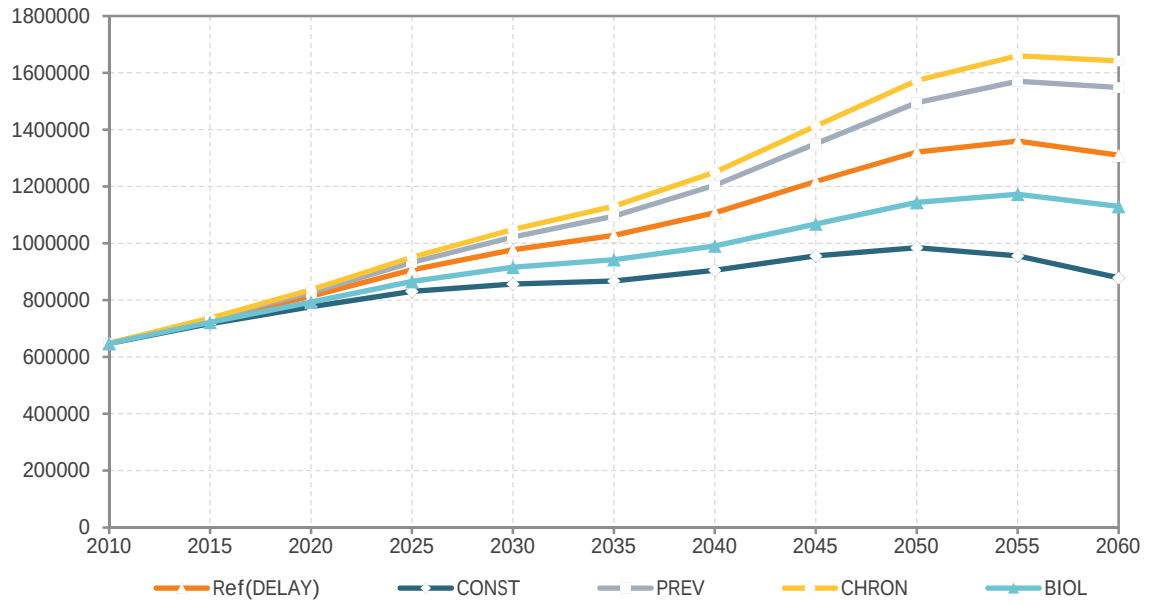


Source: see Table 4.2.

As is shown in Figure 4.3 to Figure 4.6, the projected numbers of residential care users are quite sensitive to alternative bio-demographic scenarios. In the four countries, projected numbers of residential care users are lowest under the CONST scenario. This scenario assumes that mortality rates would not decrease in future years, resulting in lower numbers of older persons and, hence, lower numbers of care users. Leaving the 'optimistic' and not very realistic CONST scenario out of consideration, the projected numbers of residential care users still vary considerably in Germany. In the Netherlands, Spain and Poland, projections are less sensitive to alternative assumptions about disability trends. This difference in sensibility to alternative disability projections is related to differences in the share of non-disabled residential care users and in the age-gradient of residential care use. In the four countries, the projected increase in the number of residential care users between 2010 and 2060 is lowest under the BIOL scenario, DELAY comes next, followed by PREV and CHRON.

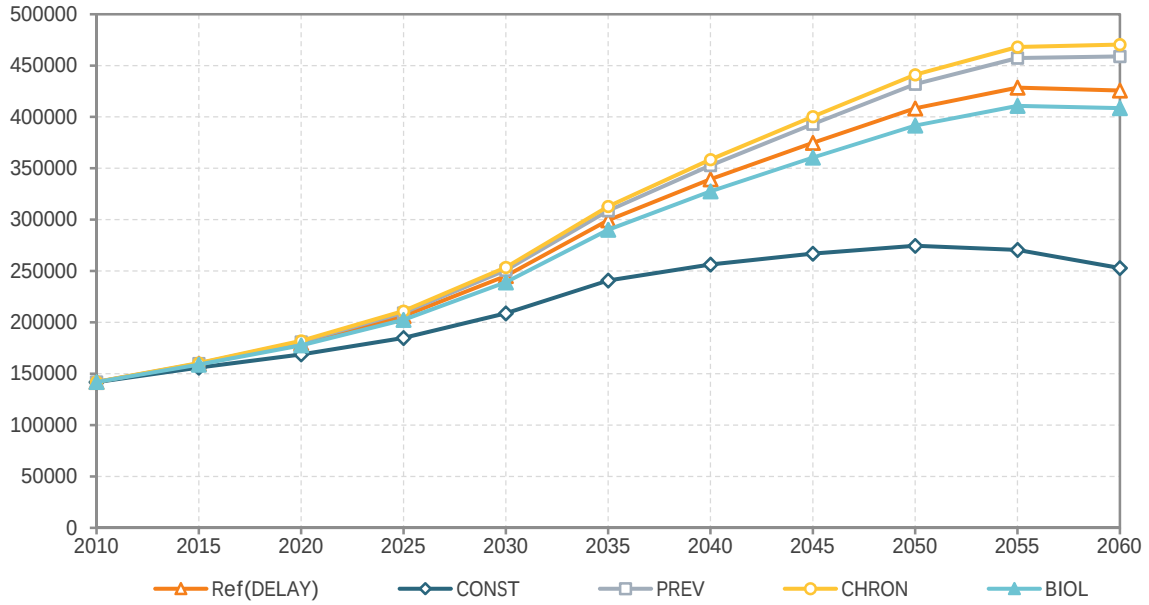
For Germany, the projected increase in the number of residential care users between 2010 and 2060 ranges from 74% under the BIOL scenario to 153% under the CHRON scenario. For the Netherlands the increase ranges from 188% to 231 %, for Spain from 159% to 168% and for Poland from 130% to 176% (see Table A4.6, Table A4.9, Table A4.12 and Table A4.15 in Appendix).

Figure 4.3 Projected numbers of residential care users, Germany, 2010-2060, bio-demographic scenarios



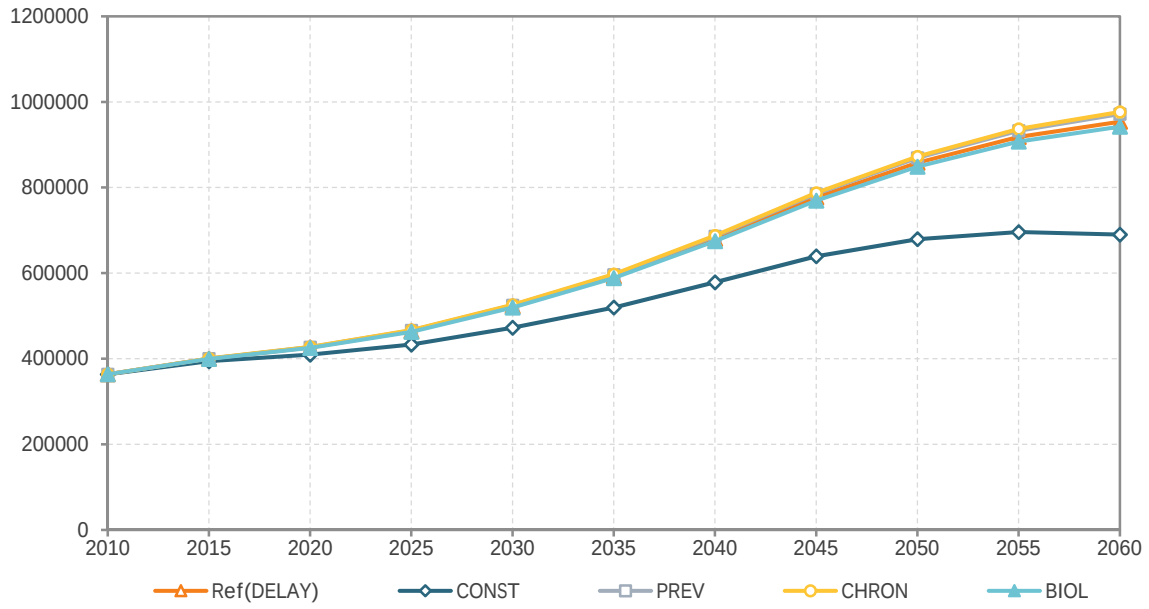
Source: see Table 4.2.

Figure 4.4 Projected numbers of residential care users, The Netherlands, 2010-2060, bio-demographic scenarios



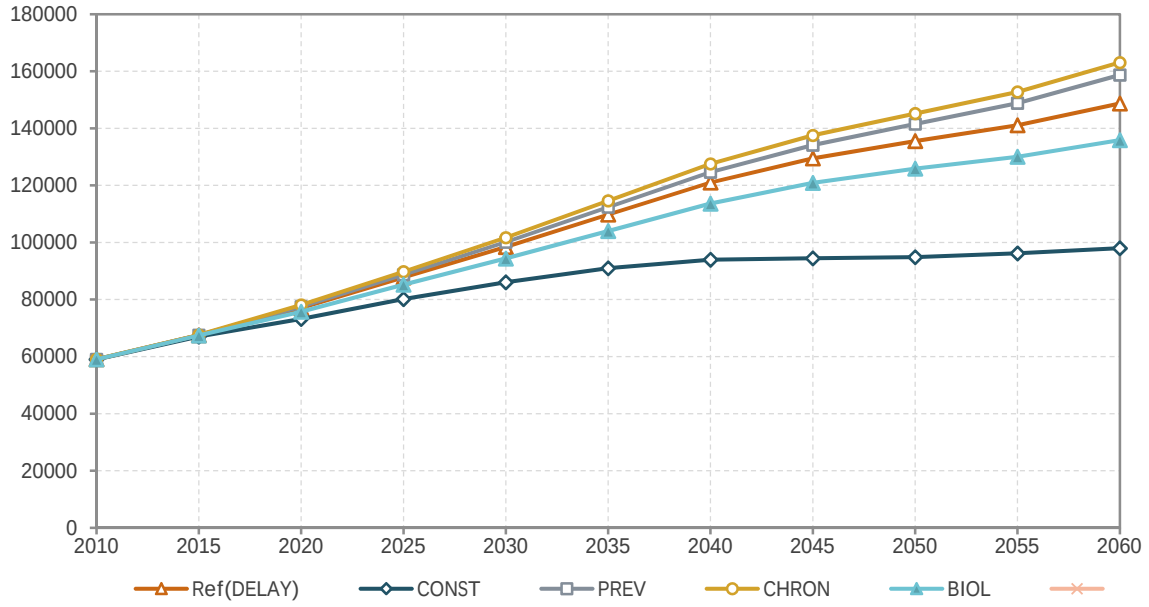
Source: see Table 4.2.

Figure 4.5 Projected numbers of residential care users, Spain, 2010-2060, bio-demographic scenarios



Source: see Table 4.2.

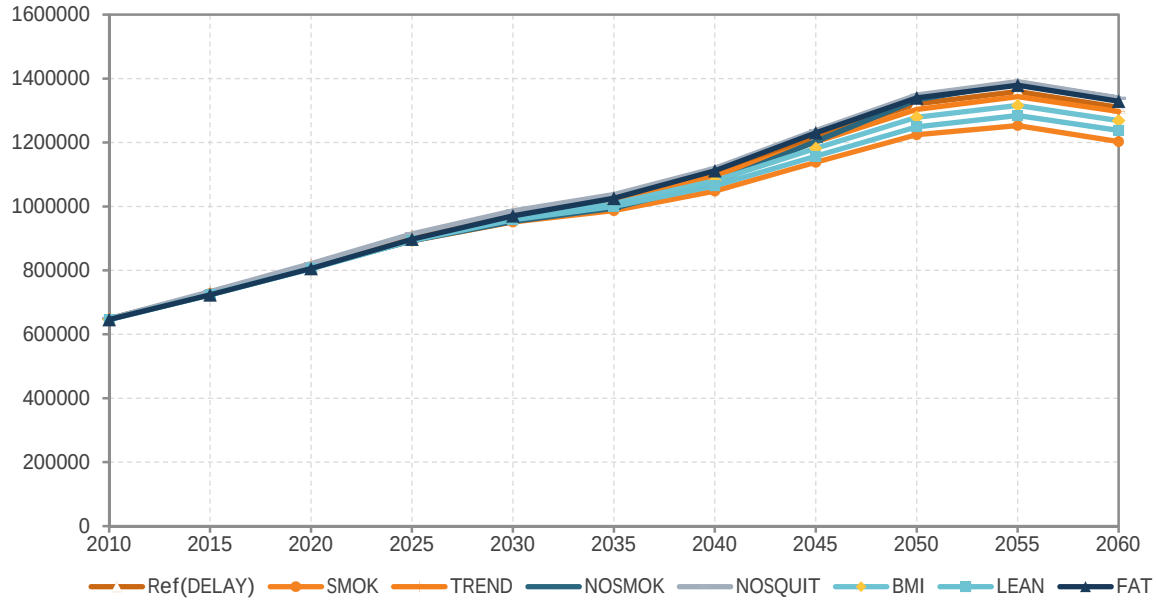
Figure 4.6 Projected numbers of residential care users, Poland, 2010-2060, bio-demographic scenarios



Source: see Table 4.2.

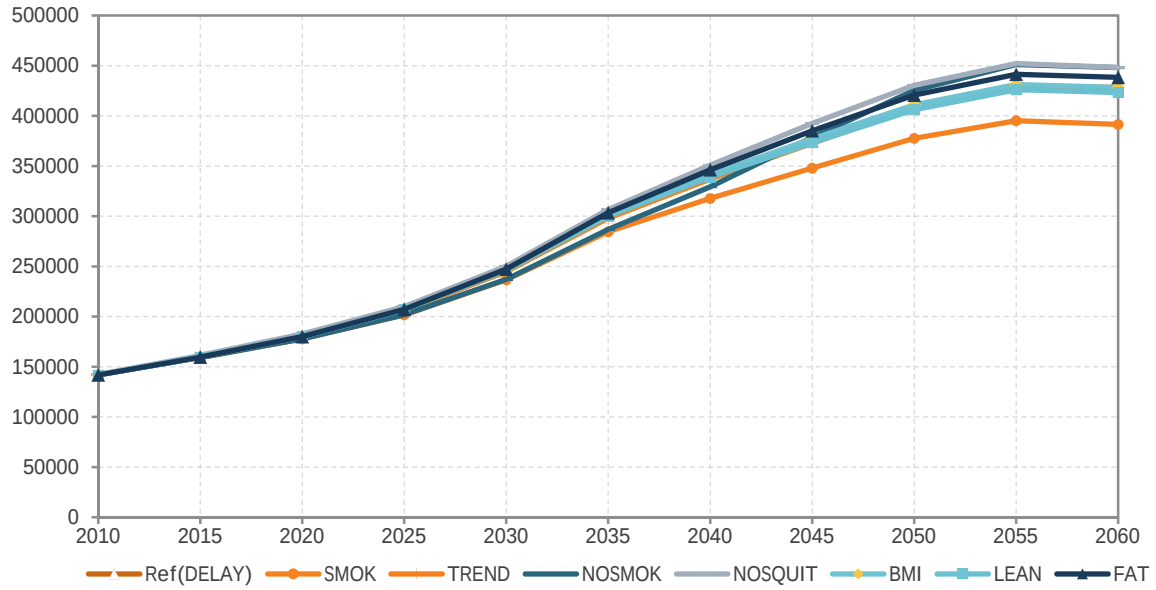
The BMI scenarios have a limited impact on the projected numbers of residential care users, as is shown in Figure 4.7 to Figure 4.10. For all four countries the differences between LEAN, FAT, BMI and the DELAY scenarios are rather small. In Poland the effect is somewhat more pronounced and this may be related to the combined impact of high obesity prevalence and high disability prevalence (see Bonneux et al., 2011). The effects of alternative smoking scenarios are larger. The projected numbers of residential care users are substantially lower under the SMOK scenario and substantially higher under the NOSMOK scenario.

Figure 4.7 Projected numbers of residential care users, Germany, 2010-2060, risk factor scenarios



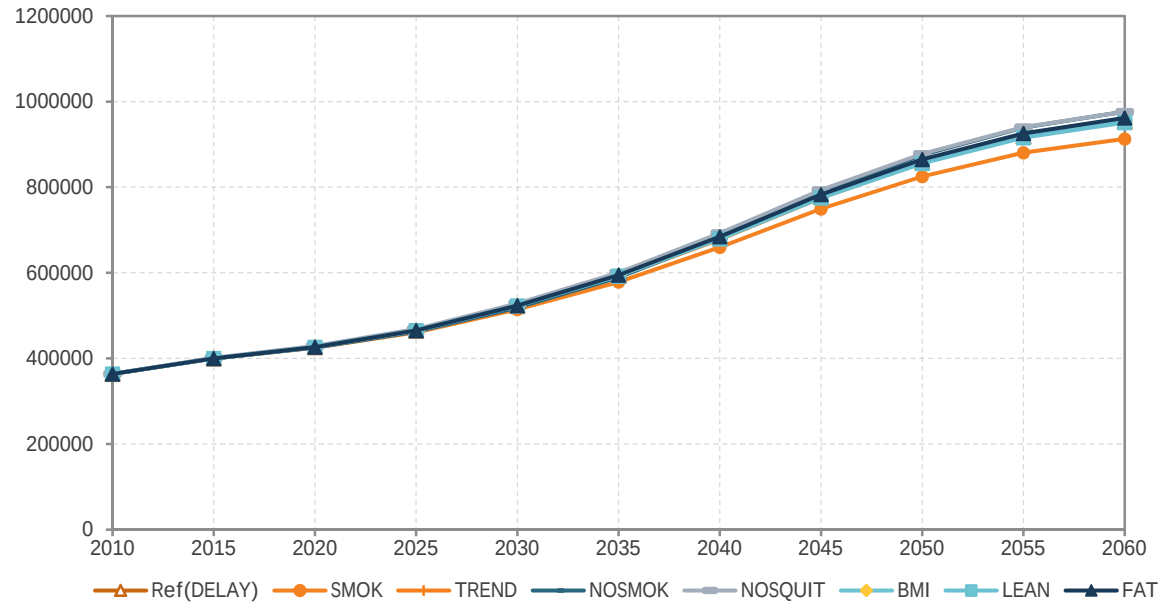
Source: see Table 4.2.

Figure 4.8 Projected numbers of residential care users, the Netherlands, 2010-2060 risk factor scenarios



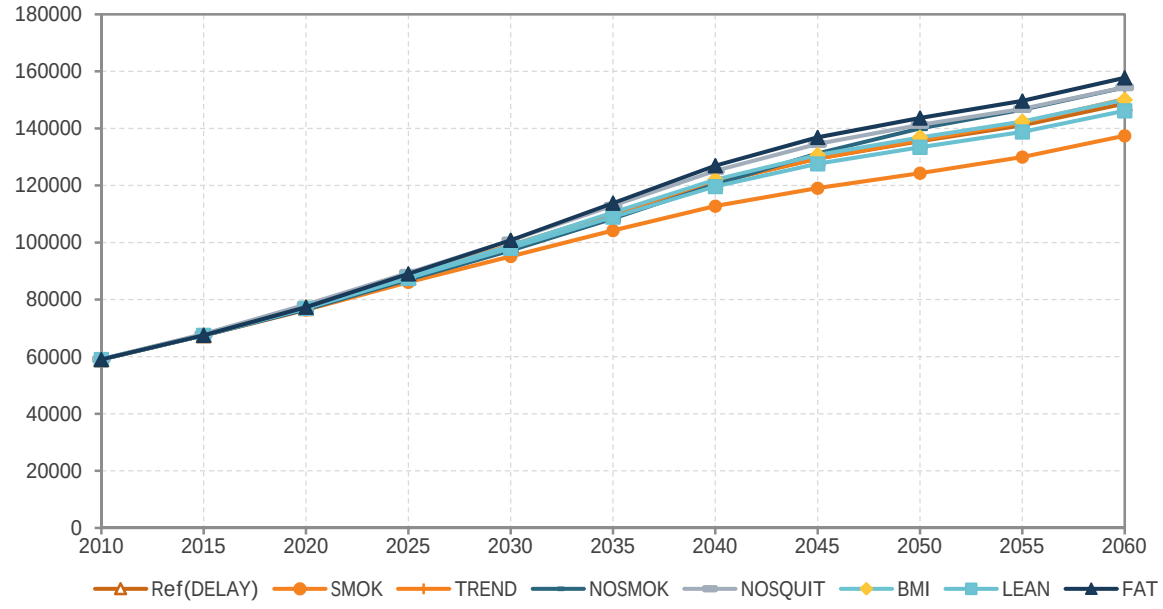
Source: see Table 4.2.

Figure 4.9 Projected numbers of residential care users, Spain, 2010-2060, risk factor scenarios



Source: see Table 4.2.

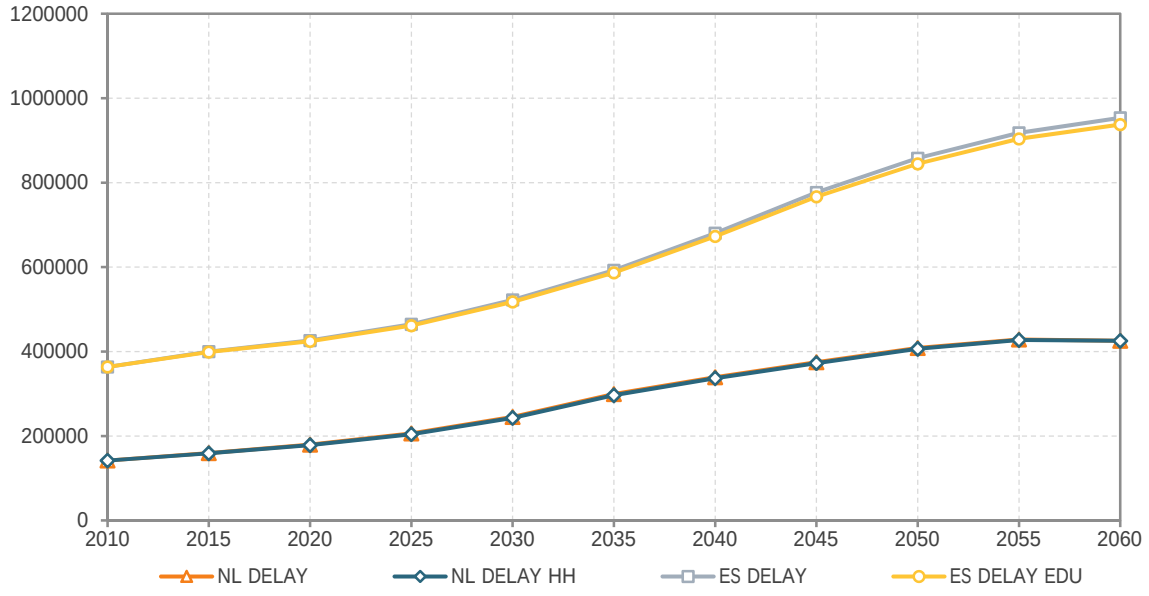
Figure 4.10 Projected numbers of residential care users, Poland, 2010-2060, risk factor scenarios



Source: see Table 4.2.

Scenarios taking into account changes in household composition of older persons (the Netherlands, DELAY HH) or the better education of future cohorts of older persons (Spain, DELAY EDU) have little or no impact on the projected numbers of residential care users, as is shown in Figure 4.11.

Figure 4.11 Projected numbers of residential care users, the Netherlands and Spain, 2010-2060, DELAY, changing household composition (DELAY HH) and better education (DELAY EDU) scenario



Source: Own calculations based on Bonneux et al. (2011), Chapter1, Statistics Netherlands (2011) and Kc et al. (2010).

4.4.2 Projected numbers of formal home care users

The numbers of formal home care users, either alone or in combination with informal care, are projected to increase in Germany, under the base DELAY scenario, from slightly more than 755,000 in 2010 to around 1,360,000 in 2060, an increase of 79% (Table 4.4). The numbers of home care users are projected to peak at approximately 1,410,000 in 2050 and to decline afterwards. The base year figure of 755,000 home care users is higher than the recorded number of home care facility users under the LTC insurance scheme (501,936 users of 65 years and over in 2009, source: Pflegestatistik, Statistisches Bundesamt, www.gbe-bund.de). The latter figure only includes persons receiving in kind benefits from the LTC insurance, that is to say persons who have at least two ADL limitations. Less severely limited formal care users and other persons relying on services not comprised within the LTC insurance scheme are not included in the LTC insurance figure.

Table 4.4 Projected numbers of formal home care users, in Germany, the Netherlands and Spain, 2010-2060, DELAY scenario (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DE	756	849	940	1014	1095	1180	1275	1364	1410	1403	1357	79%
NL	229	258	296	338	387	436	472	493	502	502	493	116%
ES	417	463	494	532	592	663	751	851	937	1001	1042	150%

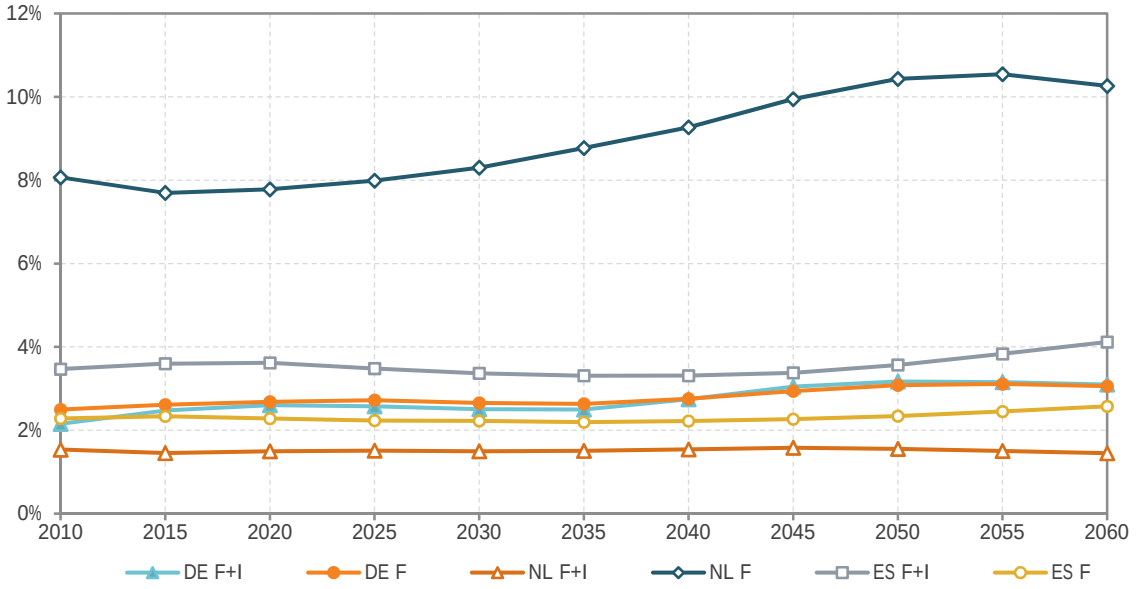
Source: Own calculations based on Bonneux et al. (2011), Chapter1, Schulz (2008) and Statistics Netherlands (2011).

In the Netherlands, the projected increase in the numbers of formal home care users over the projection period amounts to 116 %, from almost 230,000 formal home care users in 2010 to about 495,000 users in 2060. The numbers of home care users are projected to increase gradually to 2050 and to slightly decrease afterwards. A comparison of the base year estimate of about 230,000 home care users with estimated numbers reported elsewhere shows that the base year estimate is comparable to the figure of 227,000 elderly clients of AWBZ care at home at the end of 2007 according to the Dutch ministry of Health and reported in the ANCIEN WP 1 report on the LTC system in the Netherlands (Mot, 2010). For 2010, Statistics Netherlands reports a much higher number (327,450) of older recipients of non-residential personal or nursing care financed by the AWBZ, but the latter figure includes recipients of cash benefits (personal budgets/persoonsgebonden budget), which are free to spend the budget on formal services or to hire carers, including family members. According to Sadiraj et al. (2011) about 20 % of all AWBZ clients were receiving a personal budget in 2008. In Spain, the numbers of formal home care users are projected to increase from around 420,000 in 2010 to slightly above 1,040,000 in 2060, an increase of 150 per cent. The base year estimate is higher than the figure of 358,078 users of home care services in 2008 reported in the WP 1 report on the Spanish LTC system (Gutiérrez et al., 2010).

The projected relative increase of home care users between 2010 and 2060 is largest in Spain (+150%), followed by the Netherlands (+ 116%) and Germany (+79%). The relatively large increase in Spain could be partly explained by the high use of formal care at younger ages and its late baby-boom.

Figure 4.12 shows the trends in the prevalence of formal home care use as projected under the DELAY scenario and assuming constant utilisation rates by age, gender, disability and other relevant characteristics. In the base year, the prevalence of formal home care use is much higher in the Netherlands (9.7%) than in Germany (4.7%) and Spain (5.7%), and this difference is getting larger over the projection period. The share of formal care users is projected to increase to almost 12% in the Netherlands, while it oscillates around 6 % in both other countries. As is also apparent from Figure 4.12, in Germany and Spain formal care use is often complemented with informal care, while in the Netherlands formal care users are predominantly relying on formal care only.

Figure 4.12 Prevalence of formal home care use in Germany, the Netherlands and Spain, 2010-2060, DELAY scenario (% of population aged 65 and over residing at home)

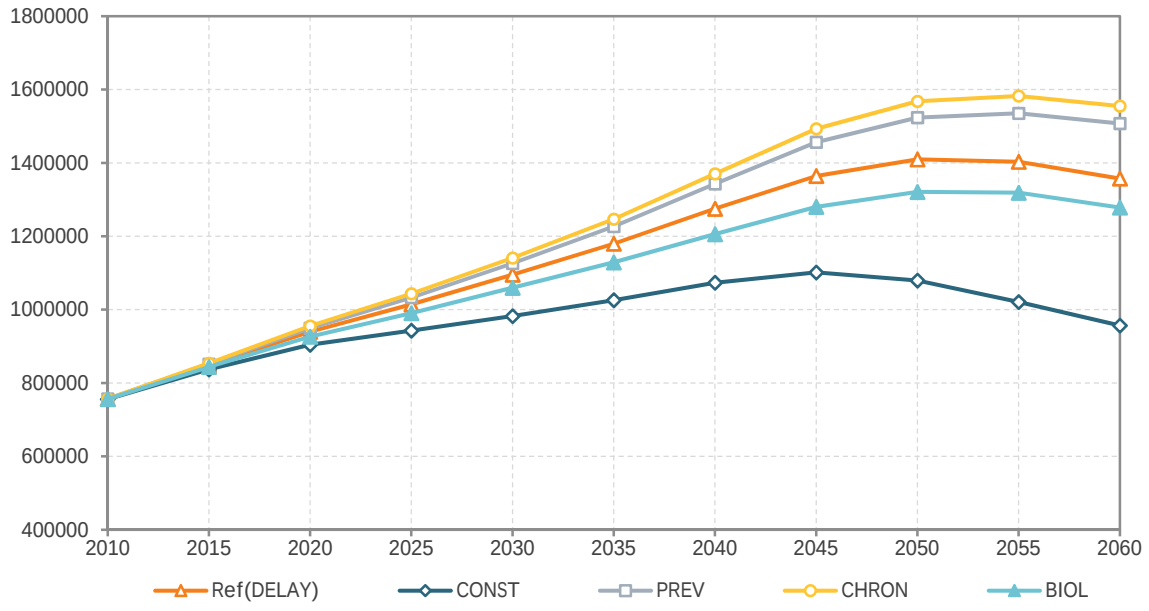


F+I: formal and informal care; F: formal care only

Source: see Table 4.4.

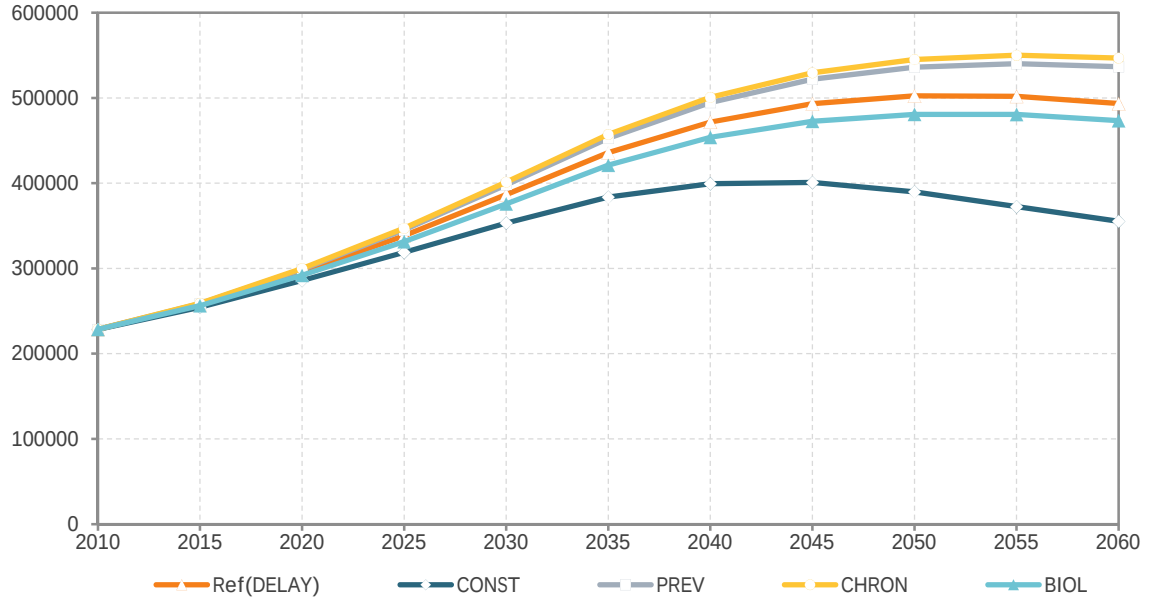
The projected numbers of home care users are sensitive to alternative bio-demographic scenarios. For the three countries, future numbers of home care users are much lower under the constant mortality assumption of the CONST scenario. Leaving this scenario out of consideration, the projected increase ranges from 69% to 105% in Germany, from 107% to 139% in the Netherlands and from 128 to 190% in Spain, with BIOL being the most optimistic scenario and CHRON the most pessimistic scenario in all three countries, as is shown in Figure 4.13 to Figure 4.15.

Figure 4.13 Projected numbers of formal home care users, Germany, 2010-2060, bio-demographic scenarios



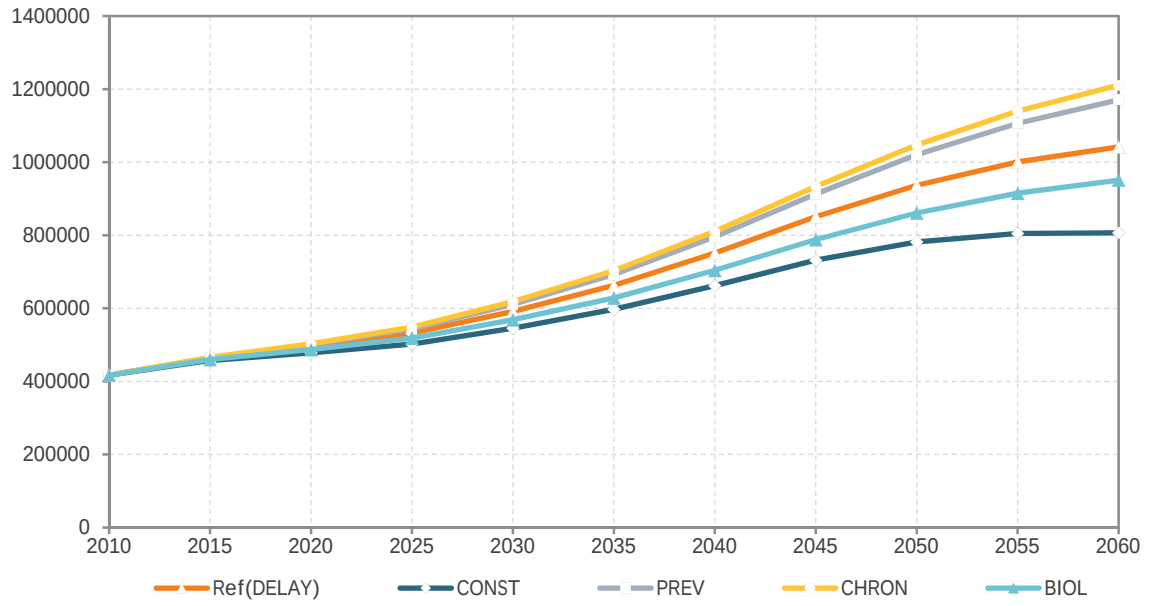
Source: see Table 4.4.

Figure 4.14 Projected numbers of formal home care users, the Netherlands, 2010-2060, bio-demographic scenarios



Source: see Table 4.4.

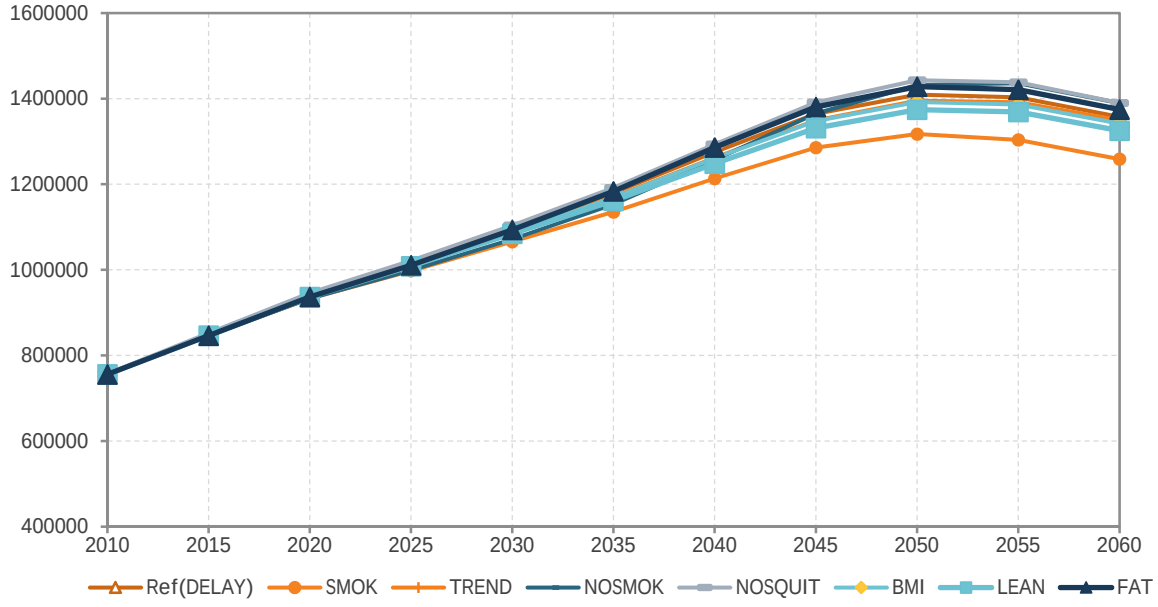
Figure 4.15 Projected numbers of formal home care users, Spain, 2010-2060, bio-demographic scenarios



Source: see Table 4.4.

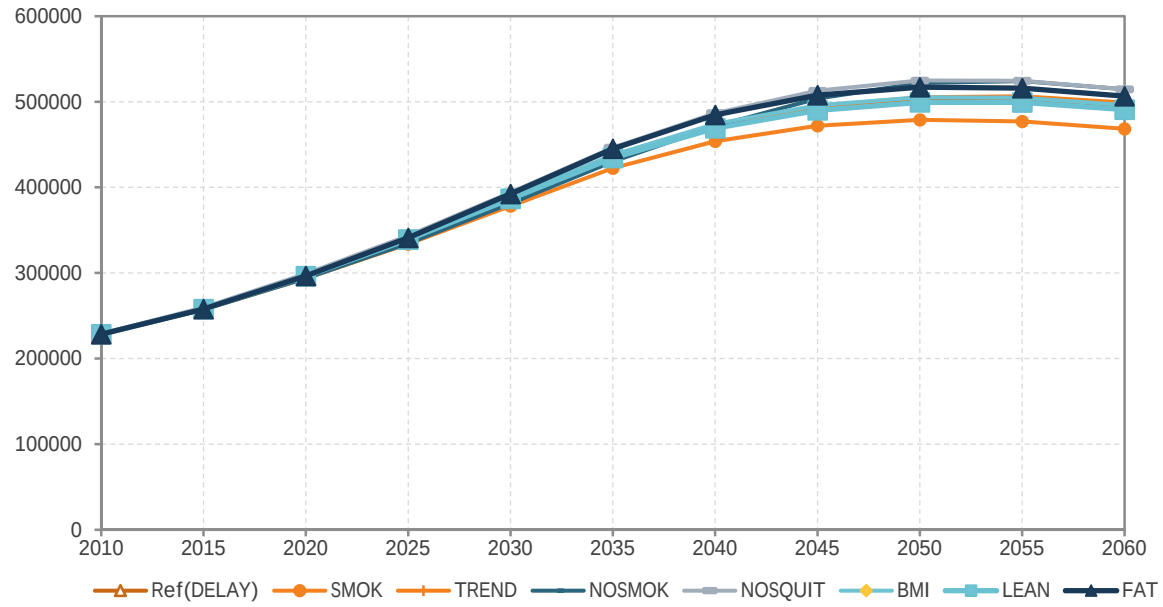
With the exception of Spain, the BMI scenarios have a limited impact on the projected numbers of formal home care users, as is shown in Figure 4.16 to Figure 4.18 .

Figure 4.16 Projected numbers of formal home care users, Germany, 2010-2060, risk factor scenarios



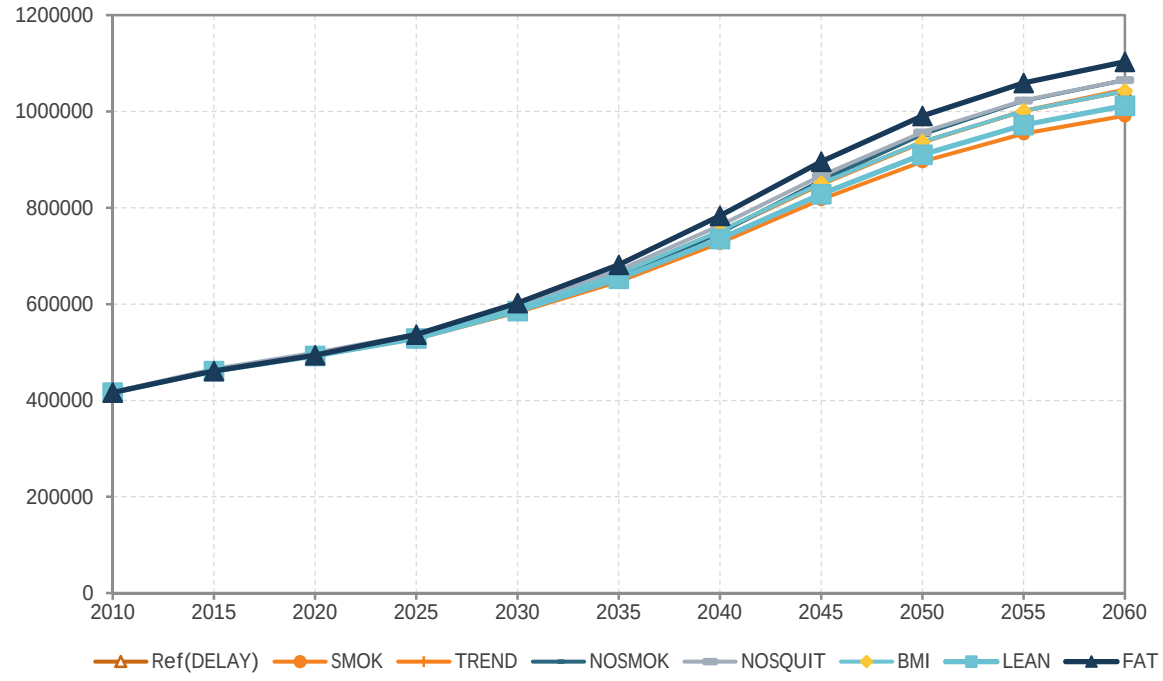
Source: see Table 4.4.

Figure 4.17 Projected numbers of formal home care users, the Netherlands, 2010-2060, risk factor scenarios



Source: see Table 4.4.

Figure 4.18 Projected numbers of formal home care users, Spain, 2010-2060, risk factor scenarios

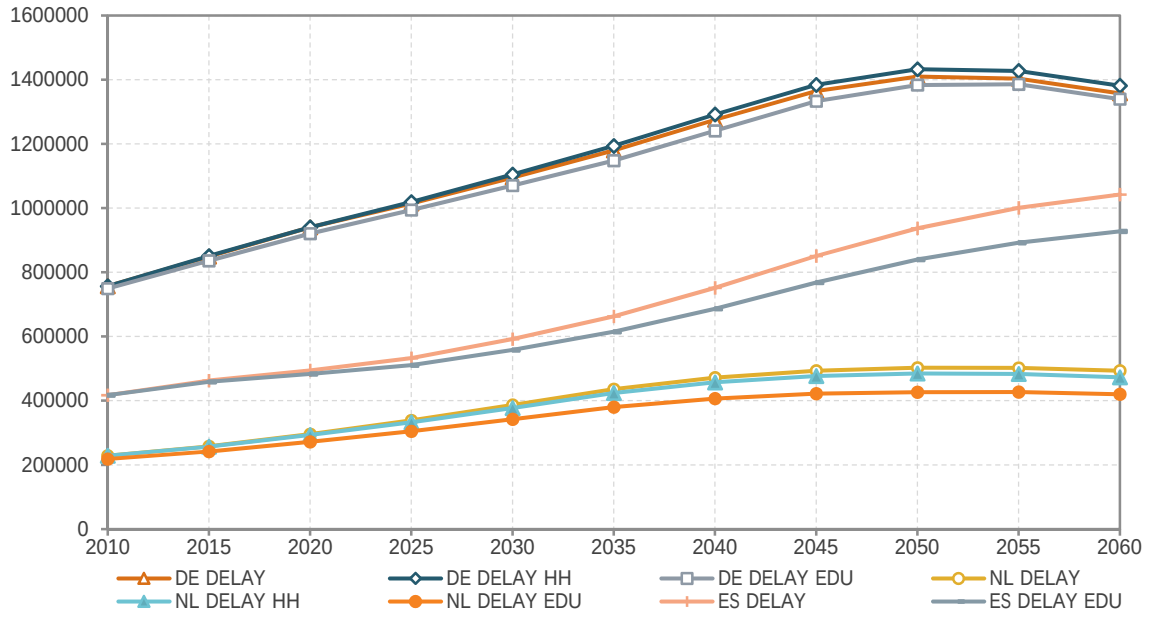


Source: see Table 4.4.

In Spain, the projected increase ranges from 143% under the LEAN scenario to 165% under the FAT scenario. The effects of alternative smoking scenarios are considerable in the three countries. The projected numbers of home care users are substantially lower under the SMOK scenario and higher under the NOSMOK and NOSQUIT scenario. The latter scenarios give quasi-similar results.

Taking account of changes in the household composition of older persons (Germany, the Netherlands) has little or no impact, while the scenario that takes account of the better education of future cohorts of older persons (Germany, the Netherlands, Spain) yields substantially lower numbers of formal home care users in the Netherlands and Spain, but makes little difference in Germany, as is shown in Figure 4.19. The very limited impact of household composition changes may be explained by a number of factors. One aspect relates to the finding of Chapter 3 that both in Germany and the Netherlands persons living alone have a higher probability of using formal care only but no significant higher probability of combining formal and informal care. Another aspect relates to the opposite household composition trends for males and females (see section 4.3.2). The insensitivity of the projection results to the better education scenario in Germany can be explained by the non-significance of education in the German home care model (see Chapter 3).

Figure 4.19 Projected numbers of formal home care users, Germany, the Netherlands and Spain, 2010-2060, DELAY, changing household composition (DELAY HH) and better education scenario (DELAY EDU)



Source: Own calculations based on Bonneux et al. (2011), Chapter1, Schulz (2008), Statistics Netherlands (2011) and Kc et al. (2010).

4.4.3 Projected numbers of informal care users

Under the base DELAY scenario, the numbers of informal care users, either alone or in combination with formal home care, are projected to increase in all three countries but with marked differences in the rate of increase (Table 4.5).

Table 4.5 Projected numbers of informal care users, in Germany, the Netherlands and Spain, 2010-2060, DELAY scenario (in thousands)

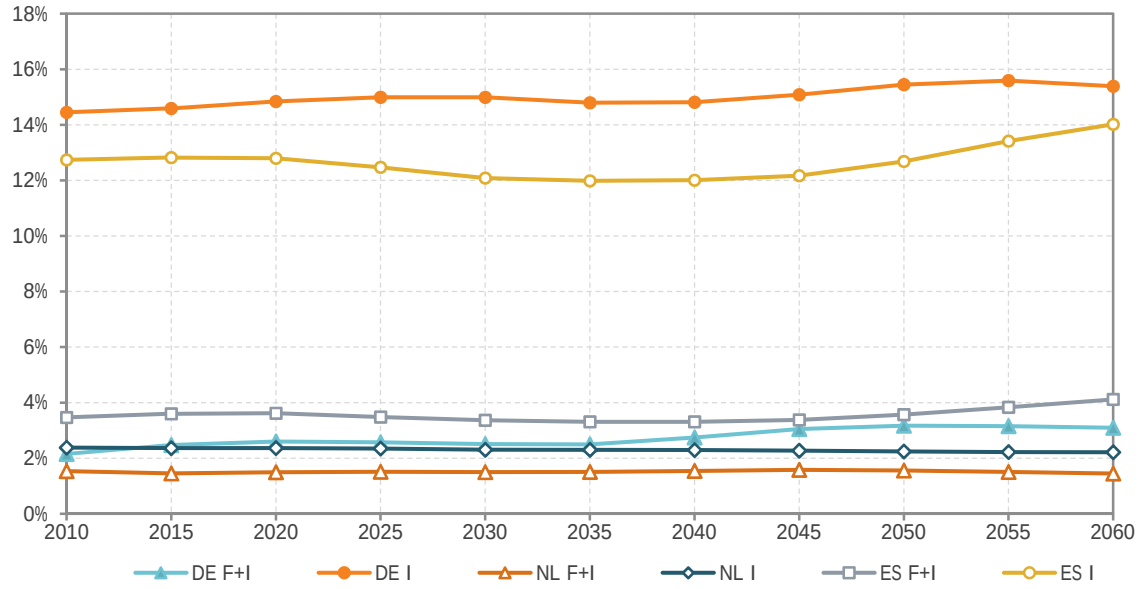
	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DE	2700	2846	3102	3364	3710	3975	4070	4133	4197	4198	4075	51%
NL	93	107	123	138	150	161	167	165	159	155	154	66%
ES	1176	1280	1376	1486	1635	1841	2080	2343	2577	2747	2825	140%

Source: Own calculations based on Bonneux et al. (2011), Chapter 1, Schulz (2008) and Statistics Netherlands (2011).

In Germany the numbers of informal care users are expected to rise from around 2.7 million in 2010 to around 4.1 million in 2060, a 51% increase. For the Netherlands, an increase of 66% is projected (from 93,000 in 2010 to around 154,000 in 2060), which is rather comparable to the relative increase for Germany. In contrast, Spain is expected to experience a much larger relative increase of informal care users: from around 1.2 million to more than 2.8 million, which is an increase of 140%. In Germany, numbers of informal care users will increase until 2055, followed by a decline in the latest years of the projection period. In the Netherlands, numbers will peak earlier, in 2040, and then gradually decline, while in Spain, numbers of informal care users are projected to rise until 2060, with the highest rates of increase between 2030 and 2045. The base year estimate of about 93,000 informal care users in the Netherlands is much lower than the figure of 160,000 older informal care users reported in the ANCIEN WP1 report (Mot, 2010). It is unclear whether the latter figure only includes users of informal personal care, or whether a broader category of informal care users is considered. For Spain, the base year estimate closely matches the number of informal care users reported in the WP1 questionnaire (984,159 users aged 65 and over, see Kraus et al. (2010) for details on the questionnaire). For Germany, the ANCIEN WP 1 report (Schulz, 2010) mentions a total of about 2,8 million informal care users aged 65 and over (750,000 older recipients of LTC insurance (LTCI) cash benefits only and about 2,040,000 older persons needing care but not receiving LTCI benefits (the latter figure includes persons who need help with household or financial tasks only). Furthermore, most recipients of LTCI home care benefits receive help from their social network: it is estimated that only 8% solely relies on professional care (Schneekloth & Wahl, 2005).

Figure 4.20 shows the trends in the prevalence of informal care use as projected under the DELAY scenario and assuming constant utilisation rates by age, gender, disability and other relevant characteristics. Over the projection period, the prevalence of informal care use is much lower in the Netherlands than in Germany and Spain. In the Netherlands, prevalence remains stable at around 4 per cent. In Germany and Spain, after an initial rise, the prevalence of informal care use declines, to rise again towards the end of the projection period, resulting in a slightly higher prevalence in 2060 (18.5 for Germany, 18.1 for Spain) than in 2010 (16.6, 16.2 respectively). As is further apparent from Figure 4.20, in the Netherlands many informal care users are also using formal care, while in Germany and Spain informal care users are predominantly relying on informal care only.

Figure 4.20 Prevalence of informal home care use, in Germany, the Netherlands and Spain, 2010-2060, DELAY scenario (% of population aged 65 and over residing at home)

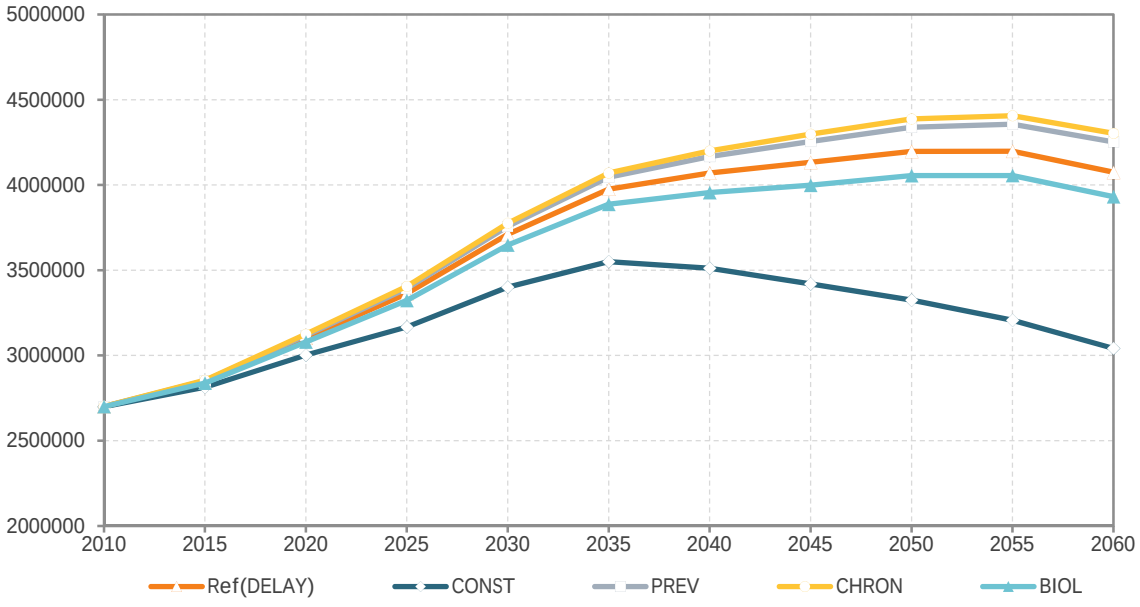


F+I: formal and informal care; I: informal care only

Source: see Table 4.5.

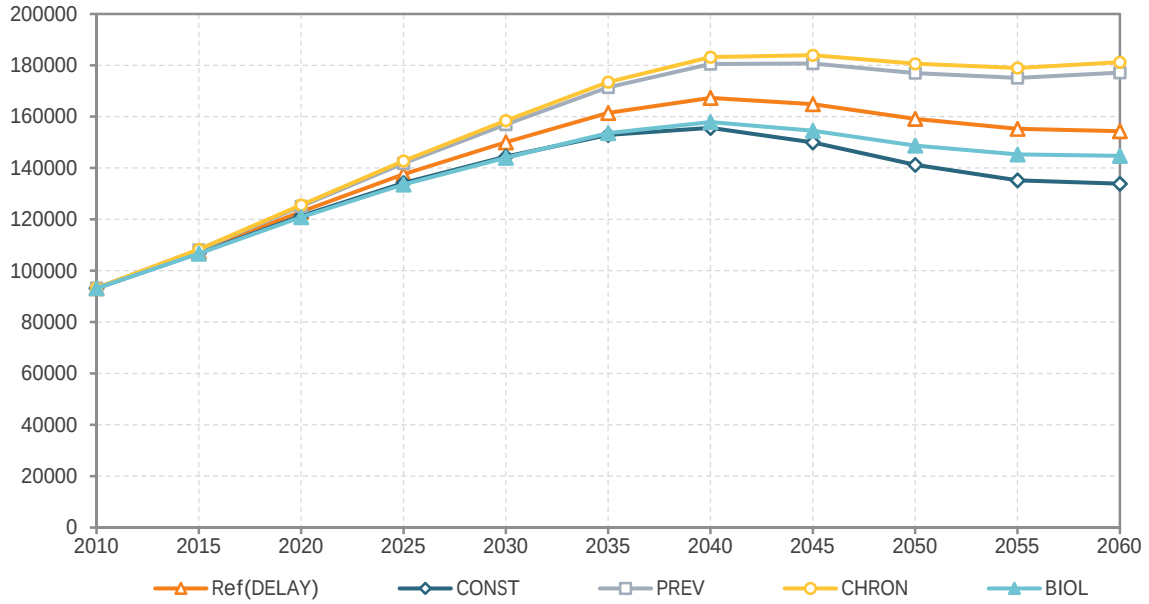
The projected numbers of informal care users are sensitive to alternative bio-demographic scenarios, as shown in Figure 4.21 to Figure 4.23.

Figure 4.21 Projected numbers of informal care users, Germany, 2010-2060, bio-demographic scenarios



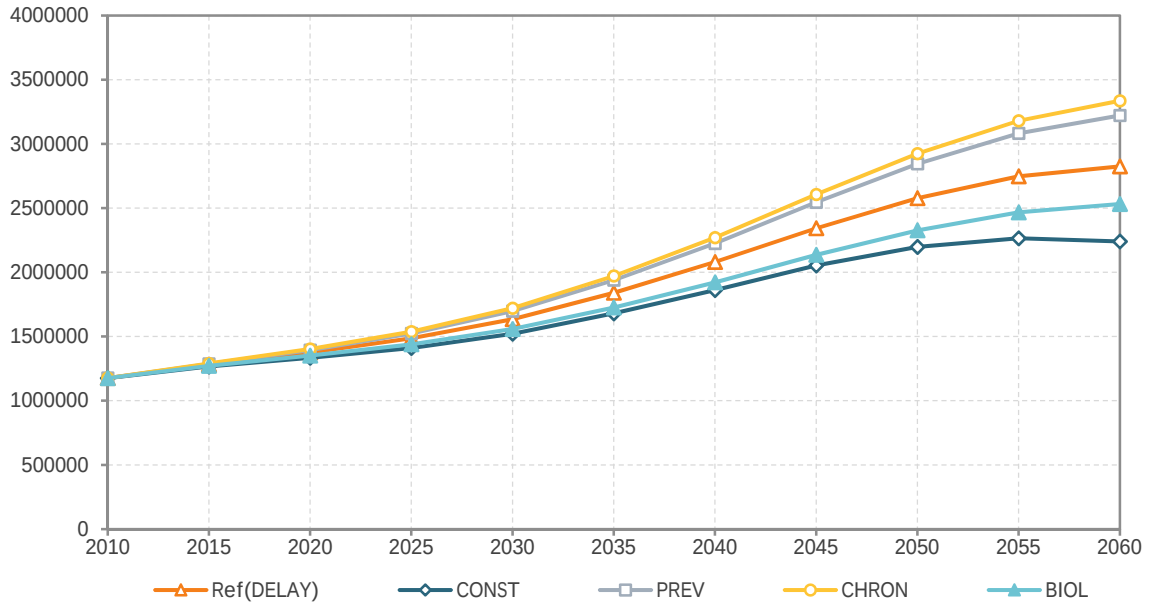
Source: see Table 4.5.

Figure 4.22 Projected numbers of informal care users, the Netherlands, 2010-2060, bio-demographic scenarios



Source: see Table 4.5.

Figure 4.23 Projected numbers of informal care users, Spain, 2010-2060, bio-demographic scenarios

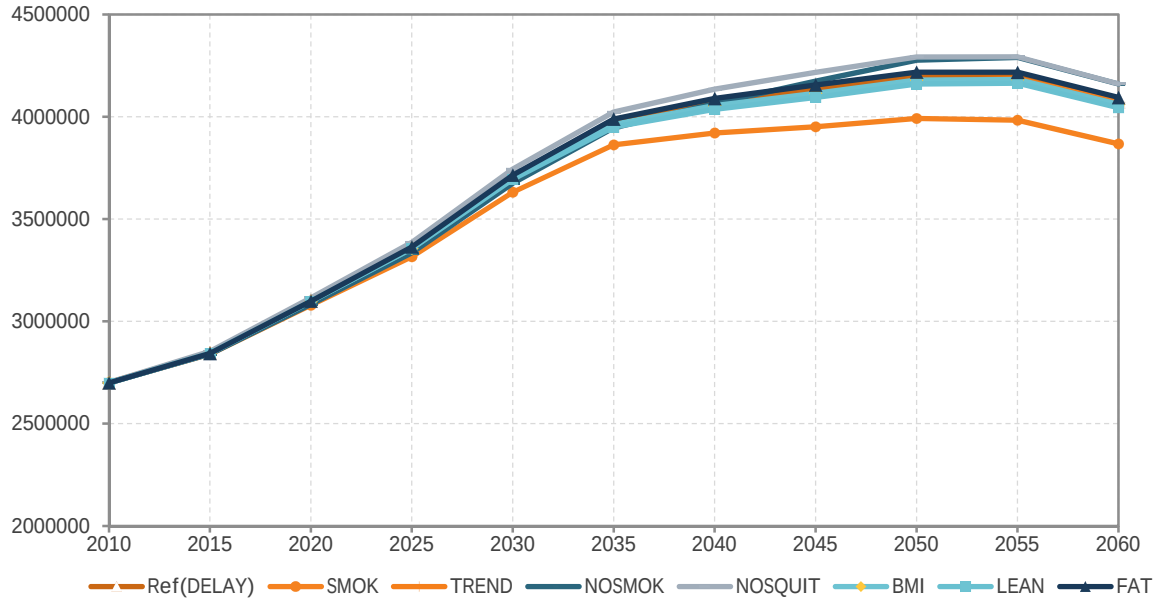


Source: see Table 4.5.

Leaving the CONST scenario out of consideration, the projected increase ranges from 46% to 59% in Germany, from 55% to 94% in the Netherlands, and from 115% to 183% in Spain, with BIOL being the most optimistic scenario and CHRON the most pessimistic scenario in all three countries.

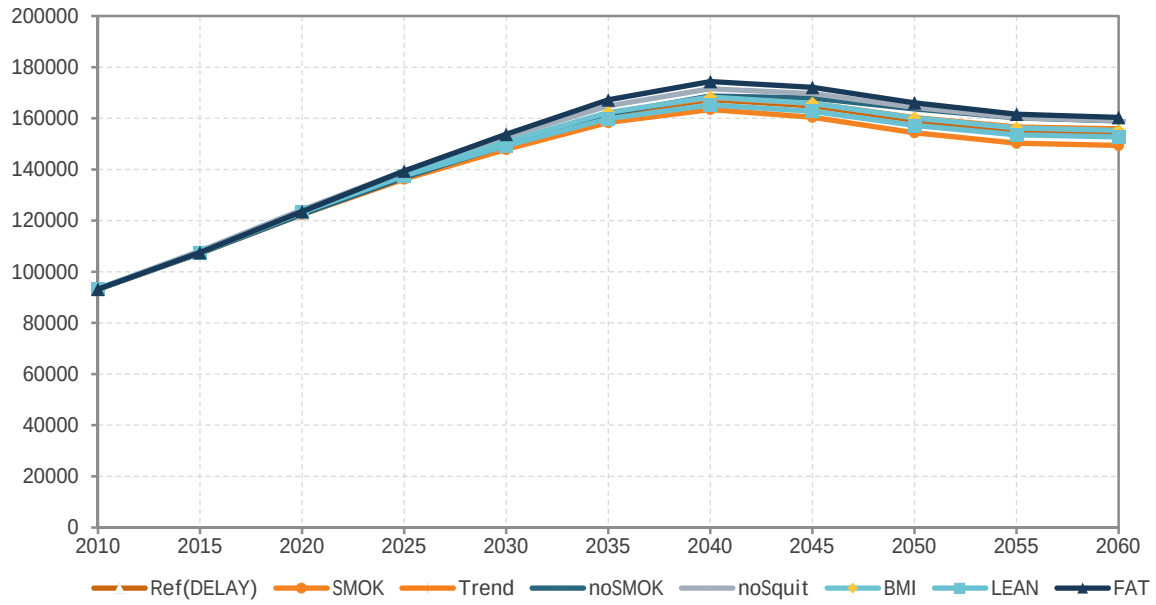
In Germany, the BMI scenarios have a very limited impact on the projected numbers of informal home care users, while their impact is somewhat larger in the Netherlands and Spain (Figure 4.24 to Figure 4.26). In the Netherlands, the projected percentage increase in informal care users between 2010 and 2060 ranges from 64% under the LEAN scenario to 72% under the FAT scenario; in Spain figures range from 133% (LEAN) to 156% (FAT). There are clear effects of alternative smoking scenarios in the three countries, with lower projected numbers of informal care users under the SMOK scenario and higher numbers under the NOSMOK and NOSQUIT scenario.

Figure 4.24 Projected numbers of informal care users, Germany, 2010-2060, risk factor scenarios



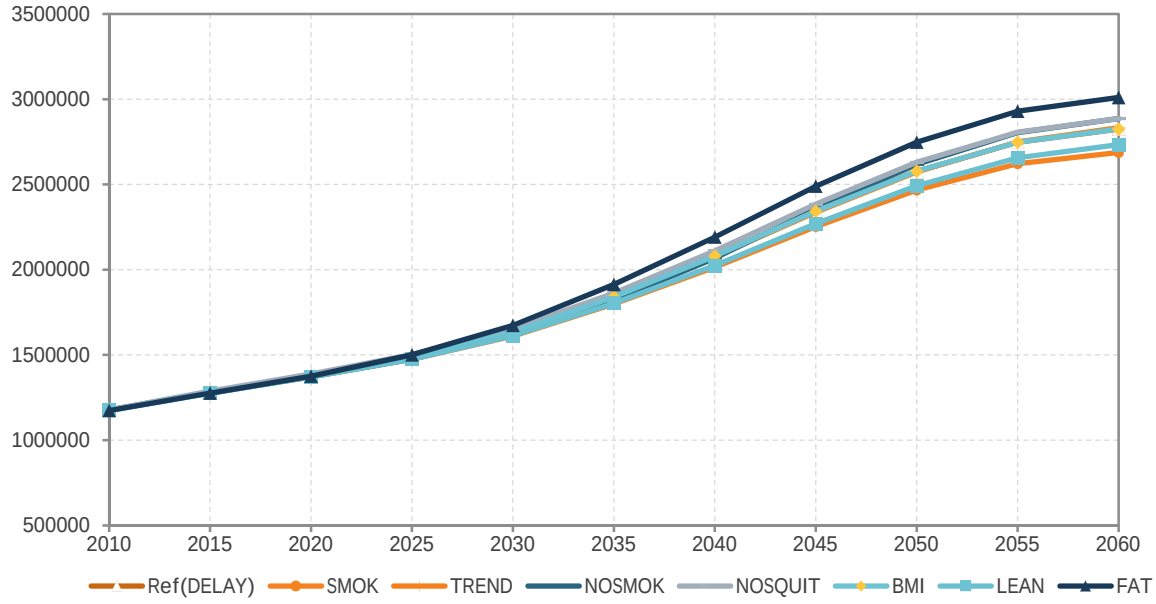
Source: see Table 4.5.

Figure 4.25 Projected numbers of informal care users, the Netherlands, 2010-2060, risk factor scenarios



Source: see Table 4.5.

Figure 4.26 Projected numbers of informal care users, Spain, 2010-2060, risk factor scenarios

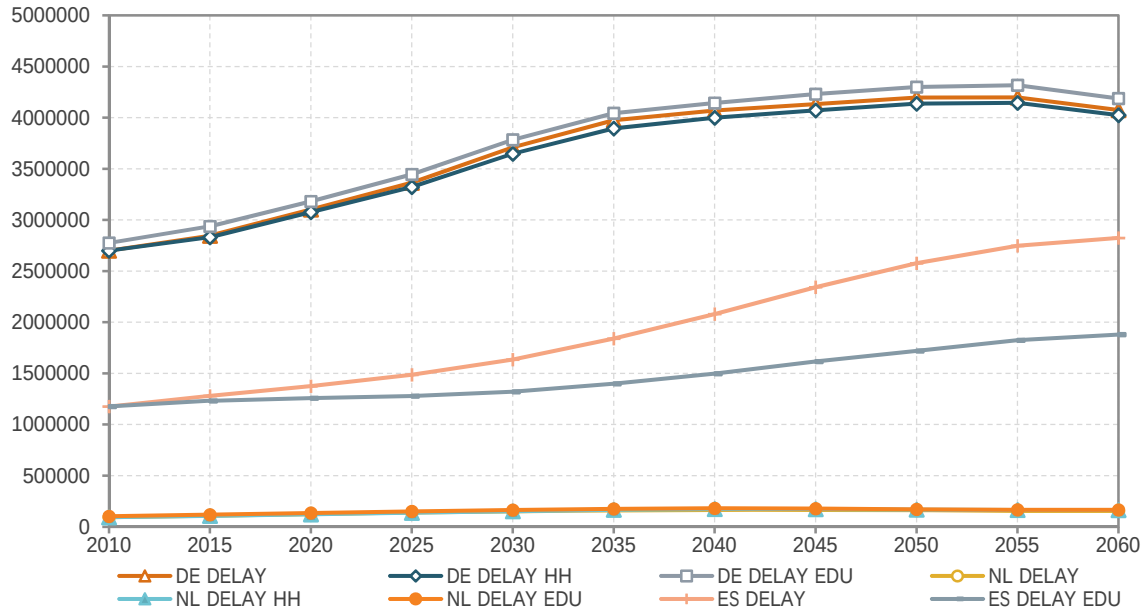


Source: see Table 4.5.

The scenario that takes account of changes in the household composition of older persons (Germany, the Netherlands) has little or no impact, while the scenario that takes account of the better education of

future cohorts of older persons (Germany, the Netherlands, Spain) yields much lower numbers of informal home care users in Spain (a 60 cent increase under better education scenario versus a 140 % increase under the base DELAY scenario) but it makes little or no difference in Germany and the Netherlands, as is shown in Figure 4.27. The larger impact of the changing education scenario in Spain may be explained by a large projected rise in educational level among the older population (see Table A4.5) in combination with a significant association of educational level and home care use (see Chapter 3).

Figure 4.27 Projected numbers of informal care users, Germany, the Netherlands and Spain, 2010-2060, DELAY, changing household composition (DELAY HH) and better education scenario (DELAY EDU)

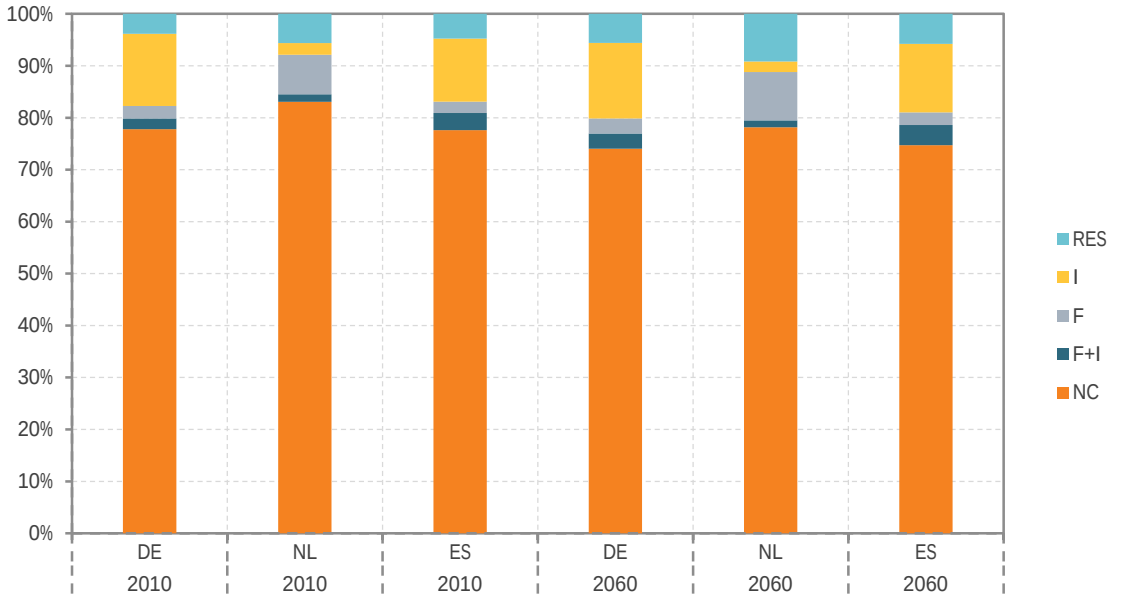


Source: Own calculations based on Bonneux et al. (2011), Chapter 1, Schulz (2008), Statistics Netherlands (2011) and Kc et al. (2010).

4.4.4 Projections of care use in total and disabled population

The next figures bring together the projection results under the base DELAY scenario for all care use categories. First, projection results are presented for the total older population (Figure 4.28). Next, projections of care use by the disabled population are shown (Figure 4.29).

Figure 4.28 Care use, Germany, the Netherlands and Spain, 2010 and-2060, DELAY scenario, total population (% of total population aged 65)



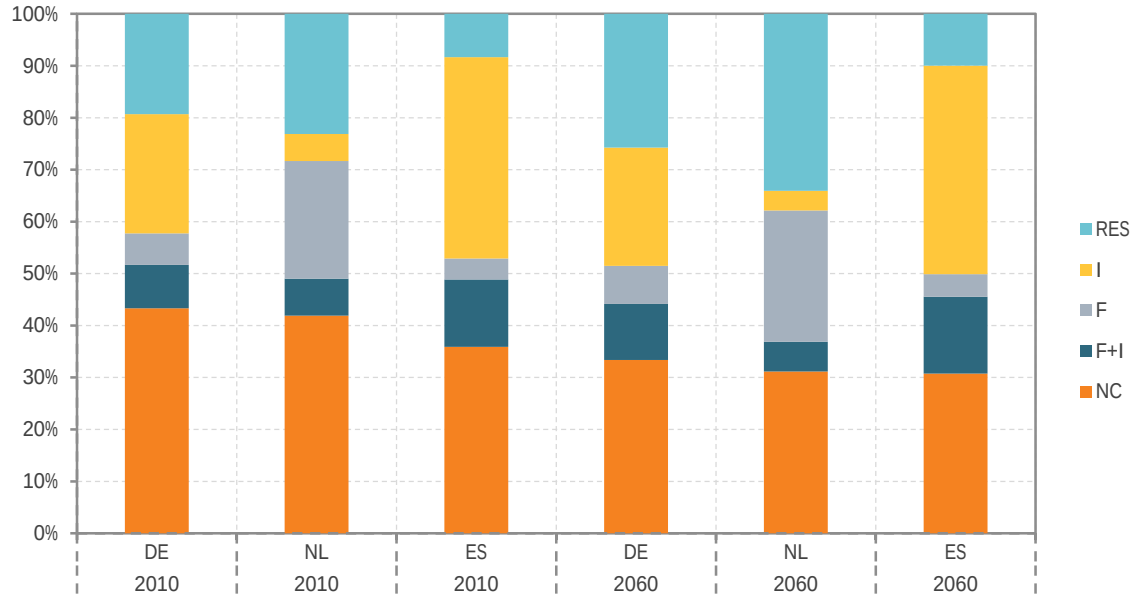
NC=no care, F+I=formal home care and informal care, F=formal home care only, I=informal care only, Res=residential care

Source: see Table 4.2 and Table 4.4.

Figure 4.28 clearly shows that there are considerable country differences in patterns of care utilisation, which are projected to persist over the projection period. Two different patterns can be discerned. First, a combination of high formal care use, both at home and in residential care facilities, and low informal care use. This pattern is present in the Netherlands. Second, a reverse pattern of low formal care, particularly at home, and high informal care, present in Germany and Spain.

Current patterns of care utilisation by the disabled population also differ considerably between the countries, as is shown in Figure 4.29. Again, total use of formal care (at home and in residential care facilities) is much more widespread in the Netherlands than it is in Germany and Spain, while use of informal care is more widespread in the latter countries. While utilisation patterns for the total population are quasi similar in Germany and Spain, there are some differences for the disabled populations. ADL disabled persons are more likely to use residential care and less likely to use formal or informal care at home in Germany compared to Spain. The share of persons using neither home care nor residential care is highest in Germany and lowest in Spain. It is important to note that not using any form of care does not necessarily imply unmet needs. Baseline probabilities of disability and informal and formal home care use are based on SHARE data. The SHARE ADL items ask respondents whether they are experiencing difficulties with ADL, and this does not necessarily imply needing help with ADL. Some persons who are experiencing difficulties in performing ADL tasks are still able to perform these tasks without help from others albeit with more effort, or slower, or by relying on assistive devices.

Figure 4.29 Care use, Germany, the Netherlands and Spain, 2010 and-2060, DELAY scenario, ADL disabled population (% of ADL disabled population aged 65 and over)



NC=no care, F+I=formal home care and informal care, F=formal home care only, I=informal care only, Res=residential care

Source: see Table 4.2 and Table 4.4.

As the projections assume constant probabilities of care use, the differences in patterns of care utilisation between the countries are projected to persist largely by 2060. A noteworthy result is that, while most care categories are projected to change in a more or less similar way in the three countries, the share of residential care users is projected to increase more in the Netherlands and Germany than in Spain. As a result, the shares of non-users are converging.

Conclusion

This chapter has presented the results of projections of formal and informal care use by persons aged 65 and over between 2010 and 2060 for four countries representative of different LTC systems: Germany, the Netherlands, Spain and Poland. The projections have focused on personal care and nursing care. Projections have been made of the numbers of persons living in residential care facilities and of the numbers of formal and informal care users among the population residing at home. The projections are based on multivariate analyses of the probabilities of care use that take into account age, gender, level of disability, household composition and other characteristics of the older persons. Due to data availability problems, the projections for Poland are based on a simplified model and only include residential care use. Using a base scenario and several alternative scenarios, the sensitivity of the projections to assumptions about trends in disability, household composition and educational level has been explored.

The projection results show that current patterns of LTC utilisation differ considerably between the four countries, corresponding with Kraus et al. (2010). Prevalence of formal care, both residential and home care, is much higher in the Netherlands than in the other countries, while prevalence of informal care is much lower. Germany and Spain have a similar profile, characterised by a low use of formal care and a high use of informal care. Currently, prevalence of residential care use is very low in Poland.

In all ANCIEN representative countries, the numbers of users of residential care, formal home care and informal care are projected to increase between 2010 and 2060. However, trends for different care

categories differ markedly within countries, and there are large between-country differences in trends for similar care categories as well. The relative increase in the use of residential care is projected to be higher in the Netherlands than in the other countries. Use of both formal home care and informal care is projected to increase most in Spain. For all countries, the percentage increase in the numbers of residential care users is projected to be higher than the percentage increase in the numbers of formal home care users. The smallest increases are projected for informal care use. While for Spain the differences between care categories are rather small (under the base scenario use of residential care is projected to rise with 162% and use of informal care with 140%), differences are much larger for the Netherlands (a 200% increase for residential care but an increase of only 66% for informal care).

These differences in care utilisation trends can be related to demographic, epidemiological and care system factors. Among European countries, the timing, extent and pace of population ageing varies considerably. Furthermore, as has been shown in WP 2, age-specific prevalences of disability also differ, as does the extent to which formal and informal care use is related to care needs, potential informal care availability and other characteristics of older persons (see Chapters 2 and 3).

Sensitivity analyses have shown that the projected numbers of residential care users are very sensitive to alternative assumptions about the incidence of disability and mortality in Germany, but less so in the other countries. The alternative bio-demographic scenarios have strong effects on the projections of formal home care and informal care in all countries considered. Of the different risk factor scenarios, the BMI scenarios generally have little impact – as their impact on the disability projections is low (see Bonneux et al. (2011), WP 2), while alternative assumptions about future trends in smoking behaviour have a larger effect. Taking account of future trends in household composition generally makes little difference. The impact of the better education scenario differs, depending on the strength of the association of care use and educational level and the magnitude of projected educational changes.

It is important to note that the projections reported in this chapter assume base year probabilities of care utilisation to remain constant over the projection period. Abstraction has been made of the extent to which current patterns of care utilisation suffice to meet the needs of care dependent persons, of their impact on the mental and physical health of informal caregivers and on labour market participation rates, and of other implications. Trends such as a possible shift from use of institutional care to care at home or shifts between formal and informal care have not been modelled. For Poland, for instance, it is expected that use of institutional care will rise substantially in the near future

Under this assumption of constant probabilities of care utilisation, the numbers of users of all types of care - residential care, formal home care and informal care - are projected to rise in all representative ANCIEN countries, mainly as a result of demographic factors. It is clear that care capacity – the availability of formal or informal resources – will have to rise considerably in future years to keep pace with the increasing demand. The extent to which future supply of LTC care is likely to meet future demand in the representative countries is examined in the concluding chapter, which brings together this chapter's results on future use of formal and informal care with the projections of informal and formal care supply of Chapters 5 and 6.

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Appendix

Table A4.1 Household composition projections, Germany, 2010-2050 % of non-instutionalised population

	65-74		75-79		80-84		85+	
	Single	With others	Single	With others	Single	With others	Single	With others
Female								
2010	32.1%	67.9%	49.3%	50.7%	68.3%	31.7%	73.3%	26.7%
2020	28.9%	71.1%	42.5%	57.5%	66.6%	33.4%	72.3%	27.7%
2030	24.9%	75.1%	36.2%	63.8%	57.2%	42.8%	72.4%	27.6%
2040	23.6%	76.4%	34.1%	65.9%	48.6%	51.4%	65.2%	34.8%
2050	23.0%	77.0%	30.9%	69.1%	45.2%	54.8%	57.2%	42.8%
Male								
2010	16.9%	83.1%	21.4%	78.6%	27.1%	72.9%	39.4%	60.6%
2020	18.1%	81.9%	22.3%	77.7%	31.4%	68.6%	41.8%	58.2%
2030	20.8%	79.2%	27.2%	72.8%	34.4%	65.6%	45.7%	54.3%
2040	21.4%	78.6%	28.2%	71.8%	36.5%	63.5%	45.8%	54.2%
2050	22.9%	77.1%	29.9%	70.1%	37.3%	62.7%	47.1%	52.9%

Source: DIW (Schulz, 2008).

Table A4.2 Household composition projections, the Netherlands, 2010-2060 % of non-institutionalised population

	65-69		70-74		75-79		80-84		85+	
	Single	With others	Single	With others	Single	With others	Single	With others	Single	With others
Female										
2010	27.6%	72.4%	36.5%	63.5%	49.7%	50.3%	64.3%	35.7%	78.0%	22.0%
2015	26.8%	73.2%	34.4%	65.6%	46.3%	53.7%	60.6%	39.4%	76.3%	23.7%
2020	27.6%	72.4%	33.1%	66.9%	43.6%	56.4%	57.5%	42.5%	74.5%	25.5%
2025	28.8%	71.2%	33.6%	66.4%	42.0%	58.0%	54.9%	45.1%	72.7%	27.3%
2030	30.2%	69.8%	34.5%	65.5%	42.1%	57.9%	53.4%	46.6%	70.9%	29.1%
2035	31.7%	68.3%	35.9%	64.1%	42.8%	57.2%	53.3%	46.7%	69.6%	30.4%
2040	33.4%	66.6%	37.3%	62.7%	43.8%	56.2%	53.6%	46.4%	69.9%	30.1%
2045	34.3%	65.7%	39.0%	61.0%	44.8%	55.2%	54.1%	45.9%	69.8%	30.2%
2050	34.8%	65.2%	39.8%	60.2%	46.2%	53.8%	54.7%	45.3%	69.8%	30.2%
2055	34.9%	65.1%	40.3%	59.7%	46.7%	53.3%	55.7%	44.3%	70.2%	29.8%
2060	34.6%	65.4%	40.2%	59.8%	47.0%	53.0%	55.9%	44.1%	71.0%	29.0%
Male										
2010	15.0%	85.0%	16.4%	83.6%	19.8%	80.2%	26.0%	74.0%	40.2%	59.8%
2015	16.7%	83.3%	17.1%	82.9%	19.7%	80.3%	25.1%	74.9%	38.2%	61.8%
2020	19.2%	80.8%	18.7%	81.3%	20.1%	79.9%	24.9%	75.1%	37.3%	62.7%
2025	21.4%	78.6%	21.2%	78.8%	21.6%	78.4%	25.1%	74.9%	37.0%	63.0%
2030	23.1%	76.9%	23.4%	76.6%	23.9%	76.1%	26.4%	73.6%	36.9%	63.1%

2035	25.3%	74.7%	25.2%	74.8%	25.9%	74.1%	28.2%	71.8%	37.4%	62.6%
2040	27.7%	72.3%	27.5%	72.5%	27.5%	72.5%	29.9%	70.1%	39.3%	60.7%
2045	28.8%	71.2%	29.9%	70.1%	29.7%	70.3%	31.2%	68.8%	40.3%	59.7%
2050	28.8%	71.2%	31.1%	68.9%	32.0%	68.0%	33.1%	66.9%	41.0%	59.0%
2055	28.6%	71.4%	31.0%	69.0%	33.1%	66.9%	35.2%	64.8%	42.3%	57.7%
2060	28.6%	71.4%	30.8%	69.2%	32.9%	67.1%	36.0%	64.0%	43.9%	56.1%

Sources: 2010 - Statistics Netherlands - Persons in households; 2015-2060 - Statistics Netherlands - Populations according to household position, projections 2011-2060.

Table A4.3 Educational level projections, Germany, 2010-2050 (% of population)

	65-69			70-74			75-79			80-84			85+		
	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6
Females															
2010	1.8%	83.8%	14.4%	1.4%	88.4%	10.2%	1.6%	90.9%	7.5%	1.3%	92.5%	6.3%	0.9%	93.6%	5.5%
2015	2.0%	81.1%	16.8%	1.7%	83.6%	14.7%	1.3%	88.2%	10.5%	1.6%	90.6%	7.8%	1.1%	92.6%	6.4%
2020	2.9%	76.9%	20.2%	2.0%	80.9%	17.1%	1.7%	83.3%	15.0%	1.3%	87.9%	10.9%	1.3%	91.1%	7.6%
2025	3.6%	74.9%	21.5%	2.9%	76.7%	20.4%	1.9%	80.6%	17.4%	1.6%	82.9%	15.5%	1.2%	88.5%	10.2%
2030	3.2%	75.5%	21.3%	3.5%	74.7%	21.8%	2.8%	76.4%	20.9%	1.9%	80.1%	18.0%	1.3%	84.7%	14.0%
2035	3.7%	74.8%	21.5%	3.1%	75.3%	21.6%	3.4%	74.4%	22.2%	2.7%	75.9%	21.5%	1.5%	81.4%	17.1%
2040	5.2%	71.1%	23.7%	3.7%	74.6%	21.7%	3.0%	75.0%	22.0%	3.2%	73.9%	22.8%	2.1%	77.1%	20.8%
2045	6.2%	67.5%	26.3%	5.1%	70.9%	24.0%	3.6%	74.3%	22.1%	2.9%	74.5%	22.6%	2.6%	74.2%	23.2%
2050	6.5%	64.2%	29.3%	6.1%	67.4%	26.6%	5.0%	70.6%	24.4%	3.4%	73.9%	22.7%	2.7%	73.3%	24.0%
	65-69			70-74			75-79			80-84			85+		
	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6
Males															
2010	1.3%	67.4%	31.2%	1.2%	71.0%	27.8%	1.1%	73.5%	25.3%	0.9%	74.0%	25.1%	0.9%	75.6%	23.4%
2015	1.2%	67.2%	31.6%	1.3%	66.9%	31.8%	1.2%	70.3%	28.5%	1.1%	72.6%	26.3%	0.9%	73.4%	25.7%
2020	1.5%	67.2%	31.3%	1.2%	66.7%	32.2%	1.2%	66.1%	32.6%	1.1%	69.3%	29.6%	1.0%	71.8%	27.2%
2025	2.0%	67.9%	30.1%	1.4%	66.7%	31.9%	1.1%	65.9%	33.0%	1.1%	65.1%	33.7%	1.0%	68.9%	30.0%
2030	2.0%	67.2%	30.8%	2.0%	67.4%	30.6%	1.4%	66.0%	32.7%	1.1%	64.9%	34.0%	1.0%	65.3%	33.7%
2035	1.9%	69.1%	29.0%	1.9%	66.8%	31.3%	1.9%	66.7%	31.4%	1.3%	65.0%	33.7%	1.0%	63.8%	35.2%
2040	2.8%	66.1%	31.2%	1.8%	68.7%	29.5%	1.8%	66.1%	32.0%	1.8%	65.8%	32.4%	1.1%	63.4%	35.5%
2045	3.7%	62.7%	33.6%	2.7%	65.7%	31.6%	1.7%	68.0%	30.2%	1.7%	65.2%	33.0%	1.4%	63.9%	34.6%
2050	4.0%	59.7%	36.2%	3.6%	62.3%	34.0%	2.6%	65.1%	32.3%	1.6%	67.2%	31.2%	1.5%	63.8%	34.7%

Source: IISCA (Kc et al., 2010).

Table A4.4 Educational level projections, the Netherlands, 2010-2050 (% of population)

	65-69			70-74			75-79			80-84			85+		
	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6
Females															
2010	21.9%	64.3%	13.8%	26.7%	60.7%	12.6%	33.0%	56.5%	10.4%	42.4%	49.8%	7.8%	47.3%	44.5%	8.2%
2015	18.3%	64.6%	17.1%	21.5%	64.4%	14.1%	26.0%	61.0%	13.0%	31.9%	57.1%	11.0%	42.5%	48.9%	8.7%
2020	15.8%	64.4%	19.8%	18.0%	64.7%	17.4%	20.9%	64.6%	14.5%	25.1%	61.3%	13.6%	34.5%	54.7%	10.8%
2025	13.4%	65.8%	20.8%	15.5%	64.4%	20.1%	17.4%	64.7%	17.9%	20.1%	64.8%	15.2%	27.2%	59.4%	13.4%
2030	10.0%	68.5%	21.5%	13.1%	65.7%	21.1%	15.1%	64.4%	20.6%	16.7%	64.7%	18.6%	21.3%	63.2%	15.5%
2035	8.8%	66.9%	24.3%	9.8%	68.4%	21.8%	12.7%	65.6%	21.6%	14.4%	64.2%	21.3%	17.2%	64.3%	18.5%
2040	9.4%	63.9%	26.7%	8.6%	66.7%	24.6%	9.5%	68.2%	22.3%	12.2%	65.4%	22.4%	14.6%	64.1%	21.3%
2045	8.5%	62.2%	29.2%	9.2%	63.8%	27.0%	8.4%	66.5%	25.1%	9.1%	67.9%	23.0%	12.4%	64.5%	23.2%
2050	7.1%	60.6%	32.3%	8.4%	62.1%	29.5%	9.0%	63.5%	27.5%	8.0%	66.1%	25.9%	9.9%	65.9%	24.3%
	65-69			70-74			75-79			80-84			85+		
	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6	ISCED 0_1	SCED 2_4	ISCED 5_6
Males															
2010	18.3%	59.1%	22.6%	19.5%	59.9%	20.6%	21.2%	59.4%	19.4%	23.7%	55.8%	20.5%	27.8%	54.2%	18.0%
2015	15.1%	58.8%	26.2%	17.8%	59.0%	23.1%	18.8%	59.9%	21.4%	20.2%	59.4%	20.5%	23.6%	55.4%	21.0%
2020	12.3%	59.3%	28.4%	14.6%	58.6%	26.7%	17.1%	58.9%	23.9%	17.8%	59.7%	22.4%	20.1%	58.1%	21.9%
2025	10.4%	62.4%	27.2%	11.9%	59.1%	28.9%	14.0%	58.4%	27.6%	16.2%	58.7%	25.0%	17.5%	59.1%	23.4%
2030	9.6%	63.4%	27.0%	10.1%	62.2%	27.8%	11.4%	58.8%	29.8%	13.3%	58.0%	28.7%	15.7%	58.6%	25.8%
2035	8.5%	65.4%	26.1%	9.3%	63.2%	27.5%	9.7%	61.8%	28.5%	10.8%	58.3%	30.9%	13.2%	57.6%	29.2%
2040	7.9%	66.0%	26.2%	8.3%	65.2%	26.6%	8.9%	62.8%	28.2%	9.1%	61.3%	29.6%	10.9%	57.3%	31.7%
2045	8.5%	62.6%	28.9%	7.7%	65.8%	26.6%	7.9%	64.8%	27.3%	8.5%	62.3%	29.3%	9.1%	59.0%	31.8%
2050	7.3%	60.5%	32.2%	8.3%	62.3%	29.4%	7.4%	65.4%	27.2%	7.5%	64.2%	28.2%	8.1%	60.4%	31.4%

Source: IISCA (Kc et al., 2010).

Table A4.5 Educational level projections, Spain, 2010-2050 (% of population)

	65-69			70-74			75-79			80-84			85+		
	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	SCED2 _4	ISCED 5_6	ISCED 0_1	SCED2 _4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6
Females															
2010	59.2%	38.2%	2.7%	70.4%	27.9%	1.7%	78.1%	20.8%	1.1%	81.6%	17.5%	0.9%	84.2%	15.0%	0.8%
2015	49.0%	47.0%	4.0%	58.6%	38.6%	2.7%	69.6%	28.6%	1.7%	77.1%	21.7%	1.2%	81.3%	17.7%	1.0%
2020	38.1%	55.3%	6.6%	48.5%	47.4%	4.1%	57.8%	39.3%	2.9%	68.5%	29.6%	1.9%	77.4%	21.3%	1.3%
2025	29.6%	61.4%	9.0%	37.6%	55.6%	6.7%	47.7%	48.0%	4.3%	56.6%	40.4%	3.0%	71.0%	27.2%	1.8%
2030	22.8%	65.7%	11.6%	29.2%	61.7%	9.1%	36.9%	56.2%	7.0%	46.5%	49.0%	4.5%	61.1%	36.2%	2.7%
2035	18.7%	67.6%	13.7%	22.4%	65.8%	11.7%	28.6%	62.0%	9.4%	35.8%	56.9%	7.3%	50.4%	45.4%	4.1%
2040	16.6%	68.1%	15.3%	18.4%	67.7%	13.9%	21.9%	66.1%	12.0%	27.7%	62.6%	9.8%	40.1%	53.5%	6.4%
2045	16.4%	65.6%	18.0%	16.3%	68.1%	15.5%	18.0%	67.8%	14.2%	21.2%	66.4%	12.4%	31.2%	59.9%	8.9%
2050	15.0%	64.0%	21.0%	16.2%	65.7%	18.2%	16.0%	68.2%	15.8%	17.4%	68.0%	14.6%	23.9%	64.4%	11.7%

	65-69			70-74			75-79			80-84			85+		
	ISCED 0_1	SCED2 _4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	ISCED 2_4	ISCED 5_6	ISCED 0_1	SCED2 _4	ISCED 5_6	ISCED 0_1	SCED2 _4	ISCED 5_6
Males															
2010	48.34%	45.05%	6.61%	59.74%	35.01%	5.25%	68.78%	26.83%	4.39%	74.00%	21.97%	4.03%	77.02%	19.34%	3.64%
2015	40.10%	51.85%	8.05%	47.53%	45.63%	6.85%	58.59%	35.85%	5.56%	67.44%	27.80%	4.76%	73.60%	22.10%	4.30%
2020	33.14%	57.09%	9.77%	39.36%	52.34%	8.30%	46.40%	46.41%	7.19%	57.14%	36.88%	5.98%	67.95%	27.00%	5.05%
2025	27.04%	62.35%	10.61%	32.48%	57.48%	10.04%	38.32%	53.00%	8.68%	44.97%	47.35%	7.68%	59.46%	34.41%	6.13%
2030	23.23%	65.56%	11.21%	26.47%	62.65%	10.88%	31.54%	58.00%	10.46%	37.00%	53.79%	9.21%	48.11%	44.17%	7.72%
2035	20.16%	67.81%	12.04%	22.73%	65.79%	11.48%	25.67%	63.04%	11.29%	30.36%	58.61%	11.03%	38.76%	51.86%	9.38%
2040	18.52%	69.46%	12.02%	19.71%	67.99%	12.30%	22.03%	66.10%	11.88%	24.65%	63.49%	11.86%	31.62%	57.20%	11.18%
2045	18.10%	67.21%	14.70%	18.12%	69.60%	12.28%	19.09%	68.21%	12.70%	21.12%	66.44%	12.44%	25.63%	61.96%	12.41%
2050	16.50%	65.52%	17.98%	17.71%	67.31%	14.98%	17.55%	69.79%	12.66%	18.29%	68.44%	13.27%	21.44%	65.36%	13.20%

Source: IISCA (Kc et al., 2010).

Table A4.6 Projected numbers of residential care users, Germany, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	648	729	814	906	978	1028	1108	1218	1321	1360	1310	102%
CONST	648	717	777	831	857	868	905	956	985	956	879	36%
PREV	648	733	827	933	1022	1096	1204	1351	1495	1570	1549	139%
CHRON	648	737	837	951	1049	1131	1251	1413	1573	1660	1642	153%
BIOL	648	722	793	866	916	943	991	1068	1144	1173	1130	74%
SMOK	648	728	809	892	951	987	1048	1138	1225	1253	1203	86%
TREND	648	730	815	906	974	1021	1096	1202	1304	1344	1297	100%
NOSMOK	648	728	809	893	953	994	1075	1203	1334	1387	1338	107%
NOSQUIT	649	733	821	914	986	1037	1120	1237	1348	1390	1339	106%
BMI	646	723	805	894	962	1009	1080	1182	1279	1316	1268	96%
LEAN	646	723	805	893	958	1000	1064	1157	1249	1284	1238	92%
FAT	646	723	806	898	970	1025	1112	1230	1339	1379	1329	106%

Table A4.7 Projected numbers of formal home care users, Germany, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	756	849	940	1014	1095	1180	1275	1364	1410	1403	1357	79%
CONST	756	837	904	943	982	1026	1073	1101	1079	1021	957	27%
PREV	757	852	949	1033	1126	1227	1343	1456	1524	1535	1507	99%
CHRON	757	854	955	1043	1141	1247	1370	1493	1568	1583	1555	105%
BIOL	756	844	926	990	1060	1129	1206	1280	1321	1319	1278	69%
SMOK	756	847	933	998	1066	1135	1213	1286	1317	1304	1259	66%
TREND	757	849	940	1013	1090	1170	1262	1349	1395	1391	1350	78%
NOSMOK	756	847	933	999	1071	1153	1257	1365	1432	1436	1390	84%
NOSQUIT	757	852	946	1022	1104	1192	1293	1391	1443	1438	1390	84%
BMI	756	846	937	1009	1087	1169	1261	1348	1392	1386	1342	78%
LEAN	756	846	936	1008	1084	1161	1248	1331	1374	1369	1325	75%
FAT	756	846	937	1011	1093	1183	1286	1381	1428	1421	1375	82%
DELAY HH	756	851	940	1019	1105	1194	1292	1384	1432	1427	1381	83%
DELAY EDU	749	836	920	994	1070	1148	1241	1333	1383	1386	1339	79%

Table A4.8 Projected numbers of informal home care users, Germany, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	2700	2846	3102	3364	3710	3975	4070	4133	4197	4198	4075	51%
CONST	2699	2814	3002	3167	3401	3550	3512	3420	3325	3207	3042	13%
PREV	2701	2851	3117	3392	3758	4046	4167	4255	4339	4356	4253	57%
CHRON	2701	2855	3125	3405	3776	4070	4200	4298	4387	4406	4303	59%
BIOL	2700	2838	3078	3323	3648	3887	3955	3999	4055	4056	3931	46%
SMOK	2700	2840	3079	3316	3632	3863	3921	3951	3992	3984	3868	43%
TREND	2701	2847	3099	3355	3694	3953	4043	4105	4175	4186	4073	51%
NOSMOK	2700	2840	3083	3335	3675	3946	4065	4175	4277	4290	4161	54%
NOSQUIT	2702	2854	3115	3387	3745	4023	4136	4218	4293	4293	4161	54%
BMI	2699	2843	3098	3358	3701	3963	4054	4115	4180	4182	4061	50%
LEAN	2699	2843	3097	3355	3695	3950	4037	4095	4160	4165	4044	50%
FAT	2699	2843	3099	3364	3715	3989	4090	4155	4219	4218	4095	52%
DELAY HH	2700	2831	3077	3322	3647	3895	3999	4072	4137	4145	4025	49%
DELAY EDU	2776	2937	3181	3446	3784	4044	4144	4231	4300	4318	4188	51%

Table A4.9 Projected numbers of residential care users, the Netherlands, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	142	160	180	206	245	299	339	375	408	429	426	200%
CONST	142	156	169	185	209	241	256	267	275	271	253	78%
PREV	142	160	181	209	251	309	353	393	432	457	459	223%
CHRON	142	160	182	211	254	313	358	400	441	468	470	231%
BIOL	142	159	178	202	239	290	328	360	392	411	409	188%
SMOK	142	159	178	202	237	285	318	348	378	395	391	176%
TREND	142	160	180	206	245	298	337	373	408	430	428	202%
NOSMOK	142	159	178	202	237	287	329	379	425	451	448	216%
NOSQUIT	142	161	183	210	250	307	351	392	430	452	448	215%
BMI	142	160	180	207	247	301	341	377	411	431	428	202%
LEAN	142	160	180	207	246	300	339	373	406	426	423	198%
FAT	142	160	180	207	247	303	346	385	421	441	438	209%
DELAY HH	142	159	178	204	243	297	337	373	407	427	425	200%

Table A4.10 Projected numbers of formal home care users, the Netherlands, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	diff 2060
DELAY	229	258	296	338	387	436	472	493	502	502	493	116%
CONST	228	254	286	319	353	384	399	401	390	373	355	56%
PREV	229	259	299	345	398	453	495	522	536	540	537	135%
CHRON	229	259	300	347	401	457	501	530	545	550	547	139%
BIOL	229	256	292	331	376	421	454	473	481	481	473	107%
SMOK	229	257	294	334	378	422	454	472	479	477	468	105%
TREND	229	258	297	339	387	436	472	495	505	506	499	118%
NOSMOK	229	257	294	334	381	430	471	504	522	524	515	125%
NOSQUIT	229	260	299	343	394	446	487	513	525	525	515	125%
BMI	229	258	296	340	388	438	474	496	505	505	496	117%
LEAN	229	258	296	339	387	434	469	490	499	499	491	115%
FAT	229	258	297	341	392	445	485	508	517	516	507	122%
DELAY HH	229	257	293	333	377	424	457	477	485	483	473	107%
DELAY EDU	218	241	272	304	342	380	407	422	426	427	420	93%

Table A4.11 Projected numbers of informal care users, the Netherlands, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	93	107	123	138	150	161	167	165	159	155	154	66%
CONST	93	107	121	134	144	153	156	150	141	135	134	44%
PREV	93	108	125	142	157	171	180	181	177	175	177	90%
CHRON	93	108	126	143	158	173	183	184	181	179	181	94%
BIOL	93	107	121	134	144	154	158	155	149	145	145	55%
SMOK	93	107	122	136	148	158	163	160	154	150	149	60%
TREND	93	108	124	138	151	162	168	166	160	157	156	67%
NOSMOK	93	107	122	137	149	162	169	168	164	160	159	71%
NOSQUIT	93	108	124	139	153	165	172	170	164	160	159	70%
BMI	93	108	123	138	151	162	168	166	160	156	155	67%
LEAN	93	108	123	138	149	160	165	163	157	154	153	64%
FAT	93	108	124	139	154	167	174	172	166	162	160	72%
DELAY HH	93	106	122	137	152	166	174	173	168	165	164	76%
DELAY EDU	102	119	135	151	164	175	181	178	171	167	165	62%

Table A4.12 Projected numbers of residential care users, Spain, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	364	400	426	465	522	593	680	777	858	918	954	162%
CONST	363	394	409	433	472	520	578	639	679	696	690	90%
PREV	364	400	427	466	525	596	686	785	869	933	971	167%
CHRON	364	400	427	467	526	598	688	788	873	937	976	168%
BIOL	364	400	425	463	519	588	675	769	849	907	942	159%
SMOK	364	400	425	461	514	579	660	749	825	881	913	151%
TREND	364	400	427	465	522	591	678	775	858	920	958	163%
NOSMOK	364	400	425	462	519	589	682	787	875	940	976	168%
NOSQUIT	364	401	429	469	528	601	693	793	878	940	976	168%
BMI	364	400	426	465	523	593	681	778	859	919	955	163%
LEAN	364	400	426	465	523	592	679	775	856	916	951	162%
FAT	364	400	426	465	523	595	685	783	865	926	962	165%
DELAY EDU	364	399	424	461	518	587	673	767	845	904	938	158%

Table A4.13 Projected numbers of formal home care users, Spain, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	417	463	494	532	592	663	751	851	937	1001	1042	150%
CONST	417	457	478	502	546	597	662	732	782	805	807	93%
PREV	417	465	500	544	611	692	796	913	1020	1106	1171	181%
CHRON	417	466	503	549	618	703	811	934	1047	1140	1211	190%
BIOL	417	460	487	518	569	628	704	788	861	915	951	128%
SMOK	417	462	493	528	583	647	727	817	896	954	991	138%
TREND	417	464	496	535	593	662	750	849	936	1002	1045	150%
NOSMOK	417	462	493	529	585	654	748	856	953	1022	1065	155%
NOSQUIT	418	465	499	538	598	671	763	867	957	1023	1066	155%
BMI	417	461	493	532	591	662	752	851	937	1001	1043	150%
LEAN	417	461	493	529	586	653	735	828	910	972	1012	143%
FAT	417	461	494	537	603	682	784	896	991	1059	1103	165%
DELAY EDU	417	459	483	511	558	615	686	768	840	892	928	122%

Table A4.14 Projected numbers of informal care users, Spain, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	1176	1280	1376	1486	1635	1841	2080	2343	2577	2747	2825	140%
CONST	1176	1266	1335	1410	1521	1680	1862	2053	2197	2265	2240	91%
PREV	1176	1286	1394	1523	1698	1939	2225	2545	2845	3082	3221	174%
CHRON	1177	1290	1403	1538	1720	1971	2270	2606	2924	3180	3335	183%
BIOL	1176	1271	1351	1439	1558	1726	1921	2136	2327	2466	2531	115%
SMOK	1176	1280	1372	1475	1611	1798	2014	2253	2467	2622	2688	129%
TREND	1177	1283	1382	1493	1640	1842	2077	2338	2574	2750	2833	141%
NOSMOK	1176	1280	1372	1477	1618	1820	2068	2357	2619	2804	2887	145%
NOSQUIT	1178	1288	1388	1502	1653	1863	2111	2385	2630	2807	2887	145%
BMI	1174	1276	1372	1484	1634	1840	2080	2343	2578	2748	2826	141%
LEAN	1174	1276	1370	1475	1613	1803	2025	2270	2492	2657	2733	133%
FAT	1174	1276	1375	1500	1674	1913	2191	2490	2748	2930	3010	156%
DELAY EDU	1176	1232	1258	1279	1321	1399	1498	1617	1720	1824	1880	60%

Table A4.15 Projected numbers of residential care users, Poland, 2010-2060, all scenarios (in thousands)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	% increase 2010-2060
DELAY	59	67	77	88	98	110	121	129	136	141	149	152%
CONST	59	67	73	80	86	91	94	94	95	96	98	66%
PREV	59	68	78	89	100	112	125	134	142	149	159	169%
CHRON	59	68	78	90	102	115	128	138	145	153	163	176%
BIOL	59	67	76	85	94	104	114	121	126	130	136	130%
SMOK	59	67	76	86	95	104	113	119	124	130	137	133%
TREND	59	68	78	89	99	110	121	129	136	142	150	154%
NOSMOK	59	67	77	87	97	108	120	131	140	147	154	161%
NOSQUIT	59	68	78	89	101	113	125	135	141	147	154	161%
BMI	59	68	77	88	99	111	122	131	137	142	150	154%
LEAN	59	68	77	87	98	109	120	128	133	139	146	148%
FAT	59	68	77	89	101	114	127	137	144	150	158	167%

5. Modelling the future supply of informal care for older people in Europe

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Introduction

The aim of this chapter is to report on the modelling of the future supply of informal care for older people in European countries. Informal care is very important in the supply of care to older people in Europe. As the original ANCIEN research proposal put it, the majority of older people receive the bulk of their support in daily living activities from informal or unpaid caregivers, primarily family or friends. However, the future supply of informal care is uncertain for a number of reasons, including the decline in co-residence of older people with their children; rising employment rates of mid-life women and rising old age dependency ratios (Jani Le-Bris, 1993; Salvage, 1995; OECD, 1996; EPC, 2001; Tomassini et al., 2004).

Informal care provision varies considerably across European countries (Haberkern & Szydlik, 2010; Pickard et al., 2007). Work package 1 of the ANCIEN study has captured the differences in the long-term care systems of European countries in a typology, an important component of which is the extent to which the long-term care system relies on informal care. The typology developed by work package 1 divides the EU Member States in the ANCIEN study into four clusters according to their long-term care systems (Kraus et al. 2010; see Introduction to this report, Table 1.1). Representative countries for each cluster have been identified, these being respectively Germany, the Netherlands, Spain and Poland.[9] Use of informal care varies across the clusters and representative countries, with informal care use being described as 'low' in Cluster 2 (represented by the Netherlands) and 'high' in the other three clusters (represented by Germany, Spain and Poland). The aim of the modelling of the future supply of informal care as part of w6 is to make projections of informal care in the four representative countries, that is, Germany, the Netherlands, Spain and Poland.

The analysis is concerned with provision of informal help with *personal care tasks or Activities of Daily Living* (ADLs). There are a number of reasons for this focus. First, the definition of informal care in terms of help with ADL tasks reflects the definition of disability in Work package 2 of the ANCIEN study, which defines disability in terms of an inability to perform one or more specific personal care tasks without help (the Katz definition of ADL disability) (Bonneux et al., 2011). The focus on informal help with ADL-disabilities is important in the context of the ANCIEN study because of the likely interaction between informal help with personal care tasks and the long-term care system, since many long-term care systems focus in particular on provision of formal support with ADL-tasks (Rothgang, 2002; Costa-Font & Patxot, 2005; Pickard et al., 2007). Other recent studies examining the relationship between formal and informal care in Europe have also focused on informal help with personal care tasks (Haberkern & Szydlik, 2010). Second, informal help with personal care tasks is likely to reflect more intense forms of informal care, those likely to make the greatest demands on the caregiver and involve the longest hours of caring (Haberkern & Szydlik, 2010). The focus on personal care tasks is particularly pertinent to the definition of the informal care when other measures of the intensity of care (such as hours of informal care) are unavailable, as in the SHARE data for some forms of care provision (namely, co-resident care). Finally, a definition of informal care in terms of personal care tasks is more likely to capture help given due to the disability of the cared-for person. This is because personal care tasks are tasks that non-disabled adults usually perform for themselves, whereas help with domestic tasks, such as shopping or cleaning, is often part of the domestic division of labour and may be provided to people who are not disabled.

[9] Note that the order in which the representative countries are placed in this chapter relates to their cluster number. Thus, Germany is the representative country for Cluster 1 and is placed first; The Netherlands is the representative country for Cluster 2 and is placed second; Spain is the representative country for Cluster 3 and is placed third; and Poland is the representative country for Cluster 4 and is placed fourth.

The aim of the work on informal care supply in Work package 6 is to make projections of provision of informal help with personal care tasks provided to *older people*, defined as those aged 65 and over. The aim is to make projections between 2010 and 2060, every five years. The present chapter makes projections between the present time and 2060 for each of the representative countries, that is, Germany, the Netherlands, Spain and Poland.

The modelling of the future supply of informal care depends on an analysis of provision of informal care at the present time. The analysis of informal care provision in the four European countries considered here is concerned with *care provided by people aged 50 and over* and uses the Survey of Health, Ageing and Retirement in Europe (SHARE) (Mannheim Research Institute for the Economics of Aging – MEA, 2010). It had originally been planned to use Eurobarometer data for care provided by adults under the age of 50, but ultimately it was not possible to use these data to make projections. The Eurobarometer survey was valuable for making comparisons between countries, and this analysis was reported in a paper arising from Work package 3 (Pickard, 2011). However, it was not possible to use the Eurobarometer data to make projections of informal care in the future, mainly because the data include provision of past caring over the last ten years and therefore inflate the probabilities of providing care (Pickard 2011). However, although the results reported here focus on informal care provided by people aged 50 and over, this is likely to include most informal care provision. The country reports, produced by Work package 1, where they include information on the age of informal carers, suggest that most caregivers are aged 50 and over. Thus, the report on the Dutch long-term care system shows that 68 per cent of informal caregivers in the Netherlands are aged 45 and over (Mot 2010). Equally, the report on the German long-term care system shows that 63 per cent of caregivers of people (with care levels I-III) are aged 55 and over (Schulz, 2010). In Britain, where data are available on the age of people receiving informal care, the General Household Survey (GHS) shows that 63 per cent of caregivers providing personal care to an older person are aged 50 and over (authors' analysis). At the end of the present chapter, an assessment will be made of the likely effects on the projections of informal care supply if care by the under 50s had been included.

The present chapter has five parts. The first part presents the analysis of provision of informal personal care to older people by people aged 50 and over at the present time in the four representative countries, using sample data. The second part of the chapter examines the socio-demographic factors affecting provision of informal personal care to older people by people aged 50 and over. The third part of the chapter describes the methods for making projections in future years. The fourth part presents the projections of the numbers of people aged 50 and over providing informal care between the present time and 2060 in each of the representative countries, and also compares projections between countries. Finally, the chapter ends with a summary of the main findings and some conclusions.

5.1 Provision of informal personal care to older people in the four representative countries

5.1.1 Methods of analysis of provision of informal personal care to older people

This part of the chapter looks at provision of informal care to older people in the four representative countries at the present time. As already indicated, the analysis is confined to provision of care by people aged 50 and over. The analysis primarily uses Wave 2 SHARE data, which was collected in 2006/7. The Wave 2 data is supplemented for certain variables (in particular, education) by information from Wave 1 data, which was conducted in 2004/5. Analyses were conducted using the calibrated cross-sectional weight for individuals in the main sample, supplied with the SHARE data (variable 'wgtmci'), which compensates for unit non-response and sample attrition (MEA 2010: 23). The weighted sample numbers aged 50 and over in the four representative countries at Wave 2 are as follows: Germany, 6,303 respondents; the Netherlands, 1,026 respondents; Spain, 2,840 respondents and Poland, 2,153 respondents. In total, the four representative countries include 12,322 respondents and represent 50.2 per cent of the total weighted sample size in Wave 2 of SHARE.

The SHARE data allow for the analysis of provision of informal help with personal care tasks provided both inside and outside the household. Information on help with personal care provided to someone *outside* the household is obtained through analysis of four linked questions. Question 'sp008' asks about any help given to a family member, friend or neighbour outside the household; question 'sp009' asks to whom help outside the household is given; question 'sp010' asks about the types of help given to people outside the household; and question 'sp011' asks how often help is given outside the household. Question 'sp010' asks specifically about help with personal care and gives the following examples: "dressing, bathing or showering, eating, getting in or out of bed, using the toilet". Information on help with personal care provided *inside* the household is obtained through analysis of two linked questions. Question 'sp018' asks about regular help with personal care given to someone inside the household and gives the following examples: "washing, getting out of bed, or dressing". Question 'sp019' asks to whom help is given inside the household. The definition of personal care used in the SHARE dataset relates closely to the Katz definition of ADL-disability. The Katz definition defines ADL-disability in terms of difficulty with, or inability to perform, one or more of five tasks: bathing, dressing, toileting, transferring or feeding. The tasks given as examples by the SHARE question on help provided outside the household correspond, therefore, to those included in the Katz definition, while the tasks given as examples by the SHARE question on help provided inside the household are consistent with the Katz definition.

The definition of informal personal care, used in the present analysis, refers to *regular* help. As indicated above, the SHARE question about help given inside the household refers to 'regular' help with personal care, with regular help being defined as help given 'daily or almost daily' ('sp018'). The question about help given outside the household is not confined to regular help, but a subsequent question ('sp011') asks how often help is given and includes 'almost daily' as an option. In the present analysis, the definition of help inside the household, in terms of regular help with personal care, is also applied to help outside the household.

There is no question in the SHARE survey on the *age* of the person cared for. Information on provision of care to *older* people in the present analysis is therefore derived from other information in the survey. Information primarily on the *relationship* of the cared-for person to the carer is used to identify people providing care to an older person. Two distinct types of relationship are analysed: first, help given to people in the older generation and, second, help given to spouses or partners aged 65 and over. In relation to help provided to people in the older generation, it is assumed that all people providing help to someone in the older generation do so to someone aged 65 and over. This assumption is based on the fact that the SHARE data is confined to people aged 50 and over and it is assumed that anyone aged 50 and over providing care to, for example, a parent will do so to a parent aged 65 and over. In relation to 'spouse care', it is possible to identify the age of a spouse or partner in the SHARE data and it is therefore possible to identify care provided to a spouse or partner aged 65 and over.

The identification of care provision to older people is, however, complicated by the way in which the informal care questions are asked in the SHARE survey. The SHARE questions ask about care provided either since the last interview or in the last 12 months. Three of the countries considered here, Germany, the Netherlands and Spain, were included in Wave 1 of SHARE, so respondents are asked at Wave 2 about care provided since the last interview, that is, in the last two years or so. Poland was not included in Wave 1, so respondents are asked in 2006/7 about care provided in the last 12 months. The difficulties here are two-fold. First, the SHARE data on provision of care includes *past* caring, that is, care provided during the last one to two years or so, as well as care provided in the present. The inclusion of past caring is likely to inflate artificially the measure of the prevalence of caring in the present. The second complicating factor arising from the way the questions are asked in SHARE is that the period of time about which the informal care questions are asking varies between countries. Wave 1 data were collected in 2004 in Germany, the Netherlands and Spain, but Wave 2 data were collected in 2006/7 in Germany and Spain, but in 2007 in the Netherlands (MEA, 2010: 7). The questions on informal care provision therefore relate to help provided in the last three years in the Netherlands, over the last two to three years in Germany and Spain, and in the last year in Poland. This is likely to mean that the numbers of people providing care are artificially raised in Germany, the Netherlands and Spain compared to

Poland, and that this is likely to be more of an issue in the Netherlands than in any of the other countries.[10]

In order to address these issues, different methods have been used to identify *current* provision of care to older people, depending on whether care is provided to someone in the older generation or to a spouse. With regard to care for the older generation, the analysis includes provision of care to parents, parents-in-law, step-parents, aunts, uncles and grandparents.[11] The problem of past caring is addressed by excluding, as far as possible, respondents who provide care to someone who is no longer alive. This could be ascertained where care was provided for a mother or father, since the SHARE survey includes questions about whether the respondent's natural parents are still alive ('dn026_1' for mothers and 'dn026_2' for fathers). Similar questions are not asked about people in other relationships to the respondent. Not even care for living parents-in-law can be unambiguously identified since not all partners participate in the survey. Although this means that it is only for natural parents that current provision of care can be definitely identified, this is less of a problem than might at first be supposed, since the majority of care for the older generation is in fact care for natural parents. In the four representative countries considered together, nearly 70 per cent of respondents providing care to someone in the older generation look after a (living) natural parent (authors' analysis).

With regard to spouses, respondents who are currently providing care to a spouse or partner aged 65 and over are identified, first, by identifying all those with a *current* partner or spouse, using the variable 'mstat' (which identifies whether a respondent has a partner or spouse). Those with *partners aged 65 and over* are identified using the variable from the coverscreen dataset, 'spbirthdate', which gives the date of birth of the spouse or partner, from which the age of the partner can be derived. In relation to spouse care, it is also possible to check whether a participating spouse is *receiving* personal care or not, using the variables 'sp020' and 'sp021', which ask, respectively, whether the respondent receives care from inside the household and from whom. Not all those who are the partners of respondents providing spouse care are in fact receiving it, presumably because a partner to whom care has been provided in the past is no longer receiving it. This is particularly an issue in the Netherlands, perhaps because of the longer time period over which the questions on informal care provision relate in this country. In the analysis presented here, respondents are regarded as providing care to their partner, if their partner also states that they receive care from a partner, so far as this could be ascertained.

The present estimates of provision of personal care to older people by those aged 50 and over therefore include regular care to people in the older generation, both parents and other relatives, and to older spouses. There may be some overestimation of current care for the older generation because some people providing care to, for example, parents-in-law may have done so since the last interview but may not be doing so currently. On the other hand, there is likely to be some underestimation of provision of care to older people here, because the current estimates do not include care for siblings, friends, colleagues or neighbours. It was not possible to include this latter type of care since there was no way of knowing whether the people cared for were aged 65 and over.

5.1.2 Prevalence of provision of informal personal care to older people

Figure 5.1 shows the prevalence of provision of personal care to older people, defined as regular care for the older generation and older spouses, by people aged 50 and over in the four representative countries

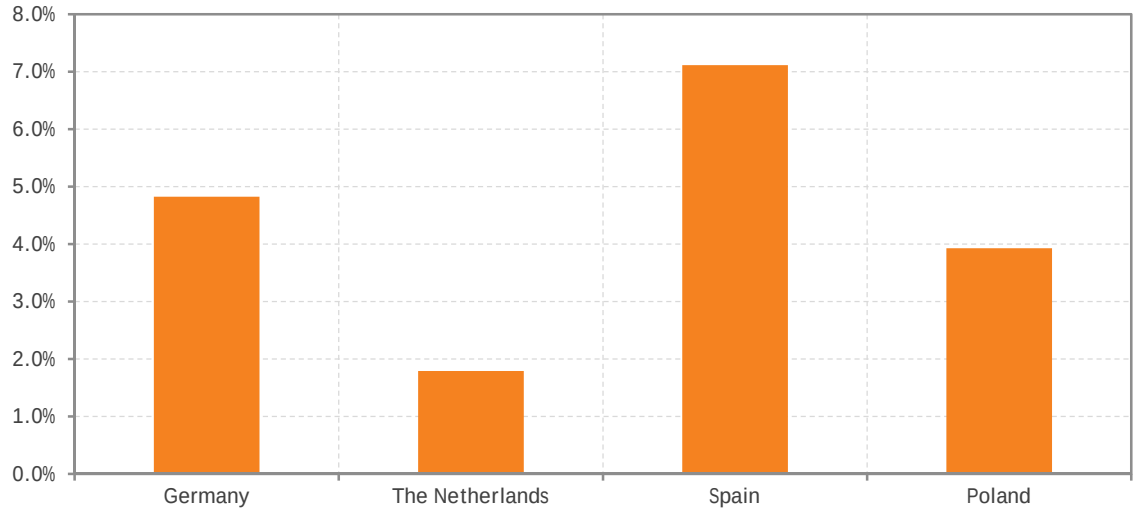
[10] The facts that the Wave 2 SHARE data contain past caring and that the period between data capture points is longer for The Netherlands than for the other representative countries may help to explain the finding in analyses of care provision for Work package 3 of the ANCIEN study that the Netherlands appears to have a higher prevalence of informal care provision (outside the household) than other representative countries (Jiménez-Martín et al., 2011).

[11] The list of care-recipients included in the 'older generation', used in the present report, is similar to the list used by Riedel and colleagues in Work package 3 of ANCIEN (Riedel et al., 2010), the only difference being that siblings are excluded in the present report since many are likely to be under the age of 65.

in the ANCIEN study, derived from Wave 2 SHARE data. The base numbers use weighted sample data, which differ slightly from the base numbers given earlier, because missing data are excluded.

Provision of personal care to older people, as defined here, is significantly lower in the Netherlands than in Germany, Spain or Poland (Figure 5.1). Approximately two per cent of the population aged 50 and over provides informal personal care to an older person in the Netherlands, compared to approximately five per cent in Germany, seven per cent in Spain and four per cent in Poland. These differences are consistent with earlier analyses in Work packages 1 and 3, which suggested that informal care provision is lower in Cluster Two countries, of which the Netherlands is the representative country, than in the other countries in the ANCIEN study (Kraus et al., 2010; Pickard, 2011).

Figure 5.1 Prevalence of provision of informal personal care to older people by people aged 50 and over in Germany, the Netherlands, Spain and Poland, 2006/7 (Percentages)



Notes: Provision of personal care to older people includes regular care for parents (living), parents-in-law, step-parents, aunts, uncles and grandparents and for spouses/partners aged 65 and over; Chi square: p = <0.001; underlying weighted sample bases (excluding missing data) are: Germany, 6,274; the Netherlands,1,004; Spain,2,823 and Poland, 2,138.

Source: Wave 2 SHARE (2.3.1).

The probability of providing personal care is lower in Figure 5.1 than in estimates published elsewhere, but this is likely to be accounted for mainly by differences in definitions used. For example, a recent Organisation for Economic Co-operation and Development (OECD) report, also based on SHARE data, suggests that the percentage of people aged 50 and over providing help with personal care tasks (ADLs) in Germany, the Netherlands, Spain and Poland ranges from 10.3 per cent to 15.3 per cent (Colombo et al., 2011: 88). Clearly, the percentages in the OECD study are considerably higher than those presented here in Figure 5.1. However, the OECD figures relate to all informal help with ADLs, whereas the current analysis is confined to regular help provided to older people aged 65 and over.

5.2 Factors affecting provision of informal personal care to older people

The analysis of the factors affecting provision of care for the older generation and care for older spouses, presented here, uses multivariate analysis. Four different variables are considered in the analysis of the factors affecting personal care to older people. These are age, gender, marital status and education (cf Parker & Lawton, 1994; Richards et al., 1996; Young et al., 2005; Karlsson et al., 2006). The factors included in the analysis of provision of care might also have included other factors, such as employment status, housing tenure and health (cf Leontaridi & Bell, 2001; Young et al., 2005). However, analytical

and data limitations restrict the extent to which these variables can be included in an explanatory model. For example, employment and health may be endogenously related to provision of care (Parker & Lawton, 1994; Richards et al., 1996) and therefore are not usually included in explanatory models of care provision, and similar problems are likely to arise in relation to housing tenure.

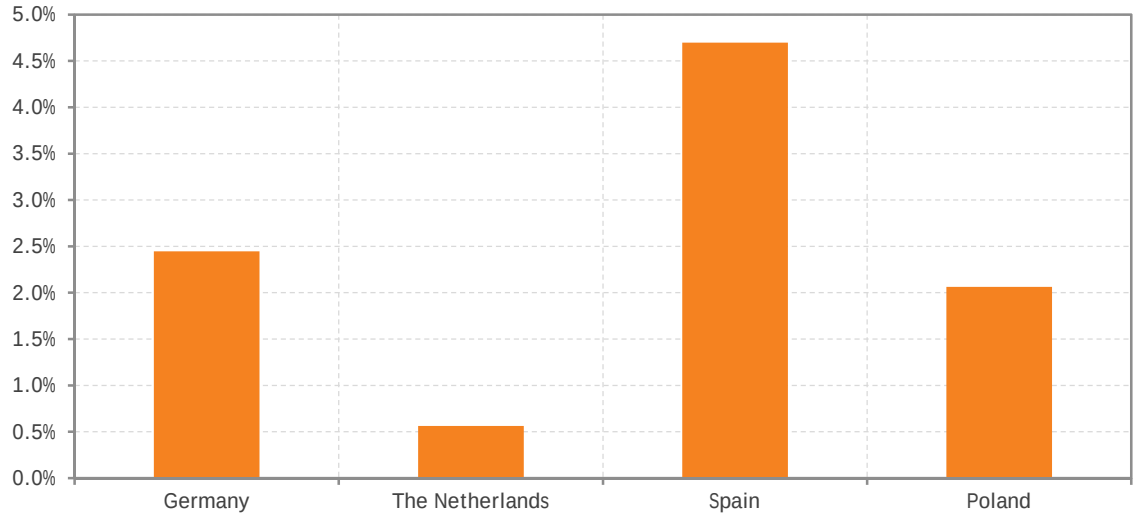
In the analysis of the provision of personal care, presented here, the definitions of the socio-demographic variables, using the SHARE data, are as follows. *Age* is defined in terms of seven age-bands, distinguishing those aged 50-54; 55-59; 60-64; 65-69; 70-74; 75-79 and 80 and over. *Marital status* refers to *de facto* marital status and distinguishes two categories: those who are married or cohabiting and those who are single (never married or previously married) and are not cohabiting. *Education* is defined in terms of the International Standard Classification of Education (ISCED 1997) into three categories: no education or primary education (ISCED 1); secondary education (ISCED 2-4); and tertiary education (ISCED 5-6). The SHARE dataset provides a derived variable in which education is categorised in terms of its ISCED classification. The age and education classifications used here are collapsed into broader categories, where appropriate.

The definition of personal care provided to older people, described earlier, includes two different types of care: care for the older generation and care for spouses or partners. It seems likely that the factors affecting these two types of care will vary and it was therefore decided to analyse each separately.

5.2.1 Factors affecting provision of informal personal care to older generation

Figure 5.2 shows the prevalence of provision of informal personal care to the older generation by people aged 50 and over in the four representative countries in the ANCIEN study, derived from Wave 2 SHARE data. There were no people aged 80 and over providing care to the older generation, so the figure relates to care provision by people aged 50 to 79. The figure shows significant differences in intergenerational care provision between countries, with the prevalence of informal care provision in the Netherlands considerably lower than in the other countries, but also particularly high provision of care for the older generation in Spain (Figure 5.2).

Figure 5.2 Prevalence of provision of informal personal care to older generation by people aged 50 to 79 years in Germany, the Netherlands, Spain and Poland, 2006/7 (Percentages)



Notes: Provision of personal care to older people includes regular care for parents (living), parents-in-law, step-parents, aunts, uncles and grandparents; Chi square: p = <0.001; underlying weighted sample bases (excluding missing data) are: Germany, 5,357; the Netherlands, 889; Spain, 2,427 and Poland, 1,939.

Source: Wave 2 SHARE (2.3.1).

Logistic regression analyses of care for the older generation by people aged 50 and over were carried out for each representative country. In all the countries, except Spain, care for the older generation is confined to people aged 50 to 74, so the analyses in Germany, the Netherlands and Poland relate to people in this broad age band. In Spain, care for the older generation extends to people in their late 70s, so the analysis in Spain relates to people aged 50 to 79. In the determination of the factors affecting provision of personal care to the older generation using multivariate analysis, age, gender, marital status and education were all initially entered into the equations as independent variables. Four logistic regression models were constructed, one for each of the representative countries.

The results of the logistic regression analyses are shown in Table 5.1. Age was significantly associated with provision of personal care to someone in the older generation in Germany, Spain and Poland; gender was significant in Spain and Poland; and marital status was significant in Germany and Spain. Education was not significantly associated with provision of personal care for the older generation by people aged 50 and over in any country (Table 5.1). No variables were significantly associated with provision of personal care for the older generation in the Netherlands.

In terms of the nature of the relationships, with regard to age, people in their fifties are more likely to provide care for the older generation than those in their sixties or seventies. With regard to gender, women are more likely to provide care than men (Table 5.1). These relationships are consistent with those identified in the wider informal care literature (EC, 2007). With regard to marital status, the direction of the relationships, shown in Table 5.1, varies between countries. In Germany, people who are married or cohabiting are more likely to provide care for someone in the older generation than those who are *de facto* single. In contrast, in Spain, those who are in effect single are more likely to provide intergenerational care than those who are married or cohabiting. These relationships between marital status and informal care provision in Germany and Spain are consistent with those identified earlier in Work package 3 (Pickard, 2011).

Table 5.1 Results (odds ratios) from logistic regression models of the proportion of people aged 50 and over providing informal personal care to older generation in Germany, the Netherlands, Spain and Poland, 2006/7 (Odds ratios and significance levels)

Variables/Categories	Germany	The Netherlands	Spain	Poland
	Model 1	Model 2	Model 3	Model 4
Age				
50-54	1.00	1.00	1.00	1.00
55-59	***0.33	*(ns)* 2.16	*(ns)* 1.41	*(ns)* 1.48
60-64	**0.49		*(ns)* 0.57	
65-69	**0.52	*(ns)* 0.38	*0.49	*0.40
70-74	***0.07		*0.44	
75-79	n/a	n/a	**0.02	n/a
Gender				
Men	1.00	1.00	1.00	1.00
Women	*(ns)* 1.11	*(ns)* 0.43	***2.24	*2.03
De facto marital status				
Married/cohabiting	1.00	1.00	1.00	1.00
Not married or cohabiting	**0.49	*(ns)* <0.01	**1.87	*(ns)* 0.57
Education				
None or primary			1.00	
	1.00	1.00		1.00
Secondary			*(ns)*1.44	
Tertiary	*(ns)* 1.26	*(ns)* 0.71	*(ns)* 0.64	*(ns)* 1.32

Notes: Provision of personal care to the older generation includes regular care for parents (living), parents-in-law, step-parents, aunts, uncles and grandparents. Asterix indicates association at *(5%), ** (1%) and ***(less than 1%); ns indicates no significant association; n/a indicates not applicable. Age-bands between 60 and 74 are collapsed in the Netherlands and Poland. Educational categories, 'none or primary' and 'secondary', are collapsed in Germany, the Netherlands and Poland. For further definitions of variables, see text.

Source: Wave 2 SHARE (2.3.1).

Given the results shown in Table 5.1, age, gender and marital status were taken into account in the subsequent modelling of the supply of informal care to the older generation. Fitted values from the logistic regression models were used as the estimated probabilities of providing personal care to the older generation by age and marital status in Germany; age, gender and marital status in Spain; and age and gender in Poland. In the Netherlands, where no variables were significantly associated with provision of personal care to the older generation, the percentages providing care by age were obtained from the Wave 2 SHARE sample. The resulting percentages providing informal personal care by age, gender and marital status in the four representative countries are shown in Table 5.2. It is these percentages that are subsequently included in the models of future informal care supply to the older generation. Table 5.2 illustrates the very large differences in provision of informal personal care to the older generation between socio-demographic groups in the different representative countries in the ANCIEN study. The percentage of people providing informal care to someone in the older generation ranges, for example, from less than one per cent among people in their sixties and early seventies in the Netherlands, to nearly 18 per cent among single women aged 55 to 59 in Spain.

Table 5.2 Provision of informal personal care to the older generation by people aged 50 and over, by age, gender and marital status in Germany, the Netherlands, Spain and Poland, 2006/7 (Percentages)

	Germany		The Netherlands	Spain				Poland	
				Men		Women			
	Married	Single		Married	Single	Married	Single	Men	Women
50-54	6.26	3.21	0.53	3.44	6.38	7.68	13.73	1.98	3.60
55-59	2.14	1.08	1.45	4.68	8.59	10.28	17.99	2.91	5.26
60-64	3.12	1.57	0.25	2.01	3.77	4.56	8.38	0.76	1.39
65-69	3.30	1.67	0.25	1.70	3.20	3.88	7.16	0.76	1.39
70-74	0.45	0.22	0.25	1.53	2.89	3.50	6.49	0.76	1.39
75-79	n/a	n/a	n/a	0.08	0.15	0.18	0.35	n/a	n/a

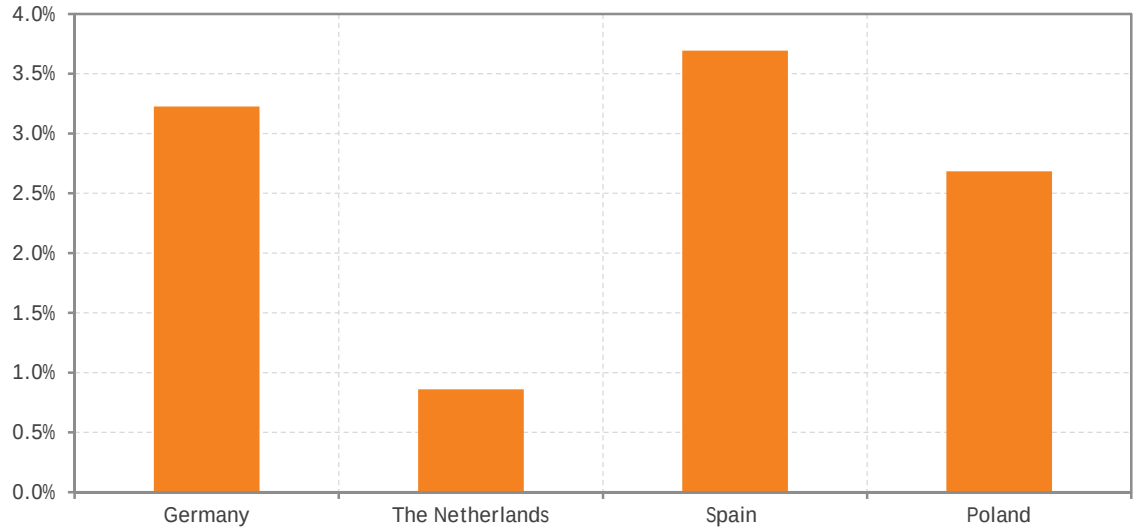
Notes: Provision of personal care to older generation includes regular care for parents (living), parents-in-law, step-parents, aunts, uncles and grandparents. For definitions of variables, see text.

Source: Wave 2 SHARE (2.3.1).

5.2.2 Factors affecting provision of personal care to spouses/partners

This section looks at the factors affecting provision of personal care to spouses or partners aged 65 and over in the four representative countries in the ANCIEN study, using Wave 2 SHARE data. Figure 5.3 shows the prevalence of provision of informal personal care to older spouses/partners in the four countries. There were no people aged under 55 providing care to an older spouse or partner, so the results here relate to care provision by people aged 55 and over. Figure 5.3 shows significant differences in care for older spouses and partners between the countries, with the Netherlands again considerably lower than Germany, Spain or Poland.

Figure 5.3 Prevalence of provision of informal personal care to spouses and partners aged 65 and over by people aged 55 and over in Germany, the Netherlands, Spain and Poland, 2006/7 (Percentages)



Notes: The figure relates to provision of personal care to spouses and partners aged 65 and over older; Chi square: p = <0.001; underlying weighted sample bases (excluding missing data) are: Germany, 5,301; the Netherlands, 813; Spain, 2,356 and Poland, 1,677.

Source: Wave 2 SHARE (2.3.1).

The factors affecting regular personal care for older spouses and partners were examined using logistic regression models, in each representative country, with the analyses relating only to those who are *de facto* married. Provision of care to older spouses or partners is confined to people aged 55 and over in Germany and Poland, and to people aged 60 and over in the Netherlands and Spain. In the logistic regression models for each country, age, gender and education were all included as independent variables.

The results of the logistic regression analyses are shown in Table 5.3. Age was significantly associated with provision of personal care to an older spouse or partner in Poland, while age and gender were significantly associated with provision of care in Germany and Spain. Education was not significantly associated with provision of personal care for older spouses/partners in any country (Table 5.3). No variables were significantly associated with provision of personal care to spouses/partners in the Netherlands, although there was a tendency for age to be associated with provision of spouse care (significant at the 10 per cent level).

Table 5.3 Results (odds ratios) from logistic regression models of the proportion of de facto married people aged 55 and over providing informal personal care to older spouses/partners in Germany, the Netherlands, Spain and Poland, 2006/7 (Odds ratios and significance levels)

Variables/categories	Germany	The Netherlands	Spain	Poland
	Model 1	Model 2	Model 3	Model 4
Age				
55-59	1.00	n/a	n/a	
60-64	*5.53			1.00
65-69	***13.49	1.00	1.00	
70-74	***25.80			***6.69
75-79	***25.36	(ns) 6.86	***3.09	***8.99
80 and over	***81.08	(ns) 8.57	***4.14	***8.63
Gender				
Men	1.00	1.00	1.00	1.00
Women	***1.84	(ns) 1.80	*1.64	(ns) 1.90
Education				
None or primary			1.00	1.00
Secondary	1.00	1.00	(ns) 1.07	(ns) 1.46
Tertiary	(ns) 0.93	(ns) 1.16	(ns) 1.75	(ns) 0.84

Notes: Provision of personal care to older spouses/partners includes regular care for a spouse/partner aged 65 and over. Asterix indicates association at *(5%), ** (1%) and ***(less than 1%); ns indicates no significant association; n/a indicates not applicable. Age-bands between 60 and 69, and between 70 and 79, are collapsed in the Netherlands and Spain; age-bands between 55 and 69 are collapsed in Poland. Educational categories, 'none or primary' and 'secondary', are collapsed in Germany and the Netherlands. For definitions of variables, see text

Source: Wave 2 SHARE (2.3.1).

Given the results shown in Table 5.3, age and gender were taken into account in the subsequent modelling of care to older spouses and partners, provided by married or cohabiting people. Fitted values from the logistic regression models were used as the estimated probabilities of providing personal care to older spouses/partners by age and gender in Germany and Spain, and by age in the Netherlands and Poland. The resulting percentages providing spouse care, by age and gender, in the four representative countries are shown in Table 5.4. It is these percentages that are subsequently included in the models of future informal care supply to older spouses and partners.

Table 5.4 illustrates the very large differences in provision of informal personal care to older spouses/partners between socio-demographic groups in the different representative countries in the ANCIEN study. The percentage of married or cohabiting people providing informal care to a spouse or partner ranges, for example, from less than one per cent among people in their sixties in the Netherlands, to over 25 per cent among women aged 80 and over in Germany.

Table 5.4 Provision of informal personal care to older spouses/partners by married or cohabiting people aged 55 and over, by age and gender in Germany, the Netherlands, Spain and Poland, 2006/7 (Percentages)

	Germany		The Netherlands	Spain		Poland
	Men	Women		Men	Women	Men
55-59	0.24	0.46	n/a	n/a	n/a	1.73
60-64	1.31	2.46	0.6	2.75	4.64	1.73
65-69	3.18	5.86	0.6	2.75	4.64	1.73
70-74	5.94	10.69	4.0	8.23	13.37	9.58
75-79	5.91	10.63	4.0	8.23	13.37	11.23
80+	16.78	27.65	4.7	10.58	16.91	10.17

Notes: Provision of personal care to older spouses/partners includes regular care for a spouse/partner aged 65 and over. For definitions of variables, see text.

Source: Wave 2 SHARE (2.3.1).

5.2.3 Summary: factors affecting provision of personal care to older people

Analysis of sample data from Wave 2 of SHARE (2006/7) suggests that age, gender and marital status significantly affect provision of informal personal care to older people by people aged 50 and over in the four representative countries in the ANCIEN study. The variables affecting provision of informal care vary by type of care and by country. In Germany, provision of personal care to the older generation is affected by the age and marital status of the caregiver, while provision of care to spouses/partners aged 65 and over is affected by age and gender. In the Netherlands, care for older spouses/partners is affected by the age of the caregiver, and age is also relevant to care for the older generation. In Spain, age, gender and marital status all affect the provision of care to the older generation, while age and gender affect provision of care to spouses/partners. In Poland, provision of care to the older generation is affected by age and gender, while care for spouses/partners is affected by age. It is these relationships that are incorporated into the subsequent modelling of the future supply of informal care. In addition, the future supply models in all countries need to take into account *de facto* marital status, to allow for the provision of informal care to spouses or partners by married or cohabiting caregivers. Therefore, the models of informal care supply in the future in Germany, Spain and Poland need to include age, gender and *de facto* marital status, while the model in the Netherlands needs to include age and *de facto* marital status.

5.3 Methods for making projections of informal care provision in future years

This part of the chapter describes the methods used to make projections of the numbers of people providing informal personal care in the future. As already indicated, the aim is to make projections of the numbers providing personal care to older people to 2060, every five years, beginning in 2010 (the base year).

The estimates of the numbers providing informal care in the future are based on the current probabilities of providing personal care to older people, by age, gender and *de facto* marital status (given in the previous part of the chapter). The current probabilities of providing care are applied to the projected numbers of people in the population and this generates estimates of the numbers of people providing informal personal care, both now and in future. A key assumption of the modelling is that the probability of providing informal personal care remains the same in the future as it is at present, controlling for key socio-demographic variables.

The probabilities of providing care, as already indicted, are applied to the projected numbers in the population, by age, gender and *de facto* marital status. The numbers in the population between 2010 and

2060, by age and gender, are derived from 'EUROPOP2008' projections of the population in European countries (EC, 2008). In the models, information on age is divided into 5-year age-bands between the ages of 15 and 79, with those aged 80 and over grouped together.

The Eurostat projections relate to the whole population, including both those in private and non-private ('institutional') households. However, provision of informal care, based on the SHARE data, relates only to the *household* population (MEA 2010). It is therefore necessary to split the total population between the household and non-household populations, by age and gender. The methods used to identify the projected household population, used here, vary by the age of the population. The numbers in households *aged 65 and over* are derived from ANCIEN projections, produced elsewhere in Work package 6, using the 'reference scenario', which is based on Work package 2's 'NIDI DELAY disability scenario'. With regard to people *aged under 65*, the identification of the projected numbers in households varies by country, according to the availability of data. In the Netherlands, the projections are derived from Statistics Netherlands projections of household type. The percentages of people, by age and gender, in the household population are derived from data on the 'institutional' population and the total population in the Statistics Netherlands database. The Statistics Netherlands projections relate to the period 2011 to 2060 and are given every five years between 2015 and 2060, by age-band and gender. Table 5.5 shows the percentages in the household and non-household population in the Netherlands in 2011.[12] In the other three countries, it is assumed that the household population aged under 65 is equal to the total population, derived from the Eurostat projections. This is likely to over-estimate the household population somewhat, but is unlikely to affect the results to any great extent. This is because the overwhelming majority of the total population at younger age-groups is in private households. In the Netherlands, for example, over 99 per cent of the total population of men and women aged 50 to 64 is in private households (Table 5.5).

Table 5.5 Household and non-household population, by age and gender, the Netherlands, 2011 (Percentages)

	MEN	MEN	WOMEN	WOMEN
	Household	Non-household	Household	Non-household
15-19	98.97%	1.03%	99.20%	0.80%
20-24	99.07%	0.93%	99.39%	0.61%
25-29	99.17%	0.83%	99.59%	0.41%
30-34	99.15%	0.85%	99.59%	0.41%
35-39	99.15%	0.85%	99.54%	0.46%
40-44	99.16%	0.84%	99.53%	0.47%
45-49	99.13%	0.87%	99.51%	0.49%
50-54	99.12%	0.88%	99.46%	0.54%
55-59	99.11%	0.89%	99.36%	0.64%
60-64	99.20%	0.80%	99.37%	0.63%
65-69	99.17%	0.83%	99.20%	0.80%
70-74	98.79%	1.21%	98.59%	1.41%
75-79	97.71%	2.29%	96.49%	3.51%
80+	91.72%	8.28%	85.19%	14.81%

Source: Statistics Netherlands.

[12] Statistics Netherlands figures for 2011 were used in the modelling of the numbers in the household population in The Netherlands in 2010.

In addition to age and gender, as the previous part of the chapter has shown, provision of informal care is also affected by *de facto* marital status. The identification of the projected numbers in households by marital status varies by country, according to the availability of data. The projected numbers by *de facto* marital status in the Netherlands are derived from Statistics Netherlands projections. The percentages of people, by age and gender, in the household population who are *de facto* married are derived from data on the population who are 'living with a partner, married or non-married' and data on the total household population in the Statistics Netherlands database. In Germany, for people aged under 75, the percentages who are *de facto* married or single are derived from the 2006/7 SHARE data and assumed to remain constant in future years. For people aged 75 and over in Germany, the projected percentages in couple households are derived from household type projections developed by Schulz (2008).[13] In Spain and Poland, projections of marital status are not available, so the percentages by marital status are derived from the 2006/7 SHARE data and assumed to remain constant in future.

5.4 Numbers providing informal personal care to older people, 2010-2060

This part of the chapter presents estimates of the numbers of people aged 50 and over providing informal care between 2010 and 2060 in the four ANCIEN representative countries. The chapter has three sections. The first looks at provision of informal care in all four countries in 2010. The second describes the projections of informal care provision in each country in turn between 2010 and 2060. Finally, the third section compares the projections across countries and offers some explanations for the findings in terms of underlying demographic trends.

5.4.1 Provision of informal personal care to older people in 2010

There are very large differences between European countries in the numbers of people providing informal care. The numbers of people aged 50 and over currently providing informal personal care to an older person range from approximately 75,000 in the Netherlands to approximately 1.6 million in Germany (Table 5.6). The differences between countries are partly due to differences in the size of the overall populations, but also reflect differences in reliance on informal care in the long-term care systems. Thus, in the Netherlands, informal care providers are measured in tens of thousands, whereas in Poland, they are measured in hundreds of thousands, and in Spain and Germany they are measured in millions.

[13] Schulz's projections of household type were not used here to estimate marital status among people under the age of 75 in Germany. The percentages of the population in couples at younger ages in Schulz's dataset seem low compared to other data sources. Thus, at ages 50 to 59, only 49 per cent of men and 53 per cent of women are in couple households in 2010 in Schulz's dataset whereas, in Wave 2 of SHARE, 81% of men and 73% of women are married or cohabiting. The relatively low percentages in couple households in Schulz's data may arise because a high proportion are in 'other households' (35 per cent of men and 31 per cent of women aged 50 to 59 in 2010) and the 'other households' category may include married/cohabiting couples living in complex households. The numbers living in couple households in Schulz's data therefore may under-represent the numbers who are married/cohabiting at younger age-groups. At older age-groups, there is a closer correspondence between the datasets. For example, at age 75 to 79, 70 per cent of men and 40 per cent of women in Schulz's dataset are in couple households, compared to 78 per cent of men and 35 per cent of women who are married/cohabiting in the SHARE data. The closer correspondence between the data sets at older age-groups may be because fewer older couples live in 'other households'. The underlying difficulty here lies with the use of household type projections as a surrogate for marital status projections.

Table 5.6 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Germany, the Netherlands, Spain and Poland, 2010 (Estimated numbers)

	Numbers of people providing personal care to		
	Older generation	Spouses/partners aged 65 and over	Total
Germany	720,976	862,154	1,583,130
The Netherlands	28,023	46,057	74,079
Spain	648,210	394,271	1,042,481
Poland	254,891	257,075	511,966

Notes: Provision of personal care to older people is defined as regular care for the older generation, including, parents (living), parents-in-law, step-parents, aunts, uncles and grandparents, and care for spouses or partners aged 65 and over.

Source: Wave 2 SHARE (2.3.1); Europop 2008; Statistics Netherlands; Schulz (2008); ANCIEN work package 6.

There are also wide variations in the balance between intergenerational care and spouse care in the different European countries at the present time. Thus, in the Netherlands, approximately a third of informal personal care for older people is intergenerational care and two-thirds is spouse care. In Germany and Poland, approximately half of the care for older people is intergenerational care and half is spouse care. In Spain, approximately two-thirds of the care for older people is intergenerational care and only a third is spouse care (Table 5.6).

5.4.2 Numbers providing informal care to older people, by country, 2010-2060

a. Numbers providing informal care to older people, Germany, 2010-2060

Table 5.7 and Figure 5.4 show the estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, in Germany, between 2010 and 2060.

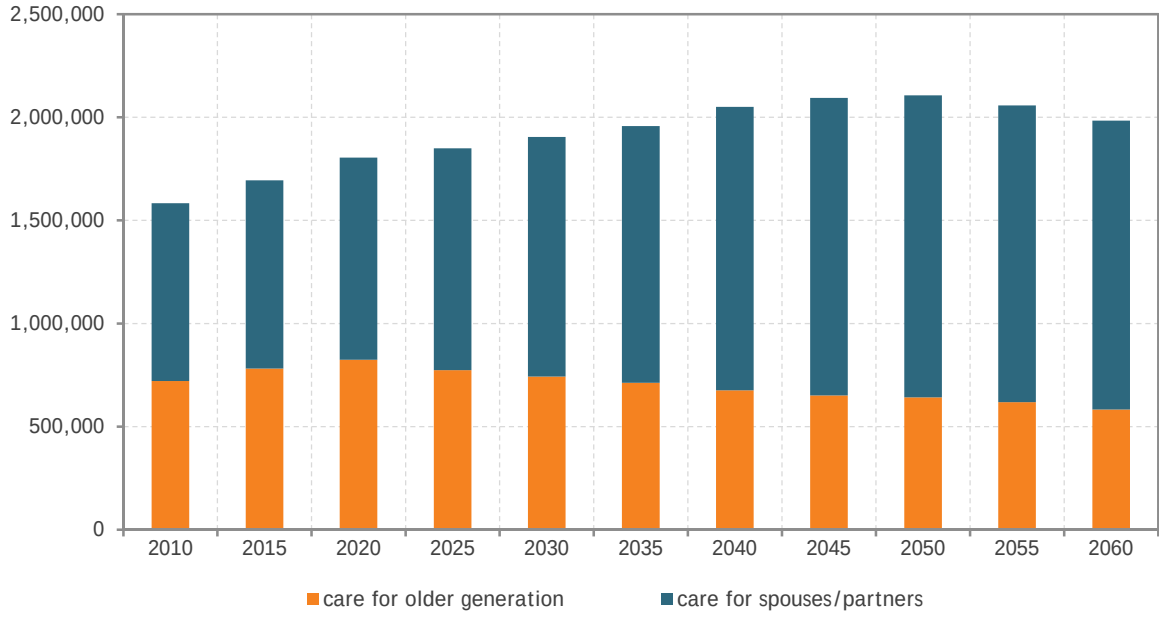
Table 5.7 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Germany, 2010-2060 (Estimated numbers and % change over time)

	Numbers of people providing personal care to		
	Older generation	Spouses/partners aged 65 and over	Total
2010	720,976	862,154	1,583,130
2015	781,509	913,093	1,694,602
2020	824,133	980,329	1,804,462
2025	774,061	1,075,624	1,849,685
2030	742,682	1,161,893	1,904,575
2035	712,865	1,244,533	1,957,398
2040	675,894	1,374,385	2,050,279
2045	651,592	1,442,232	2,093,824
2050	642,364	1,463,851	2,106,215
2055	618,852	1,438,517	2,057,368
2060	583,178	1,400,912	1,984,090
% change 2010-2040	*-6.3%*	*59.4%*	*29.5%*
% change 2010-2060	*-19.1%*	*62.5%*	*25.3%*

Notes: Provision of personal care to older people is defined as regular care for the older generation, including, parents (living), parents-in-law, step-parents, aunts, uncles and grandparents, and care for spouses or partners aged 65 and over.

Source: Wave 2 SHARE (2.3.1); Europop 2008; Schulz (2008); ANCIEN Work package 6.

Figure 5.4 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Germany, 2010-2060 (Estimated numbers)



Sources and notes: see Table 5.7.

The projections for Germany show an increase in the numbers providing informal personal care to older people over the next 50 years, with numbers rising from approximately 1.6 million in 2010 to approximately two million in 2060 (Table 5.7, Figure 5.4). However, this increase is solely due to an increase in spouse care. Care for the older generation is projected to fall in absolute terms. Although intergenerational and spouse care are approximately equal in 2010, most informal personal care by 2060 is spouse care. The decline in the projected numbers providing care to the older generation begins within the next decade, starting to take place after 2020 and, even by 2040, there is projected to be a six per cent decline in numbers providing care for the older generation in Germany (Table 5.7). Overall, between 2010 and 2060, there is projected to be a 19 per cent decline in provision of informal care to someone in the older generation in Germany (Table 5.7).

b. Numbers providing informal care to older people, the Netherlands, 2010-2060

Table 5.8 and Figure 5.5 show the estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, in the Netherlands between 2010 and 2060.

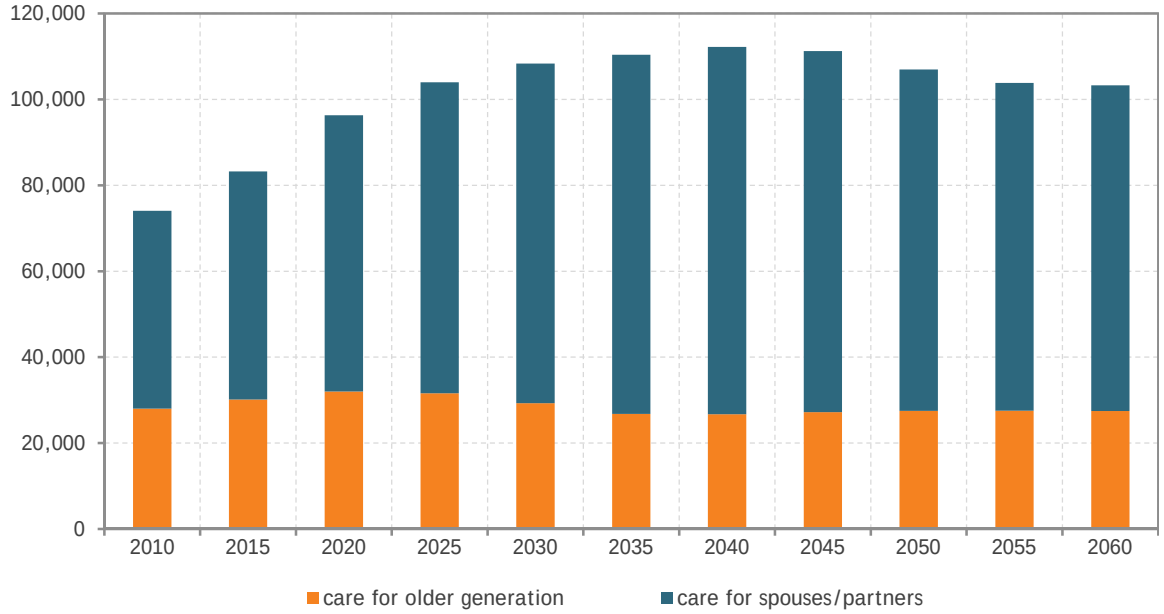
Table 5.8 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, the Netherlands, 2010-2060 (Estimated numbers and % change over time)

	Numbers of people providing personal care to		
	Older generation	Spouses/partners aged 65 and over	Total
2010	28,023	46,057	74,079
2015	30,149	53,070	83,218
2020	32,000	64,285	96,285
2025	31,582	72,372	103,954
2030	29,284	79,037	108,321
2035	26,811	83,565	110,376
2040	26,725	85,479	112,204
2045	27,186	84,066	111,253
2050	27,485	79,484	106,970
2055	27,530	76,290	103,820
2060	27,478	75,806	103,283
% change 2010-2040	*-4.6%*	*85.6%*	*51.5%*
% change 2010-2060	*-1.9%*	*64.6%*	*39.4%*

Notes: Provision of personal care to older people is defined as regular care for the older generation, including, parents (living), parents-in-law, step-parents, aunts, uncles and grandparents, and care for spouses or partners aged 65 and over.

Source: Wave 2 SHARE (2.3.1); Europop 2008; Statistics Netherlands; ANCIEN Work package 6.

Figure 5.5 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, the Netherlands, 2010-2060 (Estimated numbers)



Sources and notes: see Table 5.8.

The projections for the Netherlands show an increase in the estimated numbers providing informal personal care to older people over the next 50 years, with numbers rising from approximately 75,000 in 2010 to approximately 105,000 in 2060 (Table 5.8, Figure 5.5). As in Germany, the projected increase in the numbers providing informal care is solely due to an increase in spouse care. Care for the older generation is projected to fall in absolute terms, though the decline is not as great as in Germany. The decline in the projected numbers providing care to the older generation in the Netherlands begins within the next decade, starting to take place after 2020 and, by 2040, there is projected to be a five per cent decline in numbers providing care for the older generation. Provision of care for the older generation recovers slightly between 2040 and 2060 in the Netherlands, but there is still projected to be an overall two per cent decline in care provided to the older generation between 2010 and 2060 (Table 5.8). Intergenerational care currently forms only a minority of care for older people provided by the over 50s in the Netherlands, and this remains even more so in 2060.

c. Numbers providing informal care to older people, Spain, 2010-2060

Table 5.9 and Figure 5.6 show the estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, in Spain between 2010 and 2060.

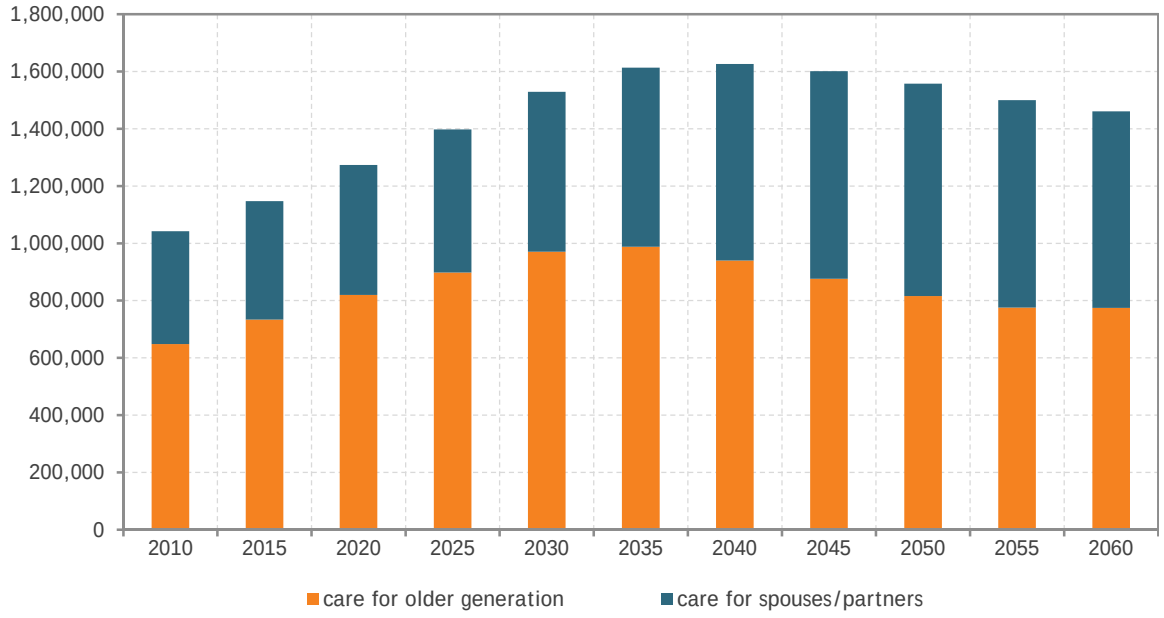
Table 5.9 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Spain, 2010-2060 (Estimated numbers and % change over time)

	Numbers of people providing personal care to		
	Older generation	Spouses/partners aged 65 and over	Total
2010	648,210	394,271	1,042,481
2015	733,606	413,383	1,146,989
2020	819,896	453,347	1,273,243
2025	897,974	499,559	1,397,533
2030	970,520	558,100	1,528,620
2035	988,099	624,866	1,612,965
2040	939,954	686,013	1,625,967
2045	876,097	724,619	1,600,715
2050	816,013	741,121	1,557,134
2055	775,763	724,053	1,499,816
2060	774,541	686,087	1,460,628
% change 2010-2040	*45.0%*	*74.0%*	*56.0%*
% change 2010-2060	*19.5%*	*74.0%*	*40.1%*

Notes: Provision of personal care to older people is defined as regular care for the older generation, including, parents (living), parents-in-law, step-parents, aunts, uncles and grandparents, and care for spouses or partners aged 65 and over

Source: Wave 2 SHARE (2.3.1); Europop 2008; ANCIEN Work package 6.

Figure 5.6 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Spain, 2010-2060 (Estimated numbers)



Sources and notes: see Table 5.9.

In Spain, there is an increase in the numbers providing personal care to older people over the next 50 years, with numbers rising from approximately one million in 2010 to approximately 1.5 million in 2060, an increase of 40 per cent (Table 5.9, Figure 5.6). In Spain, this increase is a result of increases in both spouse care and care for the older generation. Indeed, of the four representative countries in the ANCIEN study, Spain is the only country where care for the older generation is projected to rise over the next 50 years. However, in Spain, spouse care rises faster than intergenerational care, with care for older spouses and partners increasing by approximately 75 per cent between 2010 and 2060, compared to an increase of approximately 20 per cent in care for the older generation in the same period (Table 5.9). Although most care for older people is currently intergenerational care in Spain, by 2060, spouse care forms around half of all care for older people. Moreover, although intergenerational care increases between 2010 and 2035, it begins to fall after this date and, between 2035 and 2060, declines by over 20 per cent (Table 5.9).

d. Numbers providing informal care to older people, Poland, 2010-2060

Table 5.10 and Figure 5.7 show the estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, in Poland between 2010 and 2060.

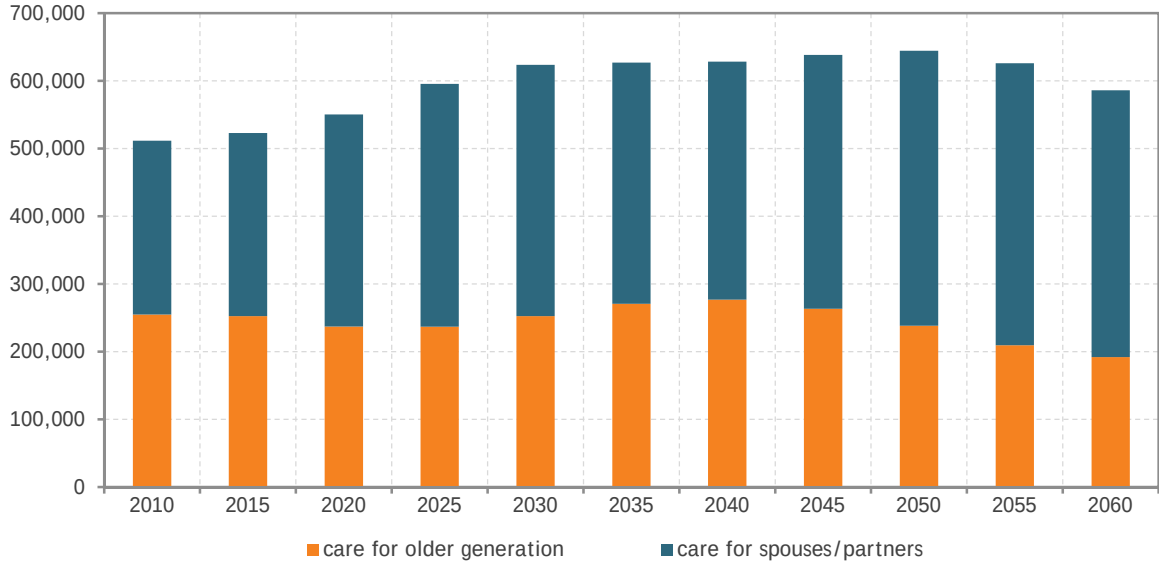
Table 5.10 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Poland, 2010-2060 (Estimated numbers and % change over time)

	Numbers of people providing personal care to		
	Older generation	Spouses/partners aged 65 and over	Total
2010	254,855	256,820	511,675
2015	252,363	270,659	523,023
2020	237,011	313,474	550,486
2025	236,775	358,864	595,638
2030	252,377	371,405	623,782
2035	270,566	356,514	627,080
2040	276,846	351,504	628,350
2045	263,323	375,045	638,368
2050	238,345	406,224	644,570
2055	209,448	416,694	626,141
2060	191,942	394,162	586,104
% change 2010-2040	*8.6%*	*36.9%*	*22.8%*
% change 2010-2060	*-24.7%*	*53.5%*	*14.5%*

Notes: Provision of personal care to older people is defined as regular care for the older generation, including, parents (living), parents-in-law, step-parents, aunts, uncles and grandparents, and care for spouses or partners aged 65 and over.

Source: Wave 2 SHARE (2.3.1); Europop 2008; ANCIEN Work package 6.

Figure 5.7 Estimated numbers of people aged 50 and over providing informal personal care to an older person, by type of care recipient, Poland, 2010-2060 (Estimated numbers)



Sources and notes: see Table 5.10.

In Poland, there is an increase in the numbers providing personal care to older people over the next 50 years, with numbers rising from approximately 500,000 in 2010 to 600,000 in 2060, an increase of nearly 15 per cent (Table 5.10, Figure 5.7). As in Germany and the Netherlands, the increase in provision of care for older people in Poland is solely due to an increase in spouse care, which rises by over 50 per cent between 2010 and 2060. In contrast, care for the older generation is projected to fall in absolute terms, declining by nearly 25 per cent over the next 50 years. Although the numbers of people providing care to the older generation and to spouses/partners are currently approximately equal in Poland, by 2060, the majority of care is projected to be spouse care. The projected 'undulation' in numbers providing care for the older generation between 2025 and 2050, visible in Figure 5.7, is directly linked to projected demographic trends in the numbers of people aged 50 to 64 in Poland, a point discussed further below. This distinctive undulation in intergenerational care in Poland means that provision of care for the older generation initially falls, then rises between 2025 and 2040, before falling again between 2040 and 2060.

5.4.3 Overview of trends in supply of informal care to older people, 2010-2060

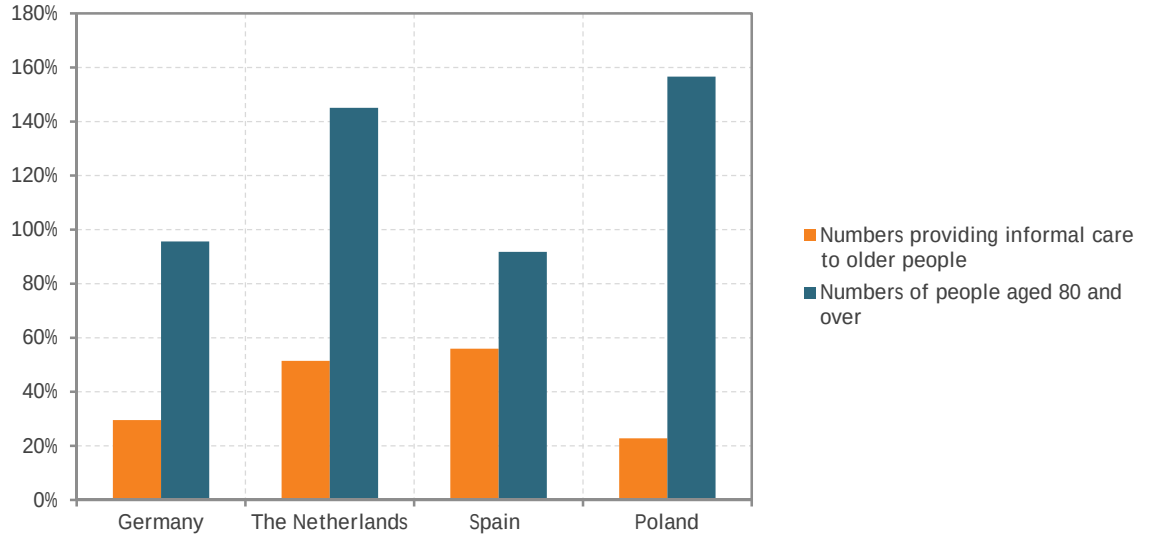
This section compares the projections of informal care supply across the four ANCIEN representative countries and offers some explanations for the findings in terms of underlying demographic trends. Two periods are examined: changes in the shorter term over the next 30 years, between 2010 and 2040; and changes in the longer term over the next 50 years, between 2010 and 2060.

a. Projected supply of informal care compared to broad measure of demand

The projections in all four ANCIEN representative countries show an increase in informal care provision to older people over the next 50 years. But how far is this likely to keep pace with demand for care? Figure 5.8 shows the percentage change between 2010 and 2040 in the numbers providing personal care to older people in each country and a broad measure of demand for care, the numbers of people in households aged 80 and over. The figure shows that, over the next 30 years, the rise in demand for care is likely to exceed the rise in the supply of informal care in all countries. Informal care provision

rises by no more than approximately 55 per cent, whereas the numbers of people aged 80 and over rise by at least 90 per cent.

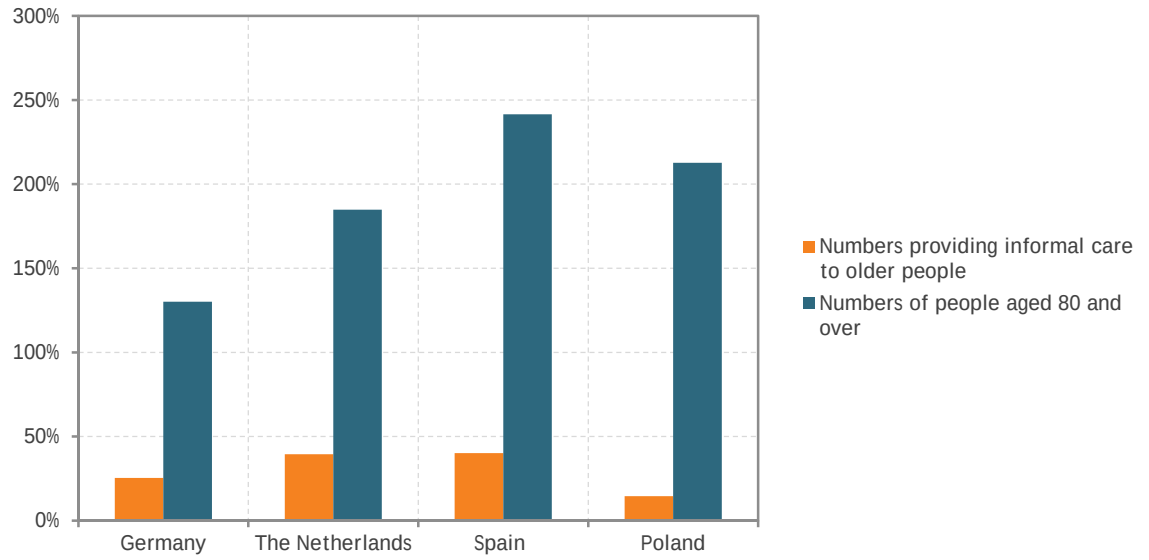
Figure 5.8 Percentage change in numbers providing informal personal care to older people and numbers in households aged 80 and over, ANCIEN representative countries, 2010-2040 (Percentage change 2010-2040)



Sources and notes: Provision of care relates to people aged 50 and over; for other sources & notes, see Table 5.6.

In the longer term, the rise in demand for care is likely to outstrip the supply of informal care even further. Figure 5.9 shows the percentage change over the next 50 years, between 2010 and 2060, in the numbers providing personal care to older people in the four countries and in the numbers of people in households aged 80 and over. The figure shows that, in the longer term, informal care provision rises by, at most, less than 50 per cent, whereas the total numbers of people aged 80 and over, at least, more than double.

Figure 5.9 Percentage change in numbers providing informal personal care to older people and total numbers in households aged 80 and over, ANCIEN representative countries, 2010-2060



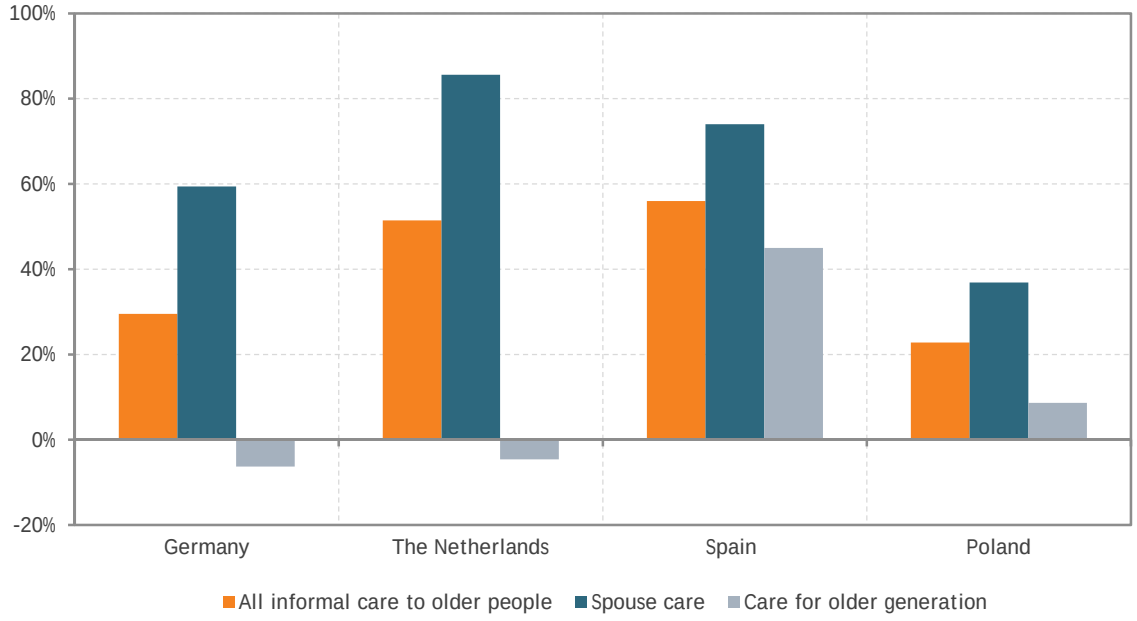
Sources and notes: see Table 5.6.

b. Differences in trends in informal care by care-recipient

The reason for the relatively slow rise in informal care in future years is not primarily due to the trends in care for spouses and partners, but to trends in care for the older generation.

Figure 5.10 shows, for each ANCIEN representative country, the percentage change between 2010 and 2040 in the numbers of people providing informal care to an older person, by the type of care recipient. The chart shows that spouse care rises in every country. Indeed, the percentage change is likely to be an underestimate in Spain and Poland, where likely trends upwards in the percentages of older people who are married, are not taken into account. In contrast, provision of care for the older generation rises more slowly than care for spouses and partners and, in Germany and the Netherlands, there is an absolute fall in the numbers of people providing care for the older generation over the next 30 years.

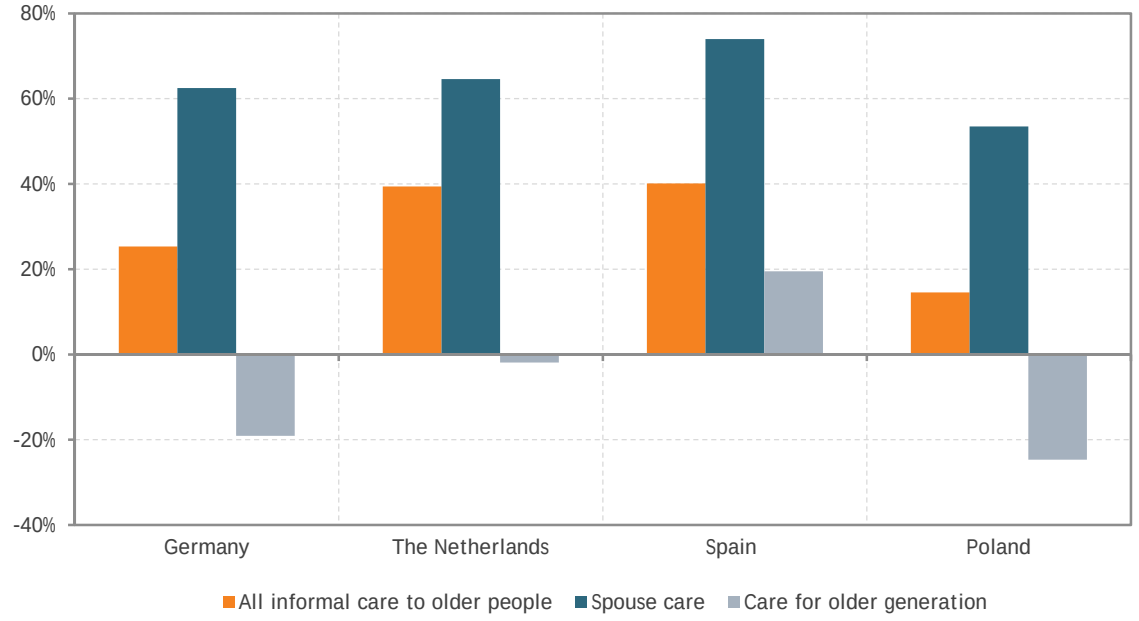
Figure 5.10 Percentage change in numbers providing informal personal care to older people, by care recipient, ANCIEN representative countries, 2010-2040 (Percentage change 2010-2040)



Sources and notes: see Table 5.6.

In the longer term, these trends in provision of care for older people are even more pronounced. Figure 5.11 shows the percentage increase between 2010 and 2060 in the numbers providing personal care to older people in each representative country, by care-recipient. The figure shows that, in every country, except Spain, there is an absolute fall in the numbers of people providing informal care for the older generation over the next 50 years.

Figure 5.11 Percentage change in numbers providing informal personal care to older people, by care recipient, ANCIEN representative countries, 2010-2060 (Percentage change 2010-2060)



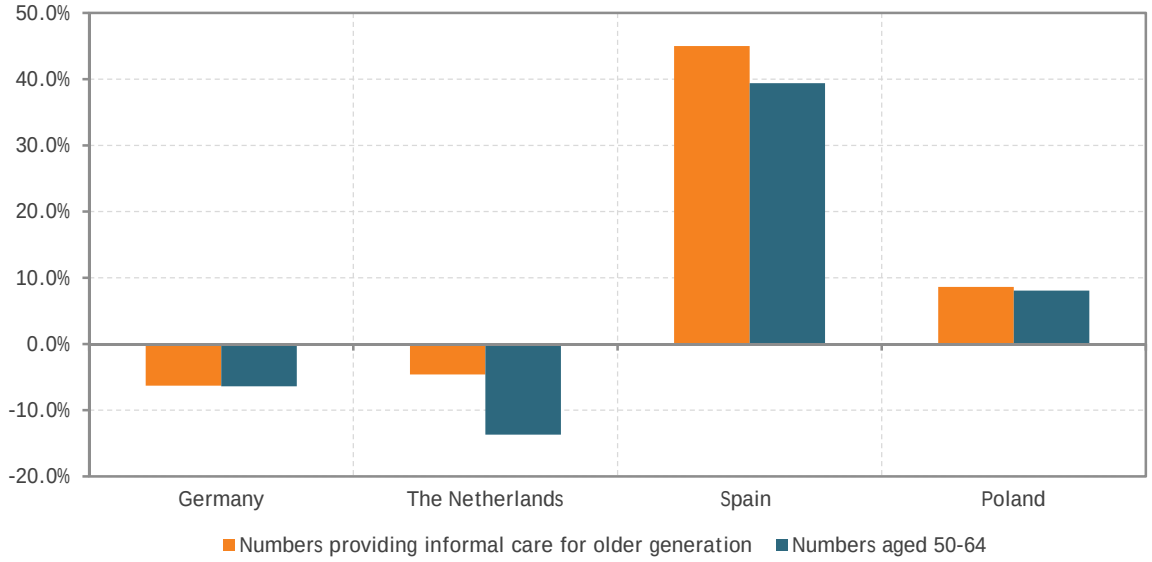
Sources and notes: see Table 5.6.

c. Demographic trends underlying changes in care for the older generation

The trends in provision of care for the older generation in future years, described in the previous section, are primarily due to demographic changes in the underlying numbers of people aged 50 to 64.

Figure 5.12 shows the percentage change between 2010 and 2040 in informal care provision to the older generation and the percentage change in the numbers of people aged 50 to 64. The figure shows that the projected declines in informal care for the older generation in Germany and the Netherlands in the next 30 years are associated with declines in the numbers of people aged 50 to 64, while the projected increases in informal care for the older generation in Spain and Poland in the same period are associated with increases in the numbers of people aged 50 to 64. The percentage change in the numbers providing informal care to the older generation does not always match exactly the percentage change in the numbers of people aged 50 to 64, because not all care for the older generation is provided by people aged 50 to 64 and some care is provided by people aged 65 and over (Table 5.2). Nevertheless, the direction of change in informal care for the older generation is clearly associated with the direction of change in the numbers of people aged 50 to 64 in the coming years

Figure 5.12 Percentage change in informal care provision to older generation and in numbers of people aged 50 to 64, ANCIEN representative countries, 2010-2040 (Percentage change 2010-2040)



Sources and notes: see Table 5.6.

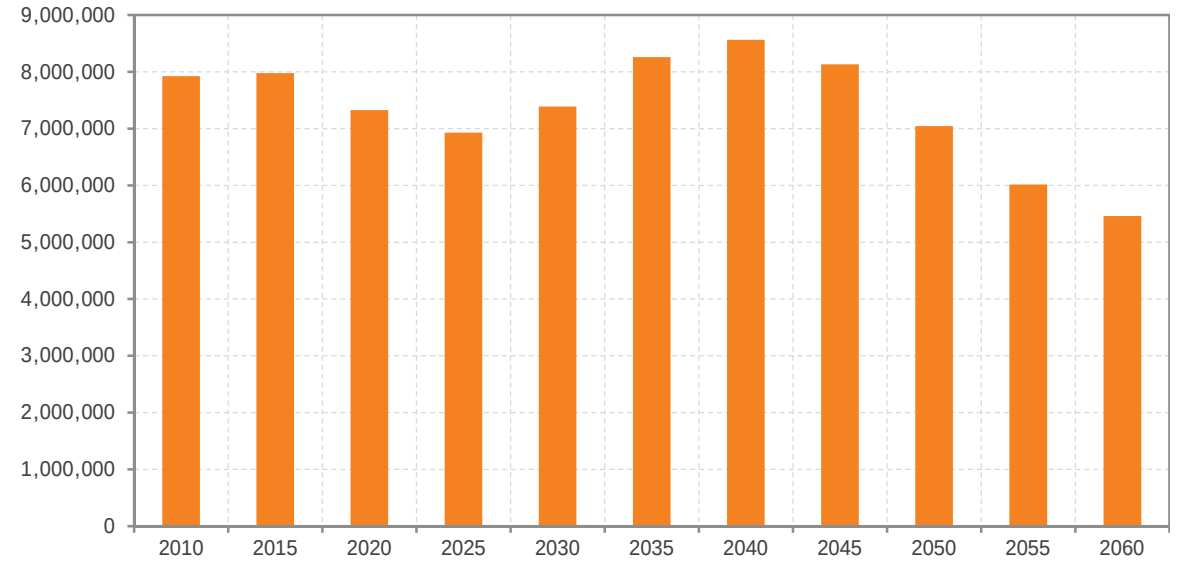
The trends in care for the older generation in the longer term are also driven by underlying demographic changes in the numbers of people aged 50 to 64. Figure 5.13 shows the percentage change between 2010 and 2060 in informal care provision to the older generation and the percentage change in the numbers of people aged 50 to 64. The figure shows that, in Germany, the Netherlands and Poland, there are projected to be absolute falls in the numbers of people aged 50 to 64 over the next 50 years, and that it is only in Spain that there is any increase projected.

Figure 5.13 Percentage change in informal care provision to older generation and in numbers of people aged 50 to 64, ANCIEN representative countries, 2010-2060 (Percentage change 2010-2060)

Sources and notes: see Table 5.6.

The demographic trends in the population aged 50 to 64 help to explain the projected 'undulation' in numbers providing care for the older generation in Poland, observed earlier. Figure 5.7, in the earlier sub-section on trends in informal care in Poland, shows a distinctive undulation in projected provision of intergenerational care, so that provision of care for the older generation initially falls, then rises between 2025 and 2040, before falling again between 2040 and 2060. Figure 5.14 shows that this undulation corresponds approximately to trends in the numbers of people aged 50 to 64 in Poland. As Figure 5.14 shows, the numbers of people aged 50 to 64 in Poland fall between 2015 and 2025, then rise between 2025 and 2040, before falling again between 2040 and 2060. The reason for the distinctive peak in the numbers of people aged 50 to 64 in the 2035-to-2045 period is that there was a 'baby boom' in Poland during the 1980s. This baby boom helps to explain why, in contrast to Germany and the Netherlands, the shorter-term trends, over the next 30 years, show an increase in provision of care to the older generation in Poland (Figure 5.12). The underlying trends in the population aged 50 to 64 in Poland also explain why, after 2040, care for the older generation falls rapidly. Indeed, as Figure 5.13 showed, the projected percentage fall in intergenerational care in Poland over the next 50 years is greater than in any of the other ANCIEN representative countries.

Figure 5.14 Numbers in population aged 50 to 64, Poland, 2010-2060



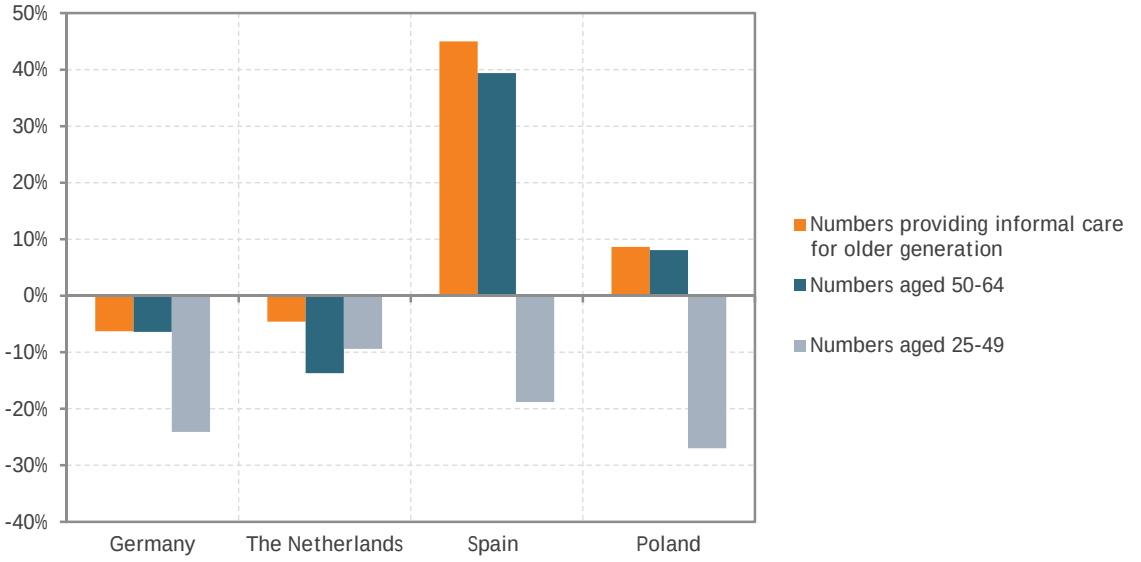
Source: Europop (2008).

d. Demographic changes in younger population aged under 50

The demographic trends also suggest that, if it had been possible to take into account provision of care by people aged under 50, then the projected declines in care for the older generation would likely have been even more pronounced and extensive.

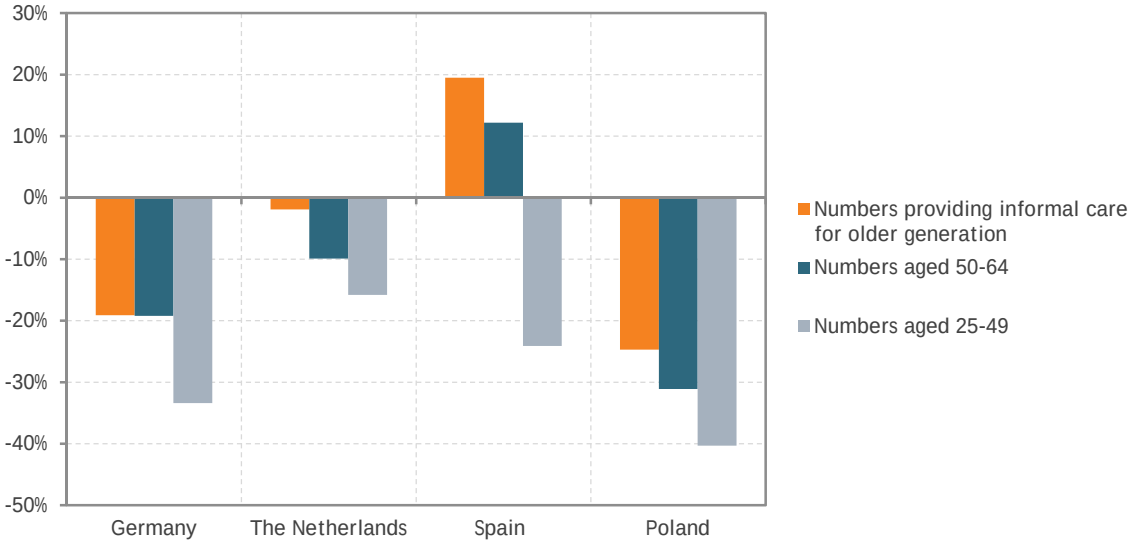
Figure 5.15 and Figure 5.16 show the trends in numbers of people aged 25 to 49, over the 2010-2040 and 2010-2060 periods respectively. The figures show that, in every country, including Spain, there are projected to be sharp falls in the numbers of people aged 25 to 49 over the next 30 years (Figure 5.15) and that these falls in the projected numbers of people in the younger age-groups are even more marked in the longer term, over the next 50 years (Figure 5.16).

Figure 5.15 Percentage change in informal care provision to older generation and in numbers of people aged 50-64 and 25-49, ANCIEN representative countries, 2010-2040 (Percentage change 2010-2040)



Source: Europop (2008).

Figure 5.16 Percentage change in informal care provision to older generation and in numbers of people aged 50-64 and 25-49, ANCIEN representative countries, 2010-2060 (Percentage change 2010-2060)

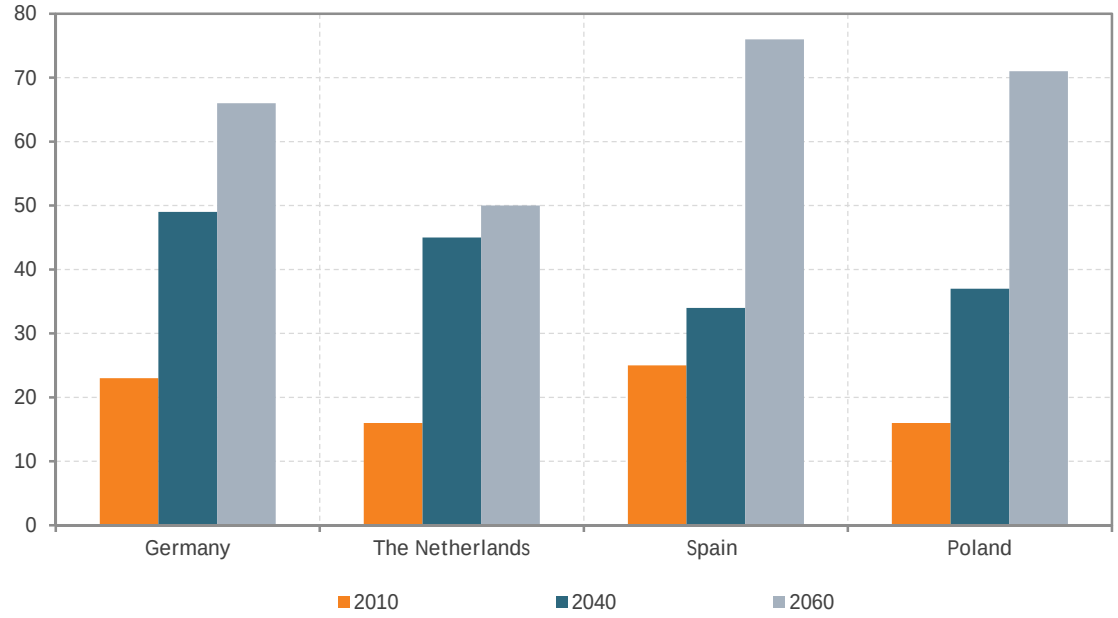


Source: Europop (2008).

e. Underlying changes in 'parent support ratio'

Clearly what underlies some of the projected trends in informal care supply and demand, identified here, is the likely rise in the 'parent support ratio'. Figure 5.17 shows a version of the 'parent support ratio', measuring the total number of persons aged 80 and over per hundred persons aged 50 to 64, in the four ANCIEN representative countries in 2010, 2040 and 2060. The figure shows a very large increase in the 'parent support ratio' in all the ANCIEN countries in the 50-year period between 2010 and 2060. In 2010, there are no more than 25 people aged 80 and over per hundred people aged 50 to 64, but by 2060, this has risen to at least 50. In Germany and the Netherlands, most of the increase in the 'parent support ratio' occurs over the next 30 years, whereas in Spain and Poland, most of the increase occurs between 2040 and 2060. Indeed, the 'parent support ratio' by 2060 is projected to be higher in Spain and Poland than in either Germany or the Netherlands.

Figure 5.17 'Parent support ratio' (total number of persons aged 80 and over per hundred persons aged 50 to 64) ANCIEN representative countries in 2010, 2040 and 2060 (Parent support ratio)



Source: Europop (2008).

Summary and conclusions

This chapter has reported on projections of the provision of informal care to older people between 2010 and 2060 in the four representative countries in the ANCIEN study (Germany, the Netherlands, Spain and Poland). The chapter has made projections of the numbers of people aged 50 and over who provide regular personal care to an older person. The projections have looked separately at provision of care to the older generation (intergenerational care) and at provision of care to partners and spouses aged 65 and over ('spouse care'). The projections of informal care in future years are based on an analysis of the probability of providing informal care in the present, based on Wave 2 (2006/7) SHARE data. Based on a multivariate analysis of the SHARE data, the projections take into account the age, gender and marital status of caregivers. The analysis of the projections in this chapter has focused on two time periods: changes in the shorter term over the next 30 years, between 2010 and 2040; and changes in the longer term over the next 50 years, between 2010 and 2060.

The results show that, at present, there are large variations between European countries in the numbers of people providing informal personal care to older people. The numbers of people aged 50 and over currently providing informal personal care to an older person range from approximately 75,000 in the Netherlands to approximately 1.6 million in Germany. These variations between countries are partly due to differences in the size of the overall populations, but also reflect differences in reliance on informal care in the long-term care systems. There are also wide variations in the extent to which different European countries rely on intergenerational care. Reliance on intergenerational care is least in the Netherlands and greatest in Spain.

In all the ANCIEN representative countries, informal care supply, by people aged 50 and over, is projected to increase both in the shorter term, over the next 30 years, and in the longer term, over the next 50 years. However, in all the countries, the increase in informal care supply is not projected to keep pace with demand, measured in this chapter by a broad indicator, the total numbers of people aged 80 and over in households. In all the countries, the percentage increase in the numbers of people providing informal care is projected to be lower than the percentage increase in the numbers of people aged 80 and over, both in the shorter term and in the longer term.

The relatively slow projected rise in informal care supply is not primarily due to trends in spouse care, which is projected to rise in all the representative countries over both the shorter term and the longer term. The key reason for the relatively slow growth in informal care supply is due to projected trends in care for the older generation. Over the next 30 years, there is projected to be an absolute decline in the numbers of people providing care to the older generation in Germany and the Netherlands. Over the next 50 years, there is projected to be an absolute decline in provision of care to the older generation in Germany, the Netherlands and Poland. It is only in Spain that the numbers of people providing care to the older generation is projected to increase, both in the shorter and longer terms.

These trends in care for the older generation are, in turn, driven by underlying demographic trends in the numbers of people aged 50 to 64. Over the next 30 years, there is projected to be a decline in the population aged 50 to 64 in Germany and the Netherlands and, over the next 50 years, there is projected to be a decline in the population aged 50 to 64 in Germany, the Netherlands and Poland. It is only in Spain, that the numbers of people aged 50 to 64 are projected to increase both in the shorter and longer terms.

The projections reported in this chapter relate to provision of informal care by people aged 50 and over. It was not possible to estimate numbers of people providing informal care aged under 50 because of limitations in the available data. However, the results reported in the chapter suggest that the inclusion of informal care by those aged under 50 would be likely to exacerbate the projected decline in care for the older generation. This is because there are projected to be absolute declines in the numbers of people aged 25 to 49 in all the ANCIEN representative countries, including Spain, both over the next 30 years and over the next 50 years.

The trends identified here reflect changes in the ‘parent support ratio’, measured here by the total number of persons aged 80 and over per hundred persons aged 50 to 64. The ‘parent support ratio’ is projected to rise in all four ANCIEN representative countries over both the next 30 years and the next 50 years. In Germany and the Netherlands, most of the increase in the ‘parent support ratio’ occurs over the next 30 years, whereas in Spain and Poland, most of the increase occurs between 2040 and 2060.

The ‘parent support ratio’ is a broad measure of the relationship between supply and demand for care. However, a more accurate measure of this relationship is likely to be obtained by bringing together the results of the present chapter on informal care supply and the results of the earlier chapter on informal care receipt or use. The concluding chapter of this report brings together our results on informal care supply and demand, and compares the numbers of caregivers projected to provide informal care to older people and the numbers of older people projected to receive informal care in the future.

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6. Projections of the future long-term care workforce

Jérôme Wittwer and Andreas Goltz, LEGOS

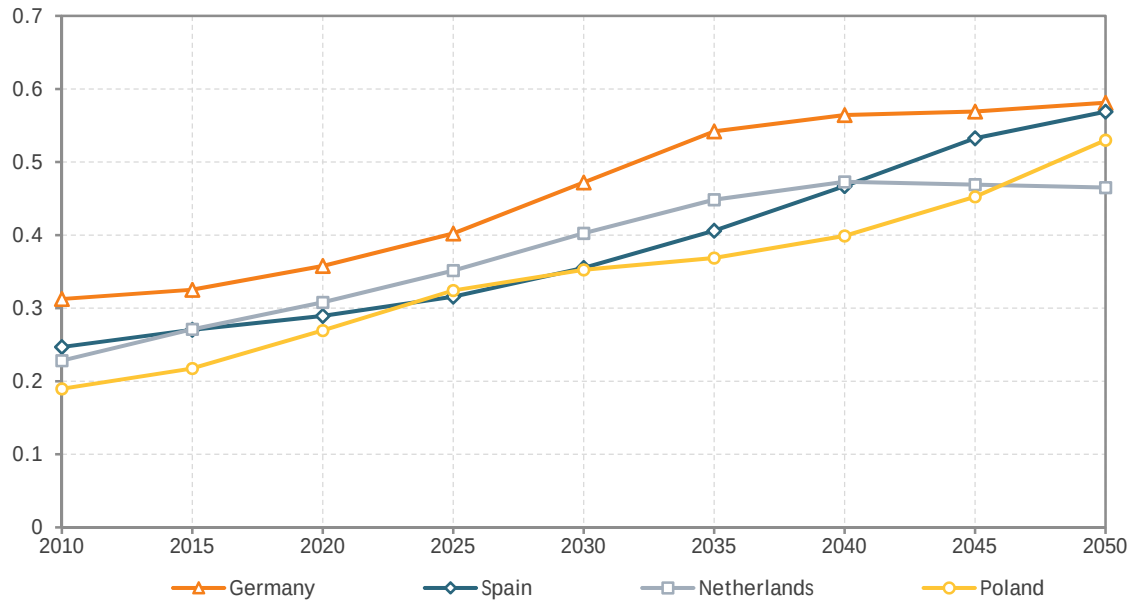
Introduction

Why are we even worried about the future supply of long-term care workers? The answer to this is closely related to the changing societies in European countries. On the one hand there are worries that changes in values and the labour market participation of women may lead to a decreasing supply of informal care and thus a greater need for formal LTC workers. Demographic changes on the other hand could lead to a shrinking workforce in general and thus also a shrinking LTC workforce while possibly increasing the demand due to the greater number of elderly people. These considerations have led to worries that the future demand may not be met by the future supply. This chapter will treat the supply side of the LTC workforce and bring together projections from Germany, the Netherlands, Spain and Poland. To give a clearer insight in the demographic effects which may be at work in the coming 40 years, we can have a look at Figure 6.1 which depicts the development of the age dependency ratio for the four countries under research. The Age dependency ratio can be seen as a standard statistic to compare the size of the older population with the size of the population in the working age. The World Bank (2011) defines it as:

$$Age\ dependency\ ratio = \frac{\#\ of\ people\ 65\ years\ old\ or\ older}{\#\ of\ people\ 15-64\ years\ old}$$

The more elderly people per person in the working age in a population, the higher the ratio will be. Using the data from the Eurostat population forecast (EUROPOP2010, convergence scenario) we can then calculate the ratio until the year 2050. Figure 6.1 shows that all four countries will experience strong increases of the ratio as we would have expected. In 2050 there will be only about two people in the working age for one elderly person in all four countries. It should especially be noted that the group of very old people, that is persons who are 85 years or older will rise significantly in the future and thus the group with the highest probability to be care dependent. A shrinking workforce may thus face an increasing number of care dependent people. In the following we will estimate more realistic models for the future supply of and the demand of LTC workers.

Figure 6.1 Age dependency ratio



Source: Eurostat, own calculations.

The report builds on LTC workforce projections of the four partner countries Germany (Schulz, 2011), Spain (Jimenez, 2012), the Netherlands (CPB, 2011), and Poland (Golinowska, 2012) and is also based on previous work of the ANCIEN project. Geerts' (2010) contribution to work package 3, a description of the long-term care workforce, and the final report of work package 1 by Kraus et al. (2010), which introduced a typology of the different long-term care systems in Europe are essential in understanding the country selection and the findings.

This chapter is organised as follows: We will begin by shortly describing the findings of Kraus et al. (2010) and Geerts (2010), before we will describe the different techniques used by the partner countries to project the LTC workforce supply. Keeping the possible differences in mind, we will then compare the findings.

6.1 Country selection

The selected countries for the forecast were chosen in accordance with the report from Geerts (2010) which itself bases the choice on the typology of long-term care systems introduced by Kraus et al. (2010, see Introduction to this report, Table 1.1). Kraus et al. (2010) identified four different clusters of care systems based on use and financing of care. in Europe. This chapter aims to give a forecast of the LTC workforce for one representative country out of every cluster and to give an impression of the different developments according to the clusters. The countries chosen for this task are: Germany from cluster one, the Netherlands from cluster two, Spain from cluster three and finally Poland from cluster four.

Table 6.1 Formal care workers density

Country	Formal care worker density, 2008	Trend 1993 – 2008
Germany	177	+ 39 %
The Netherlands	359	+ 25 %
Spain	287	+ 123 %
Poland	150	- 9 % (a)

Note: Formal care worker density based on the European Labour Force Survey and including four ISCO-88 occupational categories: 513 (personal care and related workers), 223 (nursing and midwifery professionals), 323 (nursing and midwifery associate professionals), 913 (domestic and related helpers, cleaners and launderers); Number of formal care workers per 1000 population 65+; (a) 1997 - 2008

Source: Geerts (2010).

Table 6.1 summarizes the main findings of Geerts (2010). The author had a look at the present state and the development of the care workforce from 1993 to 2008 in the four countries.[14] The author's findings are well in line with our expectancies: a country which has a high public spending like the Netherlands has also a high density of formal care workers compared to their population of 65 years or older. Germany and Poland on the other hand have a comparably low public spending and also a low density of formal care workers. Spain is somewhat in between these two groups of countries and reports medium levels of public spending and formal care workers. Geerts also finds that the countries had very different developments of their LTC workforce in the past. While the care workforce has more than doubled in Spain between 1993 and 2008, we can find an increase of 25% to about 40% in Germany and the Netherlands. In Poland finally we find that the figures have remained relatively stable, we can even identify a small decrease. Geerts' findings include also that the development of the care workforce of a country does not necessarily resemble the one of the overall workforce.

[14] The European Labour Force Survey was used because it is an internationally comparable database. However, it is difficult to select LTC workers with precision in the EU LFS. Differences with national data on the LTC workforce can be considerable, see Geerts (2010).

6.2 Projection techniques

The Netherlands, Germany, and Spain provided us with forecasts using similar definitions of the LTC workforce: It includes all personnel in nursing and residential care homes as well as all employed people in home based care. Poland on the other hand did not have information available on the number of health care workers in home based care. The Polish definition thus includes all social care workers in LTC, but only health care workers in institutional care. The following results are calculated in full time equivalents to account for possible differences in working time preferences between the countries. All countries provided forecasts using similar techniques which scale down forecasts of the overall workforce supply to the future LTC workforce supply. The results are thus relatively comparable.

The Netherlands (CPB, 2011) provided four different results which were derived under different hypotheses:

A) The fraction of LTC workers in the total workforce remains constant
B) The fractions of LTC workers by sex remain constant
C) The fractions of LTC workers by age groups of five years remain constant
D) The fractions of LTC workers by age and sex remain constant

The term "remains constant" refers in all cases to the average value between 2004 and 2009.

Under these hypotheses the CPB could calculate the actual number of LTC worker supply using the following formula:

$$LTC\ workforce_t = \sum_i \left(\frac{1}{6} \sum_{u=2004}^{2009} \frac{LTC\ workforce_{i,u}}{Total\ workforce_{i,u}}\right) * Total\ workforce_{i,t}\ ,$$

where u defines the time and i the personal characteristics which depends on the hypotheses in A to D. The Dutch authors are relying on forecasts of the total workforce which they take from Euwals & Folmer (2009). Euwals & Folmer take not only demographic factors and changes in the labour force participation rate of women and older persons into account, but also long-term effects of policies which are already implemented and changes in the hours of work that different types of workers may work in the future.

Schulz (2011) used a very similar technique to forecast the future LTC workforce supply for Germany: The author forecasts the overall workforce supply and calculates then under the assumption of a constant fraction of LTC workers in the workforce the actual number of the future supply of the LTC workforce. The technique employed as well as the hypotheses made are thus very close to the Dutch estimations under hypothesis A. For the forecast of the overall workforce supply the author takes changes in the demography and the labour force participation rates into account.

Jiménez (2011) used three different assumptions to forecast the total workforce in Spain in the future:

A) The fraction of the people in the working age who are in the workforce remains at the value of 2009
B) The fraction of the people in the working age who are in the workforce remains stable at an average value of 2005 - 2010
C) The fraction of people in the workforce rises to 70% until 2015 and remains stable afterwards

Golinowska & Styczyńska (2012) made use of two different forecasts of the overall workforce under the following assumptions:

1) pension reform and cancellation of early retirement
2) pension reform, cancellation of early retirement and an increase of the retirement age up to 67 (during 2021-2030)

For the projection exercise of the LTC workforce Jimenez (2011) and Golinowska & Styczyńska (2012) kept the fraction of people working in the LTC sector at a stable level over the years. This assumption is thus very similar to the one made for the Netherlands and Germany.

The four countries are thus only taking factors from the supply side into account. This means on the other hand that the projections here may be far from the real realized figures in the future, since the demand side will surely influence the actual number. Nevertheless this is done deliberately since we want to confront our findings with the forecast of the demand for LTC workers in the future.

6.3 Results

The results for the Netherlands show that the development of the future LTC workforce supply depends on the assumptions made. Under hypothesis A we find a number which is about 10% smaller than under hypothesis D. Still under all four hypotheses we can basically see the same trend: An initial period of stable or even increasing numbers until 2020 is followed by a decline until 2035. After 2035 we can again see that the trend seems to change: the figures start to grow slowly. Under hypotheses A and C we find more or less the same results while hypotheses B and D lead to significantly larger figures. This can be explained with the relatively high fraction of women in the LTC workforce and the fact that labour market participation by women is likely to increase in the future.

In the German case, which is comparable to the Dutch results under hypothesis A as has been noted before, we can see that the numbers also stay stable at the initial amount for the first 15 years but after 2025 there is gradual decline until 2050. Unlike the Netherlands we cannot observe an increase anymore in later periods.

In Spain we find a reduction of the LTC workforce of 7% to 18%, depending on the forecast of the total workforce. In scenario A we find an almost linear reduction of the LTC workforce of 1% to 4% every five years and thus a relative large reduction of 18% until 2049. Under the other two scenarios we can also find a total reduction of the LTC workforce, but to a much lesser degree.

We find an initial increase of LTC workers in Poland until 2020. Afterwards the numbers fall in both scenarios. In 2050 the decrease will amount to 20% – 23% of the initial value.

Table 6.2 LTC workforce projections in FTE

Year	The Netherlands				Germany	Spain			Poland	
	A	B	C	D	1	A	B	C	1	2
2010(a)	236,358	238,295	237,384	241,994	631,000	429,770	429,770	429,770	18,107	18,107
2015	236,957	242,271	239,356	248,896		422,307	439,586	483,821		
2020	236,528	245,170	238,245	252,772	642,000	418,780	435,914	479,780	19,838	19,838
2025	232,713	242,588	232,551	248,565	629,000	414,001	430,940	474,305	19,034	19,034
2030	227,733	239,328	226,280	243,440	606,000	406,073	422,688	465,223	17,842	18,278
2035	223,905	237,298	222,896	240,901		393,135	409,220	450,399		
2040	223,696	238,684	223,945	243,131	552,000	376,291	391,687	431,103	16,293	16,926
2045	226,008	242,461	227,138	248,154		359,022	373,712	411,318		
2050(b)	228,252	245,441	229,385	251,549	509,000	350,552	364,895	401,614	13,922	14,502

Note: (a): 2009 for Germany, Spain and Poland; (b) 2049 for the Netherlands and Spain.

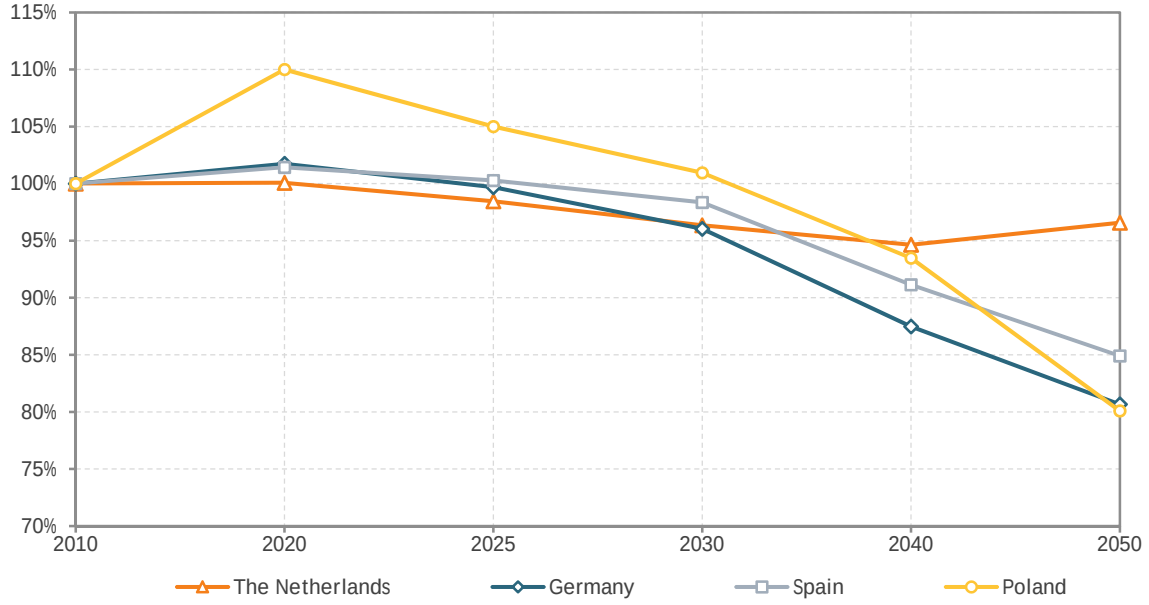
Sources: Germany: Schulz (2011), the Netherlands: CPB (2011), Spain: Jimenez (2011), Poland: Golinowska (2012).

To compare the results of the countries we can now have a closer look at the results using the figures which make very similar assumptions. We choose thus the Dutch results derived under hypothesis A, the

German forecast, the Spanish forecast in scenario B, and the Polish results under scenario 2. Figure 6.2 looks at the change in percent with the year 2009/2010 as a base year:

As already mentioned before, we can see a very similar trend until 2025: all four countries stay at a more or less stable number of LTC workers, with the exception of Poland were the number of LTC workers will increase between 2010 and 2020. After 2030 we can see that the countries will split up into two groups: The first group consisting solely of the Netherlands will experience only a very small decrease of LTC workers until 2040 and a final increase in the figure between 2040 and 2050. The second group, consisting of Spain, Germany, and Poland on the other hand are experiencing a much stronger decrease and loose 15% to 20% of their LTC workforce until 2050.

Figure 6.2 Projections of the LTC workforce as a fixed share of the total workforce (2010=100)

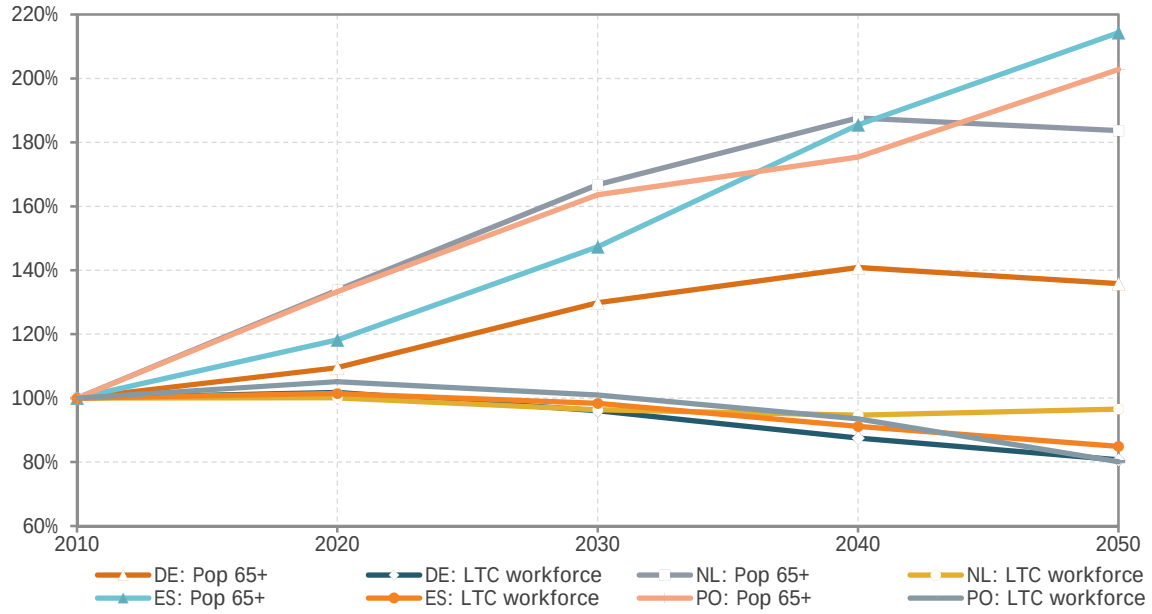


Source: Netherlands: CPB (2011) Hypothesis A, Germany: Schulz (2011), Spain: Jimenez (2011) Hypothesis B, Poland: Golinowska (2012) Hypothesis 2.

This means finally that under these simple assumptions the future LTC workforce supply is shrinking or remaining at a more or less stable figure. To get a first impression of how the demand will change over time we can set the four supply forecasts from the Netherlands, Spain, Germany, and Poland in comparison with the change of the elderly population. Figure 6.3 does exactly this. Using again the Eurostat population forecast we can see how the elderly population will change in the coming years with 2010 as the base year. The curves of the LTC workforce are exactly the same as in Figure 6.2 and thus the forecast from Germany, the forecast from the Netherlands under hypothesis A, the forecast from the Spanish scenario B, and finally the forecast from Poland under scenario 2. We can see that the elderly population will indeed strongly increase in the coming decades in all four countries. The Dutch elderly population will increase by almost 90 % until 2040 where it seems to find an upper limit. The development for Germany is very similar and yet not as drastic. The German elderly population will grow by 40% until 2040 before the growth seems to stop. The elderly population in Spain and Poland finally will grow in a very fast way and will more than double until 2050. While this picture is certainly not very comforting, it is important to notice that this figure is not necessarily telling that the supply of LTC workforce will not be met by the demand in the future. A forecast of the future demand would have to go much further than this since the partition of elderly people who are care dependent may not stay constant on the one hand and because there might be some care technology advances which may lead to

a decline in the demand for LTC workers. It is therefore of great importance to forecast the demand for LTC workers in the same way as has been done for the supply. Only then we can also draw further conclusions using the findings from Kraus et al. (2010) and Geerts (2010) (see Table 1.1 and Table 6.1). For now we can conclude that a country like Germany, which has already a low level of formal care worker density, will probably experience a further decline, while the Netherlands will maybe not be able to keep up their high level of formal care workers density.

Figure 6.3 Comparison of the workforce projection with the development of the elderly population (2010=100)



Source: Eurostat, CPB (2011), Schulz (2011), Jimenez (2011), Golinowska (2012).

Conclusion

This report summarizes projections of the supply of the LTC workforce in the Netherlands, Spain, Germany, and Poland until 2050 under simple assumptions. Various factors lead to a fear of a future shortage of LTC workers. We try to use only supply side factors here to model the future potential supply of the LTC workforce and find indeed a similar picture for the four countries: If similar forecast techniques are employed we find according to the assumptions made that the supply will not increase in the four countries until 2050. Still, the Netherlands will stay at a more or less stable figure, while Germany, Spain, and Poland will even have to cope with a reduction of almost 15% to 20% of their LTC workforce supply. A short comparison with the future elderly population in the four countries revealed furthermore a strong increase in the number of older people and thus a probable increase in the demand for LTC services in the future. Better forecasting techniques for the future demand of LTC services are nevertheless important to give final answers about the future demand of LTC workers Moreover, potential scarcity of workers in the future also depends on the interaction between demand and supply.

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7. Conclusions

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This chapter brings together the results of the projections of LTC use and LTC supply for the four representative ANCIEN countries: Germany, the Netherlands, Spain and Poland. Section 7.1 compares the results of the projections presented in Chapter 4 of use of informal care under the base DELAY scenario with the projections of informal caregivers reported in Chapter 5. Section 7.2 makes a similar comparison for formal care: the Chapter 4 projections of formal care use are compared with the projections of formal care workers reported in Chapter 6.

The comparison of informal care supply and demand (section 7.1), and the comparison of formal care supply and demand (section 7.2), both draw on a methodology originally developed in relation to projections of informal care supply and demand in England (Pickard 2008). In the methodology, a comparison is initially made between projected numbers of informal (or formal) caregivers and projected numbers of informal (or formal) care-users, with the projections of informal (or formal) caregivers assuming constant probabilities of providing informal care (or constant rates of LTC workforce participation). These projections of the numbers of caregivers are then compared with the numbers of caregivers that would be needed if the supply of informal (or formal care) were to meet demand in future. The estimate of the number of caregivers that would be needed if supply were to meet demand is calculated by assuming that the current ratio of caregivers to care-users remains constant in future years. A potential shortage of caregivers, an informal (or formal) 'care gap', can then be identified. This methodology is explained in more detail in relation to informal and formal care projections, respectively, in the two sections that follow.

7.1 Informal care supply and demand in Europe

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The key question examined in this part of the conclusions is whether informal care supply is likely to keep pace with demand in future years in European countries. The evidence in the chapter on informal care supply suggested that informal care supply would be unlikely to keep pace with demand, partly because of the underlying increase in the 'parent support ratio' in all the ANCIEN representative countries, both in the shorter term and in the longer term. However, the chapter concluded by suggesting that a more accurate estimate of the extent to which informal care supply is likely to meet demand would be obtained by comparing the numbers of caregivers projected to provide informal care to older people in future and the numbers of older people projected to use or receive informal care in future. This is the purpose of the present analysis.

This part of the conclusions compares the projected numbers of informal caregivers and the projected numbers of informal care-users in representative European countries in future years. The comparison brings together the results already presented in this report in Chapter 5, which looked at projections of informal care supply, and Chapter 4, which gave projections of informal care use. As elsewhere in the report, the projections relate to the ANCIEN representative countries between 2010 and 2060.

7.1.1 Comparison of informal care provision and receipt in 2010

Table 7.1 compares the numbers providing and receiving informal personal care in the ANCIEN representative countries in 2010. The figures for the provision of care are from Chapter 5, while the figures for use, or receipt, of care are from Chapter 4. The receipt figures are available for Germany, the Netherlands and Spain, but not for Poland.

Table 7.1 Estimated numbers providing informal personal care to an older person and numbers of older people receiving informal personal care, ANCIEN representative countries, 2010 (Estimated numbers)

	Germany	The Netherlands	Spain	Poland
Caregivers	1,583,130	74,079	1,042,481	511,675
Care-users	2,700,367	93,215	1,176,185	n/a
Ratio of caregivers to users	0.59	0.79	0.89	n/a

Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

Table 7.1 shows that the numbers providing informal care are lower than the numbers receiving care in each country. This is because not all informal care provision is included. As Chapter 5 makes clear, the supply side excludes, in particular, care by people aged under 50. The ratio of provision to receipt varies by country, and this is likely to be due partly to differences in the role played by people aged under 50 in the provision of care in the different countries. Nevertheless, the ratio of provision to receipt of informal care is a useful measure, which can be used to examine the extent to which the supply of informal care keeps pace with demand over time (see below).

7.1.2 Numbers providing and receiving informal care, 2010-2060

Table 7.2 compares the numbers providing and receiving informal personal care in Germany, the Netherlands and Spain between 2010 and 2060. The table gives the percentage change over time in the shorter term, over the 30 years between 2010 and 2040, and over the longer term, over the 50 years between 2010 and 2060. The table also shows the ratio between caregivers and care-users over time.

Table 7.2 Provision of informal personal care to an older person and receipt of informal personal care by older people, Germany, the Netherlands, Spain, 2010-2060 (Estimated numbers, ratios and percentage change over time)

	(A) Caregivers	(B) Care-users	(C) Ratio of caregivers to care-users
Germany			
2010	1,583,130	2,700,367	0.59
2015	1,694,602	2,846,145	0.60
2020	1,804,462	3,101,643	0.58
2025	1,849,685	3,363,732	0.55
2030	1,904,575	3,710,499	0.51
2035	1,957,398	3,975,456	0.49
2040	2,050,279	4,070,173	0.50
2045	2,093,824	4,132,790	0.51
2050	2,106,215	4,196,898	0.50
2055	2,057,368	4,197,957	0.49
2060	1,984,090	4,074,662	0.49
% change 2010-40	*29.5%*	*50.7%*	*-14.1%*
% change 2010-60	*25.3%*	*50.9%*	*-16.9%*
The Netherlands			
2010	74,079	93,215	0.79
2015	83,218	107,429	0.77

2020	96,285	123,004	0.78
2025	103,954	137,551	0.76
2030	108,321	149,999	0.72
2035	110,376	161,423	0.68
2040	112,204	167,319	0.67
2045	111,253	164,860	0.67
2050	106,970	159,153	0.67
2055	103,820	155,235	0.67
2060	103,283	154,353	0.67
% change 2010-40	*51.5%*	*79.5%*	*-15.6%*
% change 2010-60	*39.4%*	*65.6%*	*-15.8%*
Spain			
2010	1,042,481	1,176,185	0.89
2015	1,146,989	1,280,110	0.90
2020	1,273,243	1,375,553	0.93
2025	1,397,533	1,485,978	0.94
2030	1,528,620	1,634,834	0.94
2035	1,612,965	1,840,532	0.88
2040	1,625,967	2,080,199	0.78
2045	1,600,715	2,342,997	0.68
2050	1,557,134	2,577,225	0.60
2055	1,499,816	2,747,406	0.55
2060	1,460,628	2,824,786	0.52
% change 2010-40	*56.0%*	*76.9%*	*-11.8%*
% change 2010-60	*40.1%*	*140.2%*	*-41.7%*

Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

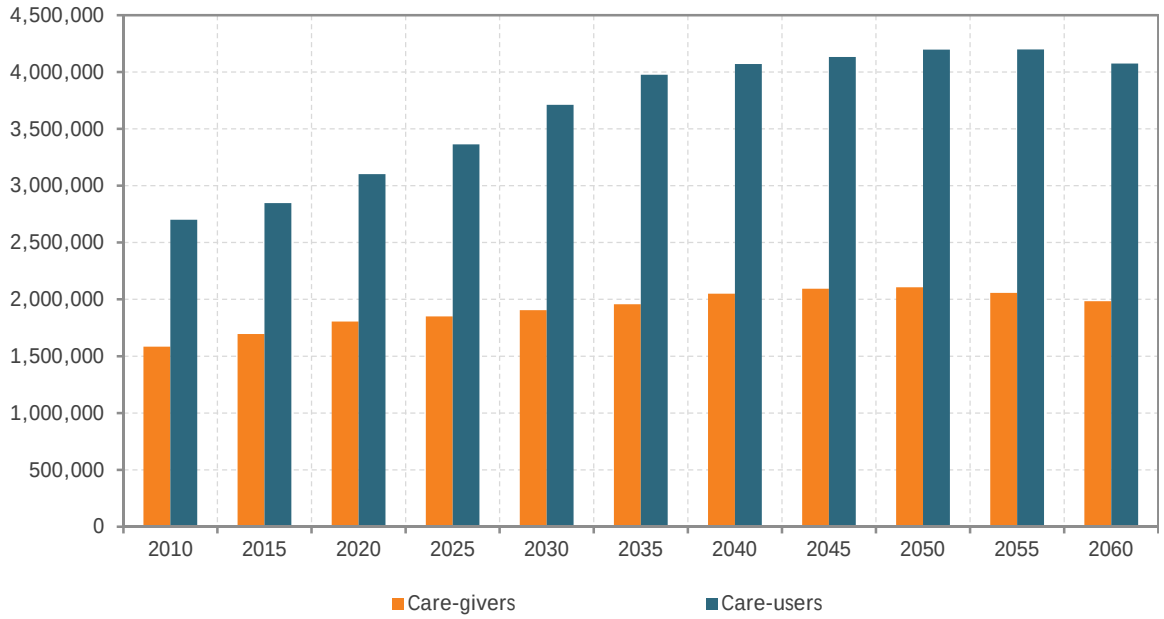
Table 7.2 shows that the number of projected care-users increases more rapidly than the number of projected caregivers in all the countries examined here, both over the next 30 years and over the next 50 years. Over the next 30 years, between 2010 and 2040, the number of caregivers in Germany is projected to increase by approximately 30 per cent, but the number of care-users is projected to increase by approximately 50 per cent. In the Netherlands, during the same period, the number of caregivers is projected to increase by approximately 50 per cent, whereas the number of care-users is projected to increase by approximately 80 per cent. In Spain, over the next 30 years, the number of caregivers is projected to increase by approximately 55 per cent, whereas the number of care-users is projected to increase by approximately 75 per cent. Most of the projected changes in the numbers of caregivers and care-users in Germany and the Netherlands take place between 2010 and 2040, but in Spain, there is a sharp rise in care-users after 2040, with no corresponding increase in caregivers. Indeed, in the 50 year period between 2010 and 2060, the number of caregivers in Spain is projected to increase by approximately 40 per cent, whereas the number of care-users is projected to increase three and half times as fast, by approximately 140 per cent (Table 7.2).

As a result of the more rapid increase in the projected number of care-users compared to caregivers, the ratio of caregivers to care-users falls in every country, both in the shorter and longer terms (Table 7.2). Between 2010 and 2060, the ratio falls from 0.59 to 0.49 in Germany, from 0.79 to 0.67 in the

Netherlands, and from 0.89 to 0.52 in Spain. The greatest decline in the ratio of caregivers to care-users occurs in Spain, with much of the decline occurring in the period between 2040 and 2060.

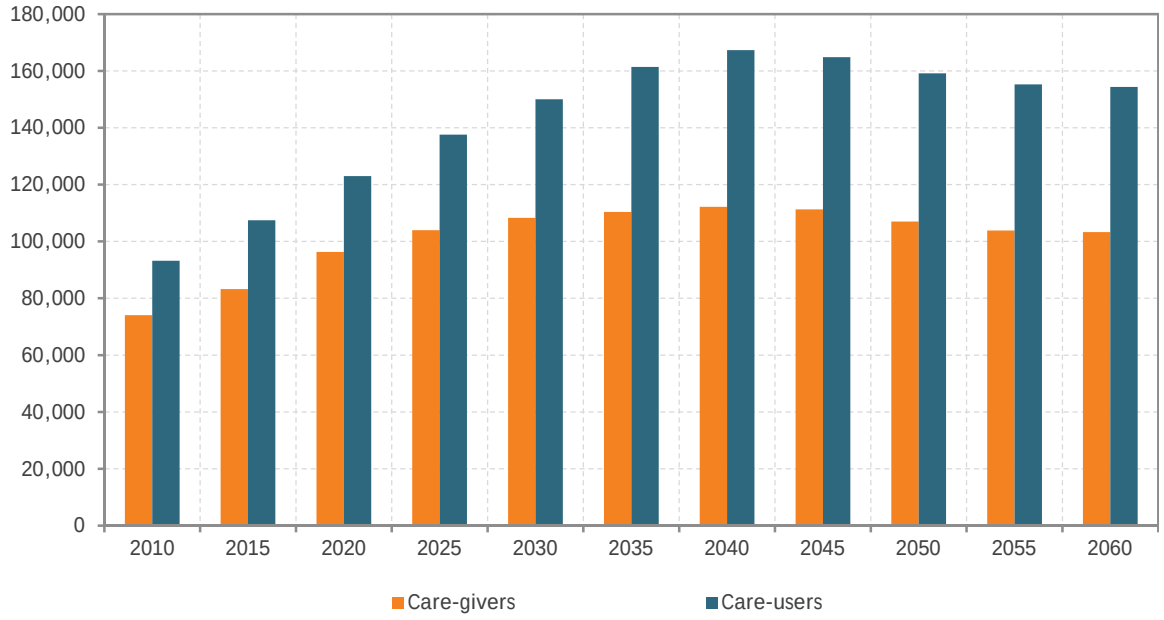
These results suggest that the supply of informal care to older people is unlikely to keep pace with demand in these representative European countries in future years. The changes are illustrated in Figure 7.1 to Figure 7.3, which show the numbers of informal caregivers and the numbers of informal care-users in Germany, the Netherlands and Spain between 2010 and 2060. The figures show that, in all the countries, there is a more rapid increase in the projected numbers of care-users compared to caregivers and that, as a result, there is a falling ratio of caregivers to care-users over time.

Figure 7.1 Caregivers providing informal personal care to an older person and care-users aged 65 and over receiving informal personal care, Germany, 2010-2060 (Estimated numbers)



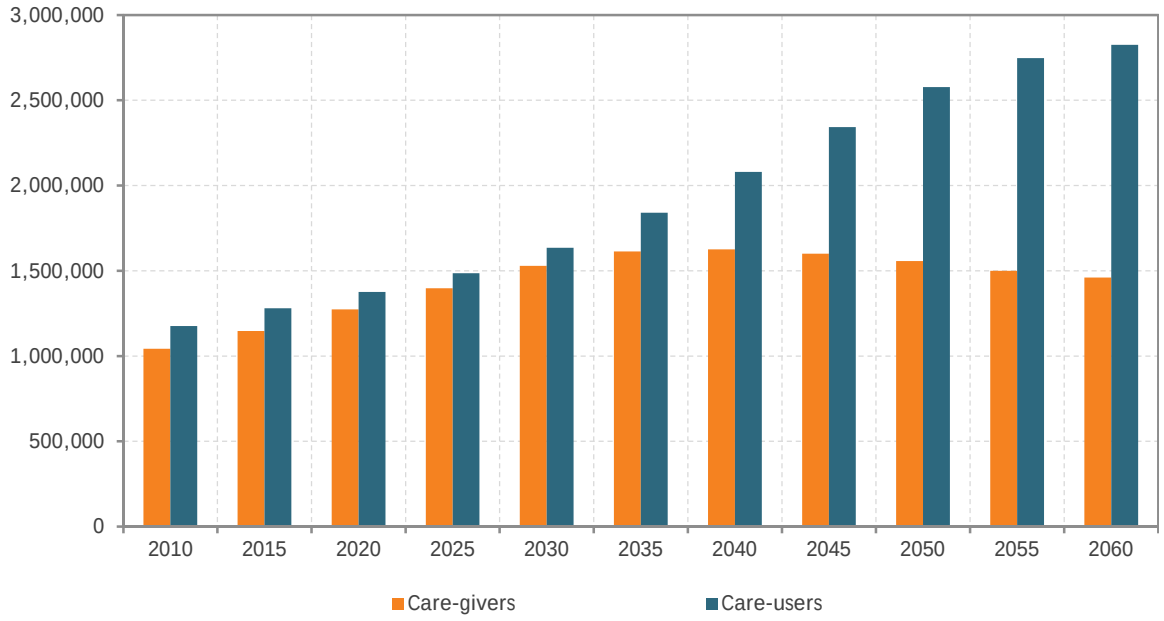
Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

Figure 7.2 Caregivers providing informal personal care to an older person and care-users aged 65 and over receiving informal personal care, The Netherlands, 2010-2060 (Estimated numbers)



Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

Figure 7.3 Caregivers providing informal personal care to an older person and care-users aged 65 and over receiving informal personal care, Spain, 2010-2060 (Estimated numbers)



Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

7.1.3 Gap between supply and demand for informal care, 2010-2060

The results so far suggest that the supply of informal care is unlikely to keep pace with demand in future years. In this section, an estimate is made of the numbers of *caregivers that would be needed if the supply of informal care were to meet demand* in future (Pickard, 2008). The estimate of the number of caregivers that would be needed if supply were to meet demand is calculated by assuming that the *current (2010) ratio of caregivers to care-users remains constant* in future years. In other words, the assumption is made that the ratio of caregivers to care-users between 2010 and 2060 remains at 0.59 in Germany, 0.79 in the Netherlands and 0.89 in Spain (Table 7.1). This constant ratio is multiplied by the projected number of care-users in each country, to give an estimate of the number of caregivers that would be needed if supply were to meet demand. The results are shown in the first column of Table 7.3.

Table 7.3 Caregivers at constant ratio of caregivers to care-users, caregivers at constant probability of providing care and 'care gap', Germany, the Netherlands, Spain, 2010-2060 (Estimated numbers and percentage change over time)

	(A) Caregivers at constant (2010) ratio of caregivers to care-users	(B) Caregivers at constant probabilities of providing care (as in Table 7.2)	(C) 'Care gap' Difference between column (A) and (B)
Germany			
2010	1,583,130	1,583,130	0
2015	1,668,595	1,694,602	-26,007
2020	1,818,384	1,804,462	13,922
2025	1,972,037	1,849,685	122,352
2030	2,175,334	1,904,575	270,759
2035	2,330,670	1,957,398	373,272
2040	2,386,199	2,050,279	335,920
2045	2,422,909	2,093,824	329,085
2050	2,460,493	2,106,215	354,278
2055	2,461,114	2,057,368	403,746
2060	2,388,831	1,984,090	404,741
% change 2010-40	*50.7%*	*29.5%*	
% change 2010-60	*50.9%*	*25.3%*	
The Netherlands			
2010	74,079	74,079	0
2015	85,376	83,218	2,158
2020	97,753	96,285	1,468
2025	109,314	103,954	5,360
2030	119,206	108,321	10,885
2035	128,285	110,376	17,909
2040	132,971	112,204	20,767
2045	131,017	111,253	19,764
2050	126,481	106,970	19,511
2055	123,367	103,820	19,547
2060	122,666	103,283	19,383
% change 2010-40	*79.5%*	*51.5%*	
% change 2010-60	*65.6%*	*39.4%*	

Spain			
2010	1,042,481	1,042,481	-0
2015	1,134,592	1,146,989	-12,397
2020	1,219,185	1,273,243	-54,058
2025	1,317,058	1,397,533	-80,475
2030	1,448,993	1,528,620	-79,627
2035	1,631,308	1,612,965	18,343
2040	1,843,730	1,625,967	217,763
2045	2,076,655	1,600,715	475,940
2050	2,284,257	1,557,134	727,123
2055	2,435,092	1,499,816	935,276
2060	2,503,675	1,460,628	1,043,047
% change 2010-40	*76.9%*	*56.0%*	
% change 2010-60	*140.2%*	*40.1%*	

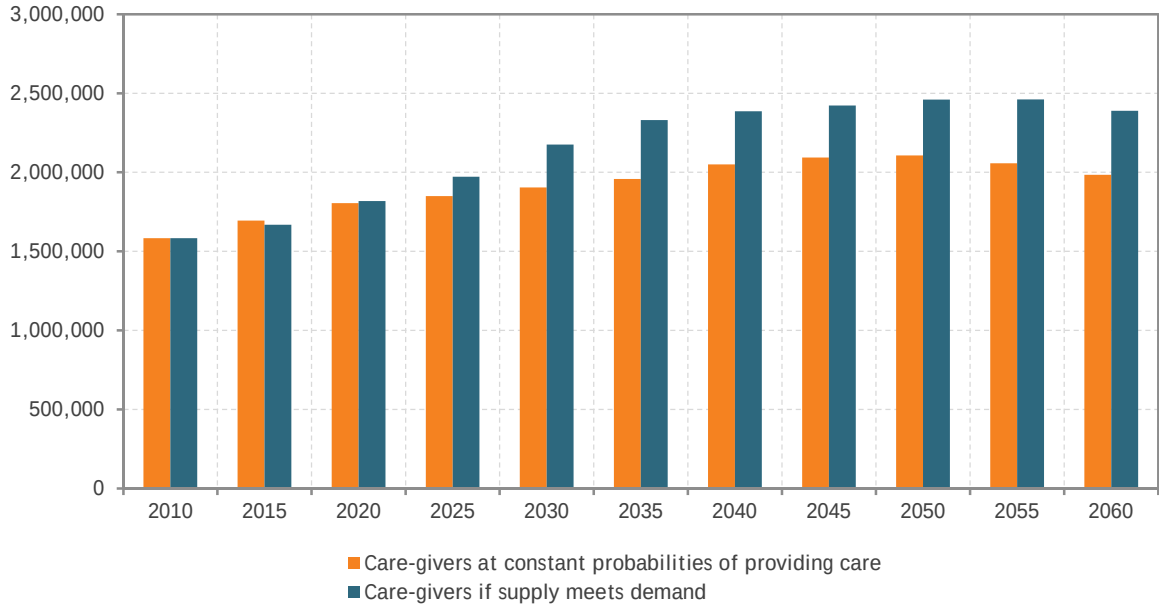
Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

Table 7.3 shows that, if the supply of informal care were to meet demand, then over the next 50 years, the number of caregivers would need to increase by approximately 50 per cent in Germany, 65 per cent in the Netherlands and 140 per cent in Spain (Table 7.3, column A). These percentage increases match the percentage increases in care- users shown in the previous section (Table 7.2, column B). Table 7.3 also shows that, if supply were to meet demand, then by 2060, there would need to be approximately 2.4 million caregivers in Germany, approximately 125,000 caregivers in the Netherlands and over 2.5 million caregivers in Spain.

The numbers of caregivers that would be needed if supply were to meet demand can be compared to the projected numbers of caregivers that are likely to be available, based on the projections given in the previous section (Table 7.2, column A). The latter numbers are based on the assumptions set out in Chapter 5 and in particular on the assumption that the *probability of providing care remains constant* over time at current rates. These estimates of the projected numbers of caregivers are replicated in Table 7.3 (column B). Table 7.3 shows that the projected numbers of caregivers, based on constant probabilities of providing care, are lower in both 2040 and in 2060 than the numbers that would be needed if supply were to meet demand. Thus, in Germany, there are projected to be approximately 2 million caregivers in 2060, but the numbers needed if supply were to meet demand would be approximately 2.4 million caregivers (Table 7.3, column B compared to column A). In the Netherlands, there are projected to be approximately 105,000 caregivers by 2060, but the number needed to meet demand would be approximately 125,000 caregivers. In Spain, there are projected to be approximately 1.5 million caregivers in 2060, but the number needed to meet demand would be approximately 2.5 million caregivers.

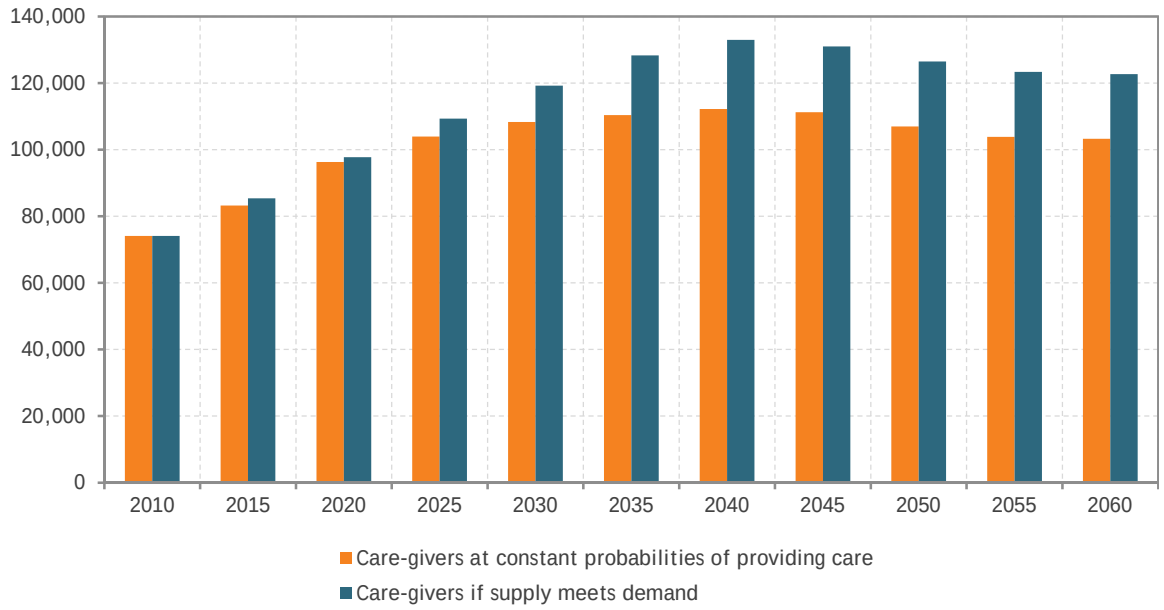
By 2060, the ‘care gap’ between the numbers of caregivers projected to be available and the numbers needed to meet demand amounts to approximately 400,000 caregivers in Germany, approximately 20,000 caregivers in the Netherlands and over a million caregivers in Spain (Table 7.3, column C). The ‘care gap’ is illustrated in Figure 7.4, Figure 7.5 and Figure 7.6, which show the numbers of caregivers at constant probabilities of providing care and the numbers if supply were to meet demand in Germany, the Netherlands and Spain between 2010 and 2060. As the figures show, the ‘care gap’ begins in 2015 in the Netherlands, 2020 in Germany and 2035 in Spain.

Figure 7.4 The 'care gap': caregivers providing informal personal care to an older person at constant probabilities of providing care, and caregivers if supply meets demand, Germany, 2010-2060 (Estimated numbers)



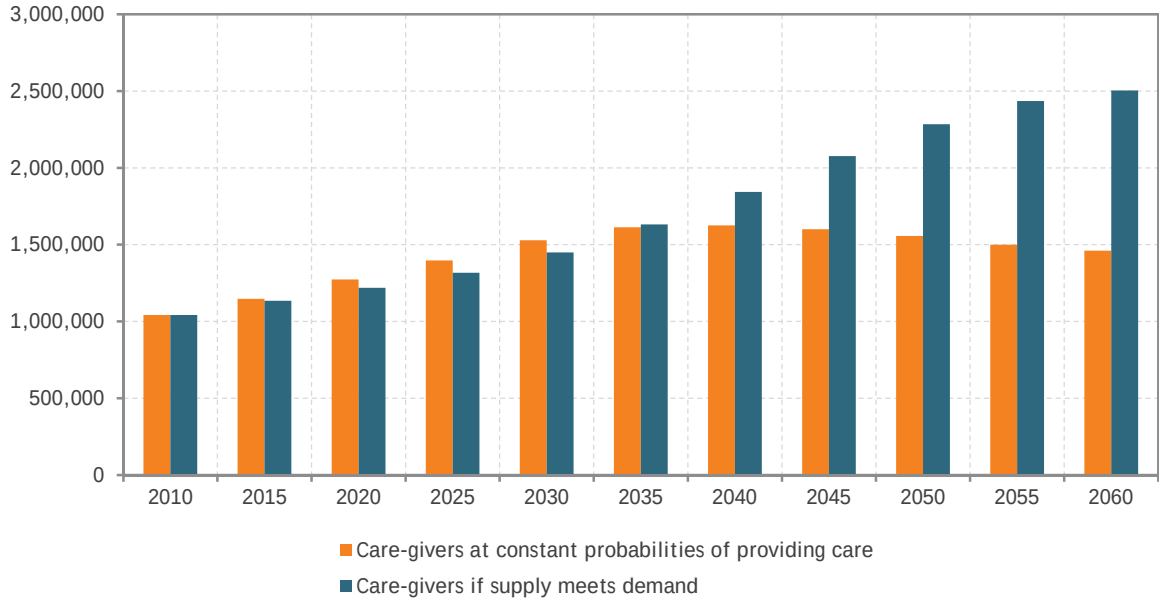
Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

Figure 7.5 The 'care gap': caregivers providing informal personal care to an older person at constant probabilities of providing care, and caregivers if supply meets demand, the Netherlands, 2010-2060 (Estimated numbers)



Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

Figure 7.6 The 'care gap': caregivers providing informal personal care to an older person at constant probabilities of providing care, and caregivers if supply meets demand, Spain, 2010-2060 (Estimated numbers)



Sources: Chapter 4 on home care use, Chapter 5 on informal care supply.

7.1.4 Informal care supply and demand: summary and conclusions

The key conclusion of the results presented here is that the supply of informal personal care to older people in representative European countries is unlikely to keep pace with demand in future years. Demand for informal care by older people is projected to exceed supply by 2015 in the Netherlands, 2020 in Germany and 2035 in Spain. By 2060, the gap between the numbers of people projected to provide informal care and the numbers needed to provide care if demand is to be met amounts to approximately 20,000 caregivers in the Netherlands, 400,000 in Germany and over a million in Spain. The 'care gap' is particularly large in Germany and Spain, and this in turn partly reflects the heavy reliance on informal care in the long-term care systems in these countries.

The reason why informal care does not keep pace with demand is primarily to do with trends in intergenerational care for older people. As Chapter 5 showed, in Germany and the Netherlands, there are projected to be absolute declines in the numbers of people providing intergenerational care between 2010 and 2040 and between 2010 and 2060. In Spain, the 'care gap' begins in around 2035 and it is at this point also, as Chapter 5 showed, that the decline in intergenerational care begins in Spain. The decline in intergenerational care after 2035 has a huge impact in Spain because of the very heavy reliance on intergenerational care in this country (Chapter 5). The trends in intergenerational care are, as Chapter 5 showed, themselves based on underlying demographic trends in the numbers of people aged 50 to 64.

The key policy implications of these findings are that, if the 'care gap' is to be filled in future years, then either more people will need to provide informal care or more formal care will need to be provided. It seems unlikely that more people will be able to provide informal care. Given that the 'care gap' is attributable primarily to trends in intergenerational care, and given that the trends in intergenerational care are themselves primarily attributable to demographic trends in the population aged 50 to 64, then if more people are to provide care, they are likely to be people of 'working age'. There is pressure in all

European countries for people of 'working age' to be in employment, in order to maximize the tax base in the context of population ageing (OECD 2006). It seems unrealistic to expect people to combine regular personal care for an older person with high rates of employment. It seems likely then that, in response to the 'care gap', more formal services will need to be provided, and this is likely to have implications for long-term care expenditure. Given the results shown here, the implications for long-term care expenditure are likely to be greater the more the long-term care system relies on informal care.

7.2 Formal care supply and demand in Europe

Joanna Geerts and Peter Willemé, Federal Planning Bureau

In the previous section it was argued that the supply of informal personal care to older persons in the representative ANCIEN countries is unlikely to keep pace with demand in future years. It was further argued that, in response to this informal 'care gap', it seems likely that more formal services will need to be provided. The ensuing question, then, is whether future supply of formal LTC services will suffice to meet the increasing demand for care. This part of the conclusions delves into that issue by comparing the projected numbers of formal care users reported in Chapter 4 and the projected numbers of formal care workers presented in Chapter6.

Anticipating potential future imbalances between formal care supply and demand in time for action to be taken is crucial. While population ageing and other factors, like possible reductions in the availability of informal caregivers and growing expectations for high-quality care, are likely to cause an upward pressure on demand for formal services, demographic factors will at the same time influence the size and composition of the working age population and, thus, also the supply of LTC workers. Undoubtedly, the growing demand for formal services represents an opportunity for substantial employment creation in the LTC sector. But this will require considerable efforts in a sector that is currently characterised in many countries by low wages, gender segregation, poor working conditions and high turnover. It will put extra pressure on the labour market in a period of constant or declining labour supply and it may stimulate discussions about immigration policies in some countries.

In this section we compare the results of the projections presented in Chapter 4 of use of formal care for Germany, the Netherlands, Spain and Poland, with projections of the supply of LTC workers for these countries reported in Chapter 6. Like most other LTC utilisation and expenditure projection exercises (Hancock et al., 2007; e.g. Wittenberg et al., 1998), the projections of formal care use have assumed that rates of formal care use by age, gender, disability and other characteristics will remain constant. The implicit assumption is that supply of formal care will adjust to match demand, and that demand will be no more constrained by supply in the future than in the base year (cf. Wittenberg et al., 1998). The workforce projections, in turn, have assumed that supply of LTC workers will not be influenced by demand factors. The fractions of persons working in the LTC sector have been kept constant at their base year level. Both assumptions may be far from real future trends. On the one hand, the demand and use of formal care services will undoubtedly be influenced by the availability of services. For that matter, in some European countries service levels have changed dramatically over the past decades, with trends in supply often not corresponding to similar changes in care needs or demand for formal services. For example, in 1975 in Sweden 39% of those aged 80 and over used home help, and this rate dropped to 19% in 2002, as a consequence of cutbacks accompanied by stricter and more professional needs assessment (Sundström & Johansson, 2005). On the other hand, actual supply of services and the actual number of LTC workers is likely to be influenced by demand side factors. However, assuming constant rates of formal care utilisation and constant rates of LTC workforce participation has been a deliberate choice. These assumptions are very well suited to the purpose of illustrating how demographic changes will differentially impact on formal care supply and demand To this end, section 7.2.1 compares, for the four selected countries, trends in formal care users under the assumption of constant probabilities of use and trends in LTC workers under the assumption of stable fractions of the workforce working in the LTC sector. The next section (7.2.2) examines how the number of LTC workers would need to evolve in order to meet the condition that supply will follow demand. The numbers of LTC workers that would be

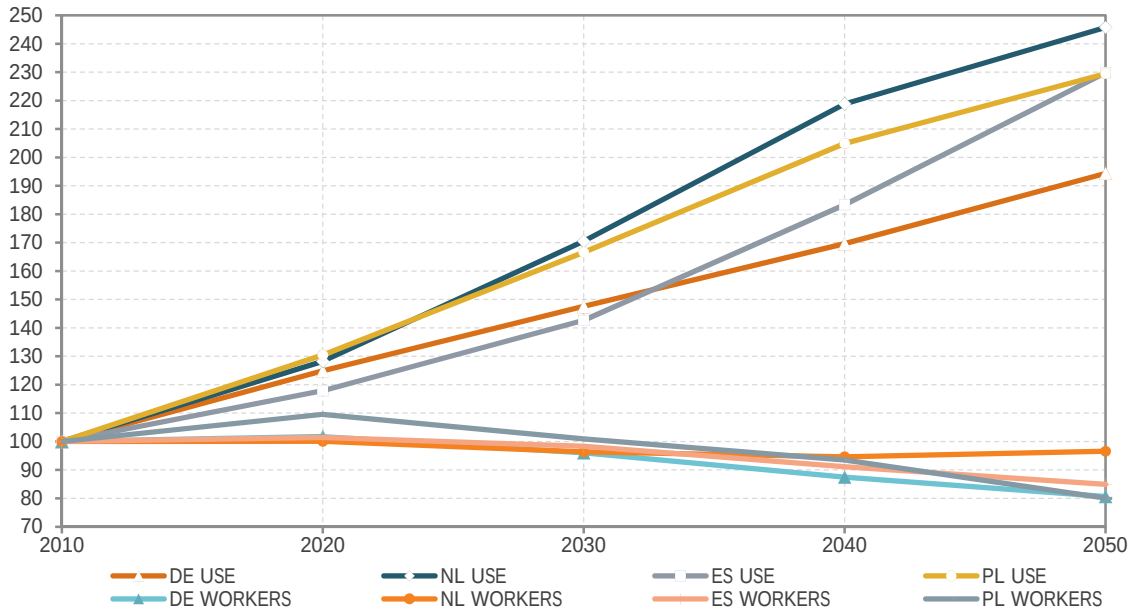
needed under that condition are estimated by assuming that the current ratio of care workers to care-users will remain constant and by multiplying that constant ratio with the projected numbers of formal care users (cf Pickard, 2008). Further, an estimate is made of the 'formal care gap', by calculating the difference between the numbers of LTC workers projected to be available under the assumption of constant participation rates and the numbers of LTC workers needed to meet the demand (cf Pickard, 2008).

The time horizon of both sections is the 2010-2050 period and results are presented at ten-year intervals, as projections of the LTC workforce (Chapter 6) have been made to 2050 only and five-year interval figures are not available for Germany and Poland. It is important to note that the numbers of LTC workers include all persons working in the LTC sector, not only persons providing personal care to older persons, while the numbers of formal care use focus on personal care by persons aged 65 and over. The latter include persons living in residential care facilities and persons receiving help with personal care at home. While for Germany, the Netherlands and Spain, figures of provision of formal LTC include all workers in residential and home care and figures of formal care use also include both residential and home care, care use figures for Poland refer to residential care only and figures of LTC workers include all social care workers in LTC but only health care workers in residential care. Poland did not have information available on use of home care or on the number of health workers in home care.

7.2.1 Provision and use of formal LTC, 2010-2050

Figure 7.7 compares changes in provision and use of formal LTC between 2010 and 2050 for the four selected ANCIEN countries (2010=100). It shows that in all four countries the number of care workers is projected to decrease between 2010 and 2050 (after an initial increase between 2010 and 2020 of about 10% in Poland but less than 2% in the other countries), while the number of formal care users is projected to steeply increase.

Figure 7.7 Projections of formal LTC workers and users of formal personal care, 2010-2050 (2010=100)



Source: Chapter 4 on formal care use, Chapter 6 on formal care workers.

In Germany, the number of care workers is projected to decrease by approximately 19% between 2010 and 2050, while the number of formal care users is projected to almost double (+ 94 %). For Poland a similar decrease (- 20%) is projected for the number of care workers, while the projected increase in the number of care users is higher (+ 129%) than for Germany, resulting in a larger gap between supply and demand by 2060. Figure 7.7 shows a similarly large gap for the Netherlands and Spain. In the Netherlands the number of care workers is projected to decrease by approximately 3 %, but the number of formal care users is projected to increase by 147%. Spain is projected to lose about 15% of its LTC workforce, while the formal care use projections show an increase of approximately 130%.

Table 7.4 further illustrates that if current rates of LTC workforce participation prevail (and assuming constant productivity), future numbers of formal care workers will not suffice to keep formal care utilisation patterns at their current levels for the increasing numbers of care dependent older persons.. The table gives the projected numbers of formal LTC workers and formal care users between 2010 and 2050 and the percentage changes over time, and shows how the ratio between care workers and care users is projected to evolve.

Table 7.4 Formal LTC workers and users of formal personal care, 2010-2050

	(A) Care workers	(B) Care users	(C) Ratio of care workers to care users
Germany			
2010	631,000	1,404,516	0.45
2020	642,000	1,754,011	0.37
2030	606,000	2,072,650	0.29
2040	552,000	2,382,812	0.23
2050	509,000	2,730,589	0.19
% change 2010-2050	-19.3%	94.4%	-58.5%
The Netherlands			
2010	236,358	370,590	0.64
2020	236,528	475,198	0.50
2030	227,733	631,860	0.36
2040	223,696	811,095	0.28
2050	228,252	910,832	0.25
% change 2010-2050	-3.4%	145.8%	-60.7%
Spain			
2010	429,770	780,946	0.55
2020	435,914	920,640	0.47
2030	422,688	1,114,098	0.38
2040	391,687	1,431,813	0.27
2050	364,895	1,794,963	0.20
% change 2010-2050	-15.1%	129.8%	-63.1%
Poland[a]			
2010	18,107	59,064	0.31
2020	19,838	77,056	0.26
2030	18,278	98,418	0.19
2040	16,926	121,024	0.14
2050	14,502	135,548	0.11
% change 2010-2050	-19.9%	129.5%	-65.1%

Notes: [a] For Poland numbers of care users relate to residential care only while numbers of care workers include all social care workers in residential and home care and health care workers in residential care.

Sources: Chapter 4 on care use, Chapter 6 on the LTC workforce.

In 2010 the ratio of formal care workers to formal care users is highest in the Netherlands (0.64, which means that there are approximately two FTE care workers for every three formal personal care users), somewhat lower in Spain and Germany (resp. 0.55 and 0.45, or about 1 FTE care worker for every two formal personal care users), and lowest in Poland (0.31, or about one FTE care worker for every three residential care users). In all four countries, the ratio is projected to decline steeply, to 0.25 in the Netherlands, to 0.20 in Spain, to 0.19 in Germany and to 0.11 in Poland.

7.2.2 Gap between supply and demand for formal care, 2010-2050

In this section, an estimation is made of the number of LTC workers that would be needed under the condition that supply of formal care will adjust to match demand and that demand will be no more constrained by supply in the future than in the base year. Therefore, it is assumed that the ratios of care workers to care users remain at their current values, that is at 0.64 for the Netherlands, 0.55 for Spain, 0.45 for Germany, and 0.31 for Poland. These ratios are multiplied by the projected numbers of formal care users (column B of Table 7.4). The resulting numbers of care workers are given in column A of Table 7.5. An estimate is made of the 'formal care gap' (Table 7.5, column C), by calculating the difference between the numbers of LTC workers projected to be available under the assumption of Chapter 6 and the previous section that LTC workforce participation rates remain constant (estimates replicated in Table 7.5, Column B), and the numbers of LTC workers needed to meet demand (assumption of constant care workers to care users ratio, Column A).

Table 7.5 Care workers at constant ratio of care workers to care users, care workers at constant fraction of workforce and 'formal care gap', 2010-2050

	(A) Care workers at constant (2010) ratio of care workers to care users	(B) Care workers at constant fraction of workforce	(C) 'Formal care gap' Difference between column (A) and (B)
Germany			
2010	631,000	631,000	0
2020	788,016	642,000	146,016
2030	931,170	606,000	325,170
2040	1,070,514	552,000	518,514
2050	1,226,759	509,000	717,759
% change 2010-2050	94.4%	-19.3%	
The Netherlands			
2010	236,358	236,358	0
2020	303,076	236,528	66,548
2030	402,993	227,733	175,260
2040	517,307	223,696	293,611
2050	580,918	228,252	352,666
% change 2010-2050	145.8%	-3.4%	
Spain			
2010	429,770	429,770	0
2020	506,646	435,914	70,732

2030	613,110	422,688	190,422
2040	787,955	391,687	396,268
2050	987,804	364,895	622,909
% change 2010-2050	129.8%	-15.1%	
Poland			
2010	18,107	18,107	0
2020	23,623	19,838	3,785
2030	30,172	18,278	11,894
2040	37,102	16,926	20,176
2050	41,554	14,502	27,052
% change 2010-2050	129.5%	-19.9%	

Sources: +Chapter 4 on care use, Chapter 6 on the LTC workforce.

As Table 7.5 shows, in all four countries the projected numbers of formal LTC workers based on constant workforce participation rates are lower than the numbers that would be needed if supply of formal care were to meet demand. The gap is increasing over the years. If LTC workforce participation rates remain constant, by 2050, there are projected to be approximately 0.5 million care workers in Germany, but the numbers needed if supply were to meet demand would be approximately 1.2 million. The resulting 'formal care gap' thus amounts to approximately 700,000 LTC workers. In the Netherlands, the projected number of formal care workers under the assumption of constant participation rates is approximately 228,000, but the number needed if supply were to meet demand would be approximately 580,000, yielding a 'formal care gap' of about 350,000 care workers. In Spain, the projected number of formal care workers under the assumption of constant participation rates is approximately 365,000, but the number needed if supply were to meet demand would be approximately 990,000, yielding a 'formal care gap' of about 625,000 care workers. In Poland, the projected number of formal care workers under the assumption of constant participation rates is approximately 15,000, but the number needed if supply were to meet demand would be approximately 42,000, yielding a 'formal care gap' of about 27,000 care workers. It should be noted that for Poland numbers of care users relate to residential care only while numbers of care workers include all social care workers in residential and home care and health care workers in residential care. It should also be noted that the use of residential care, which is currently very low in Poland, is expected to grow fast in the next few years.

7.2.3 Formal care supply and demand: summary and conclusions

The results of the previous section clearly illustrate that if current probabilities of formal care use prevail in future years, keeping LTC workforce participation rates at their current levels would not suffice to meet demand.

Between 2010 and 2050, demand for formal personal care by older people is projected to increasingly exceed supply in all four representative countries. In relative terms, the 'formal care gap' is particularly large in the Netherlands, a country with a high share of formal care users, and in Poland, where use of formal (residential) care is much less prevalent. It is also large in Spain, where use of formal care is low too. While in the Netherlands the 'formal care gap' is almost completely due to an increased demand, in Spain and Poland a combination of an increased demand and a shrinking workforce is at play. In all four countries, the shares of the workforce in the LTC sector would at least need to double in order to keep pace with demand.

Whether and to what extent the long-term care workforce will be able to expand is difficult to assess. Supply of LTC labour depends on wages and labour conditions, on people's willingness to work in the care sector, on barriers to market entry, on the action of 'competitor' industries such as health care, on migration flows and so on (Wanless, 2006). WP 3 of the ANCIEN project has reported on past trends in

the LTC workforce in the four representative countries. Over the past two decades, care employment has increased substantially in Germany, the Netherlands, and Spain, and it has increased more rapidly than total employment in Spain and Germany (Geerts, 2011). In the next decades, care employment will have to rise more rapidly than total employment only to keep the numbers of care workers at their current levels, as the labour force is expected to shrink in all four countries due to demographic changes.

Furthermore, it is important to note that the projections of care use assume base year probabilities of care utilisation to remain constant over the projection period. Abstraction has been made of the extent to which current patterns of care utilisation suffice to meet the needs of care dependent persons. The current performance of different LTC systems will be analysed in WP 7 of the ANCIEN project.

Another factor that has not been addressed in the projections is the impact of technological progress. Assistive devices and ICT services could have a downward impact on future demand for care and at the same time improve LTC labour productivity (see WP 4 of the ANCIEN project). It is however very difficult to assess the potential effect of new technologies, as the evidence base on the health, social and economic impact is still fragmentary and the future impact of technology is inherently unpredictable. The case studies in WP4 show that there is reason for optimism on the impact of technology for specific stages of certain disorders with specific needs. An example is surveillance for persons with dementia. A further element that has not been considered in the current projection exercise, as information was lacking for some of the countries, is the difference in staff/user ratio between home care and residential care or other indicators of efficiency differences between settings.

7.3 Informal and formal care supply and demand in Europe: policy implications

Linda Pickard[1], Derek King[1], Joanna Geerts[2] and Peter Willemé[2]

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The key conclusion of the previous two sections is that the supply of informal and formal care in Europe is unlikely to keep pace with demand in future years. The section comparing informal care supply and demand (section 7.1) concluded that current rates of informal care provision are not projected to keep pace with demand and that more formal services are likely to be needed, since it seems unlikely that more people will be able to provide informal care. However, as the previous section (section 7.2) has shown, at current LTC workforce participation rates, supply of formal personal care, in turn, is unlikely to keep pace with demand at constant probabilities of formal care use, let alone if probabilities of formal care use are to increase.

Therefore, there is likely to be a shortage of both informal and formal care in future years. A key factor underlying the projected shortages in both informal and formal care is underlying demographic change, in particular the rise in the numbers of older people in relation to the numbers of people of working age. Population ageing is likely not only to limit informal (intergenerational) care availability, but to hamper future formal LTC workforce expansion as well. The challenge is greatest in Spain, which combines large increases in demand for care with modest increases in informal care availability and a considerably shrinking workforce.

Since the key problem underlying the informal and formal care gap is a shortage of carers, the key issue that policy makers need to address is how to increase the efficiency of the use of available carers. It is difficult to increase the efficiency of informal carers, precisely because they are, by definition, outside the formal economy. Indeed, informal care is by its very nature inefficient, if efficiency is defined in terms of matching resources to needs. The basis of informal care provision is primarily familial ties, not needs for care. Thus, older people with the richest informal care resources are those with spouses or partners, but those with the greatest needs for care are the oldest old, who are typically widowed and lacking either a spouse or partner. Policy effort may, nevertheless, be directed towards sustaining informal care capacity and preventing the negative health, financial and labour market consequences of caregiving.

It is, however, possible to increase the efficiency of the formal care sector and, in all countries, it will be crucial to use the available formal care resources as efficiently as possible. The results of the project's work package on technology suggest that technology can help to improve efficiency provided that it is accurately matched to the type of limitation or health problem and the stage of the disorder. Further research is needed into variations in the efficiency of different LTC settings. Moreover, it is likely to be important to take measures that sustain and stimulate formal care capacity, for instance by improving wages and working conditions.

Previous work packages of the ANCIEN project have found evidence of considerable variety within Europe in current levels of formal and informal care utilisation (WP 1 and 3), in expected developments in needs and other drivers of care utilisation (WP 2 and WP 6) and in the supply of formal and informal care (WP 6). This diversity implies that no single combination of measures will fit all. A national approach is required which is adjusted to the country-specific conditions. In all countries, however, the overall implication for LTC policy is that the balance between informal and formal care utilisation may need to change, with a shift towards the use of formal rather than informal care.

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EUROPEAN COMMISSION
European Research Area

SEVENTH FRAMEWORK PROGRAMME

Funded under Socio-economic Sciences & Humanities

ANCIEN

Assessing Needs of Care in European Nations

FP7 HEALTH-2007-3.2-2

Launched in January 2009, ANCIEN is a research project financed under the 7th EU Research Framework Programme. It runs for a 44-month period and involves 20 partners from EU member states. The project principally concerns the future of long-term care (LTC) for the elderly in Europe and addresses two questions in particular:

1) How will need, demand, supply and use of LTC develop?

2) How do different systems of LTC perform?

The project proceeds in consecutive steps of collecting and analysing information and projecting future scenarios on long-term care needs, use, quality assurance and system performance. State-of-the-art demographic, epidemiological and econometric modelling is used to interpret and project needs, supply and use of long-term care over future time periods for different LTC systems.

Work Packages. The project started with collecting information and data to portray long-term care in Europe (WP 1). After establishing a framework for individual country reports, including data templates, information was collected and typologies of LTC systems were created. The collected data form the basis of estimates of actual and future long term care needs in selected countries (WP 2). WP 3 builds on the estimates of needs to characterise the response: the provision and determinants of formal and informal care across European long-term care systems. Special emphasis is put on identifying the impact of regulation on the choice of care and the supply of caregivers. WP 6 integrates the results of WPs 1, 2 and 3 using econometric micro and macro-modelling, translating the projected needs derived from WP2 into projected use by using the behavioral models developed in WP3, taking into account the availability and regulation of formal and informal care and the potential use of technological developments.

On the back of projected needs, provisions and use in European LTC systems, WP 4 addresses developing technology as a factor in the process of change occurring in long-term care. This project will work out general principles for coping with the role of evolving technology, considering the cultural, economic, regulatory and organisational conditions. WP 5 addresses quality assurance. Together with WP 1, WP 5 reviews the policies on LTC quality assurance and the quality indicators in the EU member states, and assesses strengths, weaknesses, opportunities and threats of the various quality assurance policies. Finally WP 7 analyses systems performance, identifying best practices and studying trade-offs between quality, accessibility and affordability.

The final result of all work packages is a comprehensive overview of the long term care systems of EU nations, a description and projection of needs, provision and use for selected countries combined with a description of systems, and of quality assurance and an analysis of systems performance.

Principal and Partner Institutes

CEPS is responsible for administrative coordination and dissemination of the general results (WP 8 and 9). The Belgian Federal Planning Bureau (FPB) and the Netherlands Bureau for Economic Policy Analysis (CPB) are responsible for scientific coordination. Other partners include: German Institute for Economic Research (DIW); Netherlands Interdisciplinary Demographic Institute (NIDI); Fundación de Estudios de Economía Aplicada (FEDEA); Consiglio Nazionale delle Ricerche (CNR); Universitá Luiss Guido Carli-Luiss Business School (LUISS-LBS); Institute for Advanced Studies (IHS); London School of Economics and Political Science- Personal Social Services Research Unit (PSSRU); Istituto di Studi e Analisi Economica (ISAE); Center for Social and Economic Research (CASE); Institute for Economic Research (IER); Social Research Institute (TARKI); The Research Institute of the Finnish Economy (ETLA); Université de Paris-Dauphine-Laboratoire d`Economie et de Gestion des organisations de Santé (DAUPHINE- LEGOS); University of Stockholm, Department of Economics; Karolinska Institute-Department of Medecine, Clinical Epidemiology Unit ; Institute of Economic Research, Slovak Academy of Sciences (SAS-BIER); Center for Policy studies (PRAXIS). Most of the ANCIEN partners are members of the European Network of Economic Policy Research Institutes (ENEPRI).

For more information, please visit the ANCIEN website (www.ancien-longtermcare.eu) or the CEPS website (www.ceps.eu).