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IMPACT OF AGEING ON LONG-TERM CARE WORKFORCE IN DENMARK

ERIKA SCHULZ

SUPPLEMENT A TO NEUJOBS WORKING PAPER D12.2

JANUARY 2014

This paper aims to show the impact of population ageing on the demand and supply of long-term care workforce. As age is the major driver of the need for care the growth in the number of elderly and oldest old will increase the demand for long-term care services. In Denmark with a generous social assistance system is the provision of help and care to the elderly the responsibility of the municipalities. They are obliged to finance and organize help and care to all people in need of. However, also family member provide help and care to their relatives, but personal care is almost provided to partners. Thus, the increasing demand for help with practical duties and in particular personal care is a challenge for the local authorities. Until 2025 the demand for staff working in nursing and care is expected to increase by 22 % to 32 % depending on the underlying demographic scenarios. Although the employment is also estimated to increase, a significant shortage of nursing and caring staff is expected. New technologies, intensifying of international recruitment strategies, but also new ways of organization, financing, and provision of home care may help to deal with the expected shortage of care workforce.



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1 Introduction

Although Denmark has one of the lowest life expectancy for men and women among European countries a significant increase in the number of elderly and particular of the oldest old is expected. Denmark as one of the Nordic countries is well-known for the universal approach to welfare which takes over also tasks that are the responsibility of families in other European countries. Care services are offered to all residents in need of independently from their income, assets or family network. In Denmark elderly care is predominantly the tasks of the local authorities. Thus, an adequate provision of home care and nursing home care to meet the increasing demand is a challenge for the municipalities. In 2003, a free choice of care provider for home care was introduced, which leads to an outsourcing of help and care tasks to private for-profit providers. However, most of the care tasks in particular personal care are still provided by public employed personnel (Bertelsen and Rostgaard, 2013).

One of the objectives of the Danish home help system is to encourage and enable the elderly to stay at home for as long as possible. Home care has a strict priority, however people in need of care can also choose between different kinds of accommodations suitable for the elderly and disabled. These include senior citizen residences, gated communities, assisted living units, nursing dwellings, and nursing homes (OECD, 2011). People in need of care generally pay the rent for living in a non-profit or conventional nursing home or dwelling. But they are eligible to receive public financed 'home help' independently of their living place.

Contrary to other European countries public financed home help comprises help with necessary practical duties (household chores) as well as personal care. Home help is provided to people in need of independent from potential informal caregiver and the amount of care needed. The amount of need of care is assessed by the communities. Family member take over care tasks, but mostly in addition to formal care. Solely informal personal care plays only a marginal role. The future need of long-term care workforce depends therefore to a high degree on the demographic development and the change in impairments in activities of daily living (ADLs) and instrumental activities of daily living (IADL), but not as much as in other European countries on the availability of potential informal carer. This report focuses on the impact of societal change on the need of formal care and the formal long-term care workforce.

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The report is structured as follows: Section 2 provides an overview of the number of people in need of care and the realized care giving arrangements. Section 3 shows the current size and occupational structure of long-term care workforce. Section 4 discusses the factors influencing the future demand for long-term care workforce. In section 5 the changes in the supply of formal care workforce are discussed. Section 6 shows the results and discusses strategies to adapt supply to the growing demand.

2 Need of care and caregiving arrangements

2.1 People in need of care

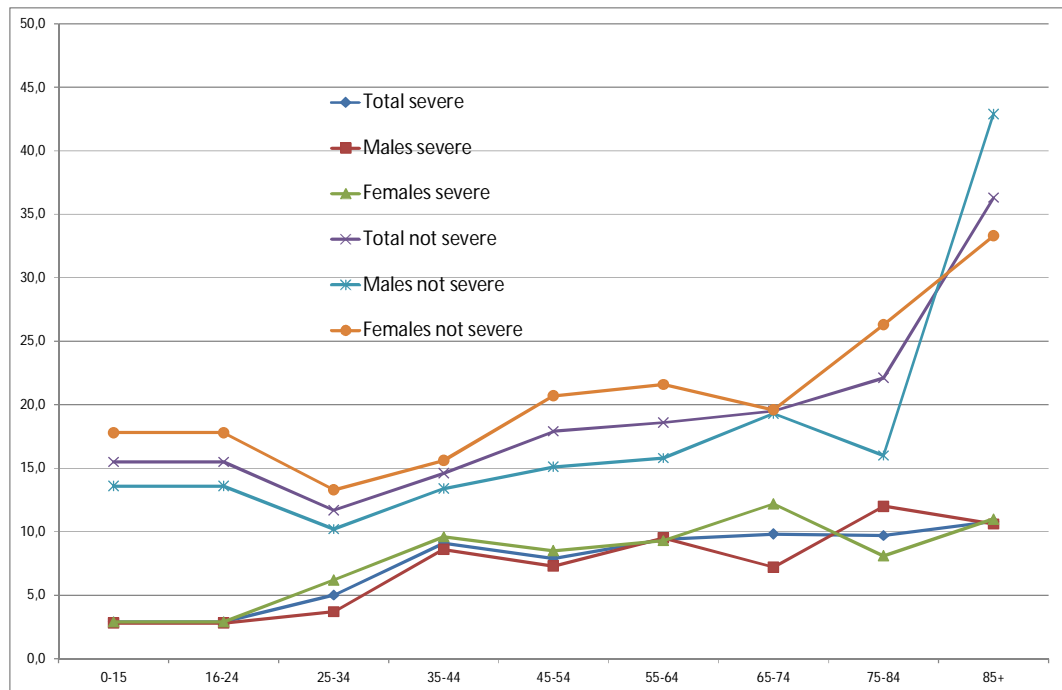
The demand for care services and the needed workforce depends on the number of people in need of care and their ability to perform every-day tasks by themselves. According to the OECD definition are people in need of care ‘persons with a reduced degree of functional capacity, physical or cognitive, and who are consequently dependent for an extent period of time on help with basic activities of daily living (ADL), such as bathing, dressing, eating, getting in and out of bed or chair, moving around and using the bathroom. This is frequently provided in combination with basic medical care, prevention, rehabilitation or services of palliative care. Long-term care services also include lower-level care related to help with instrumental activities of daily living (IADL), such as help with housework, meals, shopping and transportation’ (Fujisawa and Colombo, 2009).

Information on the quantity of people in need of care is rare. Two surveys provide information on dependency and impairments: the European Union Statistics on Income and Living Conditions (EU SILC) provides information for people aged 16+ living in private households and the Survey of Health, Ageing and Retirement in Europe (SHARE) provides information for people aged 50+ living in private households. The EU SILC asks for self-assessed impairments in daily activities. The question is “For at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do? Would you say you have been – severely limited, - limited but not severely or – not limited at all?” The Ageing working group of the European Commission used the share of people reporting severe limitations as a proxy for dependency rates. In the Ageing 2012 report these dependency rates are used to calculate the future number of dependent people and the future long-term care expenditure (EC EPC 2012).

The EU SILC results for Denmark shows a relatively high variation in the share of people reporting severe limitation in the single age-groups across the surveyed years. This may be traced back to the small sample size. Another phenomenon is that – contrary to other EU member states – the share of dependent people increases only slightly with age. Figure 1 shows the share of people reporting severe impairments in performing every-day tasks and the share of people reporting limitations, but not severe for men and women in 2010. In general, the share of people with self-perceived

severe impairments increases with age, however the increase is only marginal from the age-group 55-64 onwards and shows high variation for males and females. Contrary, the share of people reporting not severe limitations increases with age.

Figure 1 Share of people with limitations in performing everyday tasks in Denmark 2010*



*) Share of people with severe impairments in activities they usually do for at least 6 months and share of people reporting not severe limitations in activities they usually do.
Source: Eurostat, EU SILC; calculation of DIW Berlin.

Based on these limitation rates and the Eurostat population the number of dependent people (severe limitations) and the number of people with not severe limitations in Denmark is calculated.¹ In 2010 around 371,000 people reported to have severe impairments in daily activities, thereof 169,000 males and 202,000 females (Table 1). The number of people with impairments in performing everyday tasks which are not severe is 930,000, thereof 401,000 males and 528,000 females.

Around 24 % of the severe limited population is aged 65+; among men 21 % and among women 27 %. Females are living longer, but often they suffer from impairments in daily living due to longstanding illnesses. In total 90,000 people aged 65+ had severe limitations in activities they usually do in 2010. The share of elderly among people

¹ The EU SILC survey is carried out in private households. As the probability to live in institutions increases with age, the prevalence rates in the older age-groups may be underestimated (EC EPC, 2012). But in Denmark is the share of people living in nursing homes relatively low.

reporting not severe limitations is slightly lower, 22% in total. The number of not severe limited elderly amounts to around 200,000.

Table 1 People with limitations in everyday tasks by age-groups and gender in Denmark 2010

	People with severe limitations						People with limitations, but not severe					
	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females
	in 1000			Age-structure in %			in 1000			Age-structure in %		
0-14	29	14	14	7.7	8.5	7.0	157	70	87	16.9	17.4	16.5
15-24	19	10	10	5.2	5.7	4.7	106	47	59	11.4	11.7	11.2
25-34	33	12	21	8.8	7.3	10.2	78	34	44	8.4	8.5	8.3
35-44	73	35	38	19.6	20.6	18.8	116	54	62	12.5	13.5	11.7
45-54	60	28	32	16.2	16.7	15.9	137	58	78	14.7	14.5	14.8
55-64	68	34	34	18.3	20.2	16.7	135	57	78	14.5	14.2	14.8
65-74	51	18	33	13.6	10.6	16.1	100	48	52	10.8	11.9	9.9
75-84	27	14	13	7.3	8.4	6.4	61	19	42	6.5	4.7	7.9
85+	12	4	8	3.2	2.1	4.2	40	14	25	4.3	3.6	4.8
Total	371	169	202	100	100	100	930	401	528	100	100	100

Source: Eurostat, EU SILC; Huisman et al 2013; calculation of DIW Berlin.

The SHARE survey of people aged 50+ living in private households provide information on impairments in activities of daily living (ADL) and instrumental activities of daily living (IADL). The share of people aged 50+ with impairments in at least 1 ADL is for men on average 8 % and for women 10 %. Only a small part of males reported impairments solely in IADL, around 5 %. The corresponding share for females is 11 %. A large share of males (87 %) and females (79 %) had no impairments at all. The SHARE results are shown in Table 2. In total some 180,000 people aged 50+ reported impairments in at least 1 ADL in Denmark, thereof 76,000 males and 103,000 females. Around 129,000 were aged 65+.

Table 2 People aged 50+ with and without impairments in ADL and IADL in Denmark in 2010

Age-groups	Males				Females				Total			
	with at least 1 ADL	no ADL with at least 1 IADL	no ADL, no IADL	Total	with at least 1 ADL	no ADL with at least 1 IADL	no ADL, no IADL	Total	with at least 1 ADL	no ADL with at least 1 IADL	no ADL, no IADL	Total
	Share in %											
50-59	4.4	3.5	92.1	100	5.2	6.7	88.1	100	4.8	5.1	90.1	100
60-69	6.5	3.0	90.5	100	6.2	7.1	86.7	100	6.3	5.1	88.6	100
70-79	10.3	8.2	81.5	100	9.8	14.8	75.4	100	10.1	11.7	78.2	100
80+	25.9	16.1	58.0	100	30.0	22.2	47.8	100	28.6	20.0	51.4	100
50+	8.0	5.3	86.7	100	10.0	10.7	79.3	100	9.0	8.1	82.9	100
	in 1000 persons											
50-59	16	13	330	358	18	24	314	356	34	37	644	714
60-69	22	10	300	331	21	24	295	340	42	34	595	671
70-79	18	14	141	173	20	30	153	204	38	44	294	377
80+	21	13	47	81	44	33	70	147	65	46	117	228
50+	76	50	817	943	103	111	832	1 047	180	161	1 650	1 990

Source: SHARE wave 1, 2, and 4; weighted and pooled data; Huisman et al. 2013; calculation of DIW Berlin.

Contrary to the EU SILC results the SHARE survey shows a clear increase in impairments in ADL and IADL with age for both males and females. On average 6.3 % of people aged 60-69 years reported impairments in ADL, but around 29 % of people aged 80+. The corresponding share for people reporting impairments in IADL are 5 % and 20 %. In 2010 around 340,000 people aged 50+ had impairments in ADL or IADL.

2.2 Care settings – home care and nursing home care and the role of informal caregiver

2.2.1 Formal and informal care

Many people with impairments in ADL and IADL need the help of formal or informal caregiver, other are able to cope with their impairments themselves. The coping strategies as well as the amount of public financed care and help determine the need for formal care workforce.

Denmark has a comprehensive social care system with the municipalities responsible for providing help and care to the elderly financed by taxes. A high share of care tasks are carried out by public employed nurses, caregivers or helpers. Additionally, in most communities private for-profit providers provide home help almost with practical duties. All residents who need help with housework or personal care - even if the help or care is needed only for one hour per week - are eligible to receive home care irrespective of age, income, wealth or the potential of informal care givers (Schulz 2010). A basic principle is that the type of home should not dictate the offers of care to older people (OECD, 2011). Nursing and care is provided as temporary home help (with co-payments) or permanent home help (free of charge) at home and in nursing homes or in nursing dwellings. As permanent home help at home is given strict priority over caregiving in nursing homes, no new nursing homes have been constructed since 1987 (Strandberg-Larsen et al., 2007). Thus, nursing homes are in the process of being phased out. Various forms of service-enriched housing are being developed in their place with the active support of the municipal and national governments. The goal is to create non-institutional but supportive living arrangements for the elderly with varying levels of functioning. Such housing is often located near and linked with existing nursing homes, sheltered accommodation, day-care homes or day centers and/or community centers to maximize the use of personnel and facilities, as well as to ensure convenient access to nursing and other community services (Brodsky et al., 2003). In 2010, in Denmark in accommodations suitable for the persons in need of care (nursing homes, service enriched housing, sheltered accommodations) around 47,000 beds exist, that is 51 beds per 1000 persons aged 65+ (OECD Health Data, 2013a). The number of dwellings in nursing homes is 37,000, in residential homes 7,000, and in protected homes 1,500. Additional 34,500 general dwellings for the elderly exists (Statistics Denmark, 2014).

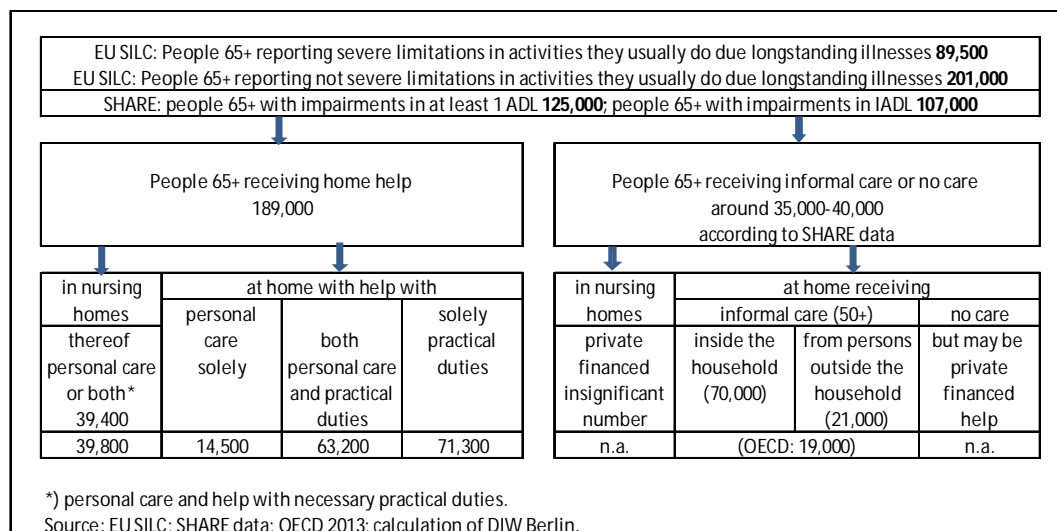
In 2010, around 42,000 persons received help and care in nursing homes or nursing dwellings (public and private for-profit). The majority (40,000) was at least 65 years old. Home help at home was provided to 177,000 persons, thereof 149,000 at least 65

years of age. Help is given with necessary practical duties, personal care or both. Almost all people living in nursing homes or nursing dwelling receive personal care or both personal care and help with practical duties (41,500). People at home receive to a high share only help with practical duties. In 2010, 87,000 people receive this kind of help, around 72,000 receive both personal care and help with practical duties and around 18,000 receive solely personal care.

As all people in need of help and care are eligible to receive the needed care, all dependent people should be covered by the home help scheme. Figure 2 gives an overview of the estimated amount of people aged 65+ in need of care and the care giving arrangements. According to the EU SILC around 90,000 persons aged 65+ reported longstanding severe limitations, and around 200,000 aged 65+ reported limitations which were not severe. Home help is provided to around 190,000 people aged 65+. The need of help and care is assessed by the municipalities and not all people reporting limitations are in need of formal help and care as they are able to cope with their impairments themselves with or without the help of informal caregiver.

We can also compare the people receiving home help with the calculated number of people with impairments in ADL and IADL. According to the SHARE survey around 125,000 people aged 65+ had impairments in ADL in 2010. 118,000 people aged 65+ received home help as personal care or both personal care and help with practical duties. As the SHARE data are only an estimation it can be assumed, that the aim to provide personal care to all people in need of care is achieved. According to SHARE, around 107,000 people aged 65+ were impaired in IADL. In 2010, around 72,000 receive solely help with practical duties (in nursing dwellings and at home). The other may cope with their impairments themselves or they receive help from family caregivers. Based on the SHARE results an estimated number of 35,000-40,000 people aged 65+ rely on informal care or are able to cope with their impairments themselves. Information on the number of people using private financed home help or living in private financed nursing homes or nursing dwellings is not available. As all people are eligible to receive public financed help and care it can be assumed that the amount of solely private financed help and care is insignificant (meals on wheels are not taken into account). The SHARE survey provides also information on informal caregiving. According to this data, people receive also informal care solely or in combination with formal help and care. In 2010, 70,000 persons provided personal care to someone inside the household and estimated around 20,000 to someone outside the household. According to the OECD health data only 19,000 people provided informal care in 2006.

Figure 2 Overview of people aged 65+ in need of care and care arrangements in Denmark in 2010



2.2.2 Informal caregivers

In general, the available (publicly financed) long-term care services and the required co-payments have a significant influence on the amount of informal care provided by the family and other informal caregiver. In the Nordic countries like Denmark traditional the state is responsible for providing care to people in need of. Permanent home help is provided to all people in need of and requires in general no co-payments. People living in nursing dwellings have to pay for the rent, but the receive help and care is free of charge. Family members who want to take over care tasks for their relatives can choose to be employed by the municipalities. The number of working hours depends on the number of hours the care receiver is granted for. The family members who act as public employees are entitled to all types of social security. However, this regulation is very rarely used (Pfau-Effinger et al., 2011). In general, it can be expected that informal care plays a smaller role than in other European countries.

The SHARE survey which comprises only people aged 50+, includes specific questions on the provision of personal care to people inside and outside the household. Information on help and care provided to someone outside the household is distinguished between types of help and care provided, and how often help and care is provided. Information on provided care to someone inside the household relies on personal care provided on a regular basis for at least three months. Information on care to someone outside the household distinguishes between 'all kind of help and care', 'personal care', and 'personal care on an almost daily basis'. The questionnaire asks about care provided in the last 12 months or since the last interview.

The share of informal caregivers aged 50+ inside and outside the household is shown in Table 3. In Denmark 4.6 % of people aged 50+ provide care on a regular basis inside the household, 3.8 % of males and 5.5 % of females.

Table 3 Share of persons aged 50+ providing informal care to someone inside or outside the household in Denmark

	Males	Females	Total
Share of people aged 50+ providing	in%		
regular personal care to someone inside the household	3.79	5.52	4.60
personal care to someone outside the household almost daily	(0,66)	1.35	1.03
Personal care to someone outside the household	3.67	8.36	6.17
all kind of help and care outside the household	48.80	42.96	45.69

Source: SHARE wave 1 and 2; pooled data, weighted; calculation of DIW Berlin.

The share of people providing care to someone outside the household depends strictly on the kind and amount of help provided. Focusing on *all kinds of help and personal care* given to someone outside the household, the share is 46 %. The share of people providing any kind of help and care is significant higher for males than for females. Males provide often help with financial tasks or doing repairs. Focusing only on the provision of *personal care* to someone outside the household changes the picture: Around 6 % of people aged 50+ provide personal care to someone outside the household. This is a significant lower share as in the case were all types of help and care are included. The share of females providing personal care is twice as high as of males indicating that personal care is mainly the tasks of women.

If we go a step further and focus only on *personal care provided on an almost daily basis*, which is comparable with the care giving inside the household, again the share of caregivers is lower. Around 1 % provides personal care on a daily basis to someone outside the household. As the sample size is small only a few persons reported to provide regularly personal care. Thus, the results have to be interpreted with caution.

If we focus only on personal care provided on a regular (inside the household) or almost daily (outside the household) basis, around 6 % of people aged 50+ provide such kind of care, that is 70,000 inside and 21,000 outside the household in 2010.

Table 4 shows the characteristics of informal caregivers aged 50+. Around three quarter (72 %) of people providing regular personal care to someone outside the household is females and a high share is aged 50-69 years (90 %). That means a high share of informal care provided outside the household is done by people in working age. Care outside the household is given to a parent (30 %) or to other members of the family (14 %). Care giving inside the household is dominantly caregiving to a partner (85 %). Partner-care is provided by males and females (share females 56 %), and the caregiver is therefor also in older age (share 70+ is around 39 %).

Table 4 Characteristics of informal caregiver aged 50+ in Denmark (%)

Characteristics of caregiver	Share of people providing personal care to someone	
	outside the household (almost daily)	inside the household (regularly)
share of caregiver aged 50-69	90.03	61.29
share of female caregiver	72.17	56.42
share caregiving to one parent	29.49	
share caregiving to other family member*	13.81	
share caregiving to partner		84.52
share caregiving to other*		5.13
*) Except child.		
Source: SHARE wave 1 and 2; pooled data; weighted results; calculation of DIW Berlin.		

In 2010, a survey on informal eldercare and the relation to employment was carried out in the three Nordic countries, Denmark, Norway, and Sweden (Jakobsson, Kotsadam, Szebehely, 2013). In general, the survey data for Denmark are similar to the SHARE results. People aged 18-65 years were asked 'Have you helped a family member, relative, friend, or neighbour who needs help in everyday life owing to long-term illness, disability, or old age at least once a month during the last year (e.g., with cleaning, paper work, personal care, or going outside)?' Help giving was distinguished in parental care, disabled child care, partner care, or other.

In Denmark 48.8 % of the respondent reported to provide some kind of help, 27.5 % to a parent, 4.5 % to a disabled child, 5.2 % to a partner and 24.2 % to another person. As only people in working age were interviewed partner care plays only a marginal role. Help to another person include also help provided to friends or other relatives which may explain the high share of persons providing any kind of help. Every fourth person provides help to parents. On average around 12 hours of help are provided per month. People with low income, but also people with a high education provide significant higher amounts of parental care than the average. Age and marital status have no significant effect.

3 Long-term care workforce – current situation

In Denmark the provision of long-term care services is one field of social activities of the municipalities. For their social tasks they employ nurses, social workers and other staff for the fields of social services like residential care or care to elderly, disabled, and people with special needs. The employees carry out different kinds of activities and it is not possible to identify exactly the activities related to long-term care giving. In 2010,

in total around 160,000 employees (FTE) are working in nursing and care, thereof 98,000 in care activities, around 6,400 in preventive measures for the elderly and disabled, and 2,900 in rehabilitation measures. We selected the main account 'care' to identify the employees working in long-term care. This is only a raw estimation, because Bertelsen and Rostgaard (2013) mentioned that around 111,200 FTE are working in elderly and disabled care (residential care, home care, day centres, preventive visits, rehabilitation). As we want to focus on long-term care measures (excluding rehabilitation and preventive measures) we decided to use the main account 'care' solely. Statistics Denmark confirmed that this statistics comprises home help at home and in institutions (Mr Hougaard, personal interview).

Table 5 provides the number of employees working in the main account care measured in full-time equivalents (FTE). The data are provided by the municipalities. The staffs mainly active in care measures for elderly, handicapped and juveniles with special needs is included. In 2010, in the field of 'care' around 98,000 FTE were employed. The number of FTE was lower in 2011 and 2012, e.g. due to changes in the accounting system. Around 75,000 FTE were social workers including personal carers, around 8,000 FTE were nurses.

Table 5 Staff working in nursing and care in Denmark (FTE)

Occupations	2010	2011	2012
	Staff working in the field of care		
Total	97 683	94 503	91 590
Management	348	299	266
Nurse	7 626	7 801	7 797
Physiotherapist	407	423	427
Catering officer etc. (matron) (-2010)	3 250	0	0
Occupational therapist	580	583	576
Teacher (-2010)	3	0	0
Pedagogue, Teacher (2011-)	0	1 293	1 196
Pedagogue (-2010)	1 100	0	0
Psychologist	20	18	19
Social worker etc.	48	90	86
Administrative work (-2010)	1 800	0	0
Administration, Office and secretary work (2011-)	0	1 904	1 772
Office and secretary work (-2010)	1 284	0	0
Caretaker etc.	1 242	1 322	1 263
Pedagogue assistant etc. (-2010)	85	0	0
Social and health workers etc. (-2010)	47 331	0	0
Social and health workers, Pedagogue assistant etc (2011-)	0	57 379	54 576
Social and health care assistants etc.	28 085	16 489	17 191
Cleaning etc.	3 938	3 453	3 164
Assistant in kitchen etc. (-2010)	537	0	0
Catering officer etc. (matron) (2011-)	0	3 450	3 259
*) Staff in all measures for elderly, handicapped and juveniles with special problems, but no child care.			
Source: Statistics Denmark.			

Hohnen (2011) provides some additional information on the working conditions of care workers. Care work is characterized by permanent contracts, and it is generally part-time (30 hours a week). There is a high turnover and 30 % change job every year. Elderly care is demanding both physically and emotionally. The level of sick absenteeism is about three times as high as it is for employees on average, and care workers have a 61 % higher risk of requiring early retirement. As the work tasks are determined, care workers feel to have a low degree of influence over work tasks. Low wages and gender wage differences have led to strikes in the past, and some improvements could be achieved.

The introduction of the free choice of care provides has led to an increase in the number of private for-profit suppliers. In 2010, 413 private supplier of home help were active, in 2012, 488. Not all communities have outsourced help and care tasks, thus in 2010 five municipalities had no private for-profit supplier. Private for-profit suppliers are mainly engaged in practical duties like housework and cleaning. Personal care is still the tasks of public suppliers in almost all municipalities (see also Fersch and Jensen, 2011). In 2010, the number of employees in private for-profit provides of home care was 3,800 FTE (Bertelsen and Rostgaard, 2013). Although the statistics on clients in nursing homes and nursing dwellings shows that 680 persons lived in private nursing homes, no information on the number of employees in private nursing homes exists.

4 Factors influencing future long-term care workforce need

4.1 Ageing populations and changes in dependency

4.1.1 Significant increase in the number of elderly and oldest old

In 2010, Denmark had 5.5 million inhabitants, thereof 0.9 million aged 65+ and 0.2 million aged 80+. The share of elderly is around 16 %. The future population is determined by the size and age-structure in the base year (stock) and by the flow variables birth, death and migration. While the migration flows have an influence mostly on the number of people in working age, the fertility rates and the changes in life expectancy determines the share of elderly and oldest old in total population. Thus the ageing process will be mostly influenced by the ageing of the population stock, the fertility rates and the life expectancy.

The NEUJOBS demographic scenarios tough and friendly assume a further increase in life expectancy (LE) for males and females (Huisman et al., 2013). The increase in LE at birth is caused by a reduction in mortality rates in the middle and in particular in the higher ages. The Netherlands Interdisciplinary Demographic Institute (NIDI) which has carried out the demographic scenarios provides the calculations of the LE at birth,

at the age of 65, and at the age of 80 for the base year and the year 2025 (Van Der Gaag, internal provision of data). In 2010, the LE at birth was 77.2 years for men and 81.4 years for women. Men aged 65 could expect to live more than 17 additional years, women more than 20 years (Table 6). Men aged 80 could expect to live 7.7 additional years and women 9.4 years. In both scenarios the LE is expected to increase, but to a higher degree in the friendly scenario. In the friendly scenario the LE at 65 is assumed to increase by 3.1 years for males and 2.8 years for females. People aged 80 can expect to have a 1.9 (men) and 1.8 (women) higher life expectancy. In the tough scenario the assumed increase in LE65 is with 1.1 year for males and 1 year for women significant lower. The LE at 80 is expected to increase by 0.5 (males and females) years.

Table 6 Assumption of population scenarios - Denmark

	2010	2025	
		Friendly	Tough
Fertility rate	1.87	1.94	1.87
LE at birth males	77.2	81.6	78.9
LE at birth females	81.4	85.1	82.7
LE at age 65 males	17.4	20.5	18.5
LE at age 65 females	20.1	22.9	21.1
LE at age 80 males	7.7	9.6	8.2
LE at age 80 females	9.4	11.2	9.9
Net migration per year (1000)	15.3	18.0	5.9

Source: Eurostat, Huisman et al.2013, Van Der Gaag (internal data).

The share of elderly in total population is also influenced by the shrinking size of following generations due to the fertility rate which is below the replacement level. In 2010, the fertility rate was 1.87 that means that the following generation is around 10 % smaller than the current one. In the tough scenario the fertility rates are assumed not to change, in the friendly scenario an increase up to 1.94 is assumed which is still below the replacement level (2.1 children per women).

In 2010, Denmark realized net immigrations of 15,300 persons. It is assumed that Denmark will have net immigrations also in the future. In the friendly scenario a yearly net migration of 18,000 is expected and in the tough scenario of around 6,000.

The increase in LE, the net migrations and – in the friendly scenario the increase in fertility is estimated to lead to an increase in total population in Denmark. In the tough scenario the population will increase by 2.2 % and in the friendly scenario by 5.3 % (Table 7). That is an increase by 122,000 persons in the tough and 294,000 persons in the friendly scenario. In 2025 around every fifth inhabitant will be at least 65 years old, around 200,000 in the tough and 280,000 in the friendly scenario.

Table 7 Demographic development in Denmark 2010 to 2025

Age-groups	2010	2025		Changes 2025/2010				2010	2025	
		tough	friendly	tough	friendly	tough	friendly		tough	friendly
	in 1000 persons			in %				age-structure in %		
0-14	1 001	980	1 006	-22	5	-2.2	0.5	18.1	17.3	17.3
15-34	1 342	1 417	1 454	75	112	5.6	8.3	24.2	25.0	24.9
35-49	1 202	1 020	1 035	-182	-166	-15.1	-13.9	21.7	18.0	17.8
50-64	1 087	1 134	1 147	47	60	4.3	5.5	19.6	20.0	19.7
65-79	675	846	874	170	199	25.2	29.5	12.2	14.9	15.0
80+	228	261	312	34	85	14.9	37.2	4.1	4.6	5.4
total	5 535	5 657	5 829	122	294	2.2	5.3	100	100	100

Source: Huisman et al., 2013; calculation of DIW Berlin.

As the need of long-term care increases significantly from the age 75 onwards, the size and share of the oldest old, in general defined as people aged 80+, are of particular interest. In 2010, around 230,000 people were aged 80+ in Denmark. The share in total population was 4.1 %. Until 2025, the number of the oldest old is expected to increase by 85,000 (friendly) and 34,000 (tough). That is a growth of 37 % in the friendly and 15 % in the tough scenario. In 2025 around 5.4 % (friendly) and 4.6 % (tough) of population will be at least 80 years old.

The shift of the baby-boomer born at the end of the fifties and the beginning of the sixties at higher ages and the effect of the demographic components on the age-structure of the population is shown in Figure 3. The baby-boomer which dominate the age-groups 40-50 in 2010, will dominate the age-group 55-70 in 2025. The different assumption on the further increase in LE leads to the differences in size of people aged 75+. The different assumptions in fertility rates can be seen in the different size of the youngest age-groups, and the assumptions concerning migration can be seen in the difference between the friendly and tough curve in the younger and middle working age-groups.

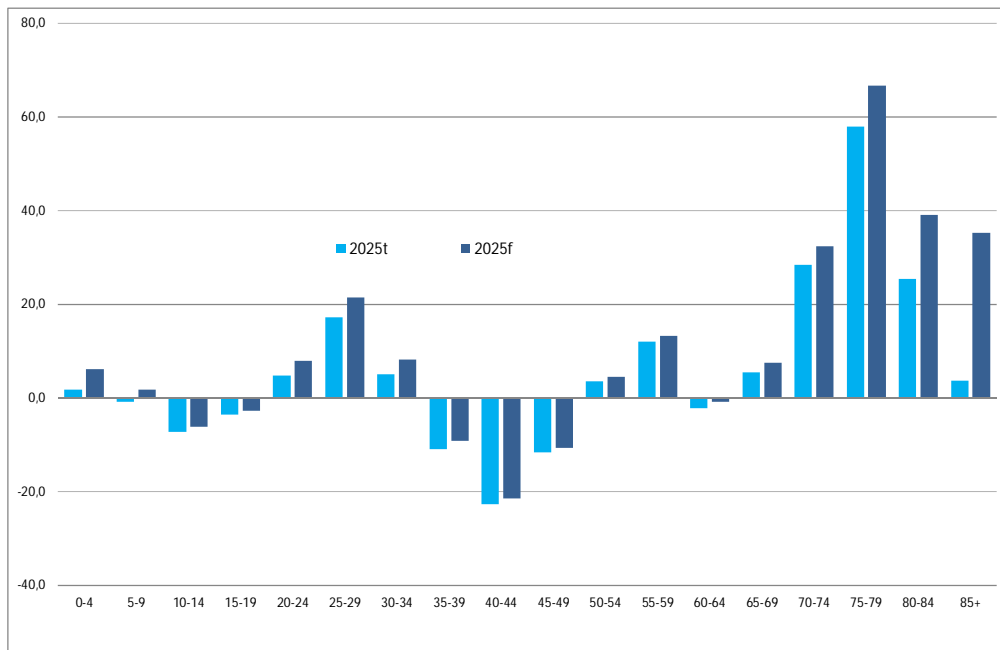
The changes in the single age-groups are shown in Figure 4. In the youngest age-group 0-4 years a slightly increase in population is calculated, while in the next age-group 5-9 years only marginal changes are expected. The number of people in young working age-groups will increase, while the number of people in prime working age is expected to decline. For elderly workers and in particular for people at least 70 years old a significant increase is estimated. In particular in the friendly scenario the pressure on care provision due to demographic change is estimated to increase. As oldest old people have a higher risk of multi-morbidity and impairments in more than 1 ADL the needed amount of care will show a higher growth than the population in these age-groups. Additional, mental illnesses are common among the oldest old, which requires additional time for advice and attendance.

Figure 3 Age-profile of the population in Denmark 2010 and 2025



Source: Huisman et al. 2013; calculation of DIW Berlin.

Figure 4 Population by age-groups in Denmark – changes between 2010 und 2025 (%)



Source: Huisman et al. 2013; calculation of DIW Berlin.

4.1.2 Changes in dependency

The continuing increase in LE in the past on the one hand and the increase in the number of dependent people in particular among the elderly and oldest old on the other hand have stirred the discussion on the relationship between these two trends. The literature provides contradictory theoretical positions on this question. There are three hypotheses: Fries et al (1980, 1989) stated that the additional years are to a high share years in good health, thus the share of the life span in bad health will decline as the LE increases due to the postponed onset of chronic diseases. This hypothesis is called 'compression of morbidity'. In contrast, Gruenberg (1977) stated that the additional years are to a higher share years in bad health ('expansion of morbidity' hypothesis). The medical progress leads to an expansion of the life span due to reduction in mortality of several diseases, but the additional life span is not free of illnesses. Chronic diseases will expand. The third hypothesis stated by Manton (1982) assumes that the additional life years do not change the relation of years in good health and years in bad health ('dynamic equilibrium' hypothesis).

Several authors carried out studies to show the empirical relevance of the mentioned hypotheses (for example Lafortune et al., 2007; Robine et al., 1993; Manton et al., 1998; Robine et al., 2003), but no clear trend across the studied countries could be shown. Some European countries showed evidence for a compression of morbidity while in other countries the data supported an expansion of morbidity (Robine et al., 2009). In Denmark the proportion of health life years at age 65 remained almost stable in the past (EHLEIS Country Report Denmark, 2013).

Thus, we used constant rates of limitations and constant rates of impairments in ADL to calculate the future development of people in need of care. As the EU SILC covers only people aged 16+, the dependency rate of people aged 16-19 is used for the total population aged under 20 to calculate the total number of dependent persons. Table 8 shows the development of people with limitations based on the EU SILC data and the both demographic scenarios tough and friendly. As the share of people reporting severe impairments due to longstanding illnesses is held constant, the changes in dependent people show the pure demographic effect. The number of dependent people (severe limitations) is expected to increase by 11,000 in the tough scenario and by 24,000 in the friendly scenario. That is an increase of 3 % (tough) and 7 % (friendly).

Due to the changes in the size and age-structure of the population the number of people with severe limitations under 55 years old is expected to decline, while the number of elderly with severe limitations will increase. The highest increase is expected for severe limited people aged 75-84 years with 45 % in the tough and 56 % in the friendly scenario. Thus, the share of severe limited elderly (65+) will increase from 50 % in 2010 to 53 % (tough) and 55 % (friendly) in 2025. The number of severe limited people aged 65+ will increase by 20,000 (tough) and 28,000 (friendly).

Table 8 Development in the number of people with limitations in activities they usually do in Denmark 2010 to 2025

Age-groups	2010		2025				Changes between 2010 and 2025							
			tough		friendly		tough		friendly		tough		friendly	
	severe	not severe	severe	not severe	severe	not severe	severe	not severe	severe	not severe	severe	not severe	severe	not severe
	limitations		limitations		limitations		limitations		limitations		limitations		limitations	
		in 1000 persons				in 1000 persons				in %				
0 - 15	29	157	28	153	29	158	- 1	- 3	0	1	-2.2	-2.2	0.5	0.5
16 - 24	19	106	19	106	20	108	0	0	0	2	0.4	0.3	2.4	2.3
25 - 34	33	78	36	86	37	89	3	8	5	11	10.2	10.5	13.8	14.1
35 - 44	73	116	61	97	62	98	- 12	- 20	- 11	- 18	-16.9	-16.8	-15.4	-15.4
45 - 54	60	137	58	131	58	132	- 3	- 6	- 2	- 4	-4.2	-4.0	-3.3	-3.1
55 - 64	68	135	71	142	72	143	3	6	4	8	4.7	4.7	6.0	5.9
65 - 74	51	100	58	115	60	118	8	15	9	18	15.2	15.1	17.8	18.0
75 - 84	27	61	39	87	42	93	12	26	15	32	44.8	43.2	56.4	53.3
85+	12	40	12	41	16	54	0	1	4	15	3.7	3.7	35.2	36.4
Total	371	930	383	959	396	995	11	29	24	65	3.1	3.2	6.6	7.0
65+	90	201	110	244	118	266	20	43	28	65	22.6	21.3	31.8	32.3

Source: Eurostat, EU SILC; Huisman et al. 2013; calculation of DIW Berlin.

As the Danish home help system provides also help and care to people with low levels of help and care needed, the development of people reporting not severe limitations in daily activities is also of interest. The number of not severe limited elderly (65+) will increase by 43,000 in the tough and 65,000 in the friendly scenario. That is an increase of 21.3 % (tough) and 32.3 % (friendly).

The SHARE results using the share of people aged 50+ with impairments in at least 1 ADL shows a higher growth in people with impairments in ADL compared to the development of severe limited people aged 50+: The number of impaired people aged 50+ is expected to increase by 16 % (tough) and 26 % (friendly), and the number of severe limited people aged 50+ according to the EU SILC results is expected to increase by 12 % (tough) and 17 % (friendly).

According to the SHARE data the number of people aged 50+ with impairments in ADL is expected to amount 208,000 in the tough and 225,000 in the friendly scenario, thereof 150,000 (tough) and 166,000 (friendly) aged 65+ (Table 9). As home care comprises also help with necessary practical duties, the development of people reporting solely impairments in IADL have also to be taken into account. In 2025 around 132,000 (tough) and 145,000 (friendly) people aged 65+ will have impairments in IADL. That is an increase by 23 % (tough) and 36 % (friendly).

Both calculations indicate a significant increase in the number of severe limited people as well as in the number of impaired people under the assumption of constant disability rates. They show that the expected population ageing will be a challenge for the municipalities.

Table 9 Number of people aged 50+ with impairments in ADL or IADL in Denmark in 2010 and 2025

Age-groups	2010	2025		Changes between 2010 and 2025			
		tough	friendly	tough	friendly	tough	friendly
		in 1000 persons			in %		
with impairments in at least 1 ADL							
50-59	34	37	37	3	3	7.81	8.85
60-69	42	43	44	1	1	1.18	2.88
70-79	38	53	56	15	18	40.92	46.98
80+	65	75	89	10	24	14.77	36.71
50+	180	208	225	28	46	15.74	25.56
with no impairments in ADL, but in IADL							
50-59	37	39	40	3	3	7.94	8.92
60-69	34	35	35	0	1	1.39	2.88
70-79	44	62	65	18	20	40.48	45.98
80+	46	52	62	7	16	14.61	36.09
50+	161	188	202	28	41	17.40	25.56
with no impairments in ADL and in IADL							
50-59	644	693	700	50	57	7.74	8.82
60-69	595	602	612	7	17	1.18	2.88
70-79	294	415	433	121	138	40.94	47.02
80+	117	135	161	18	44	15.10	38.00
50+	1 650	1 845	1 906	195	257	11.82	15.56

Source: SHARE wave 1, 2, and 4; weighted and pooled data; Huisman et al. 2013; calculation of DIW Berlin.

4.2 Changes in informal care potential

In Denmark the future development of informal caregivers is influenced by the changes in living arrangements because informal caregiving is almost caregiving inside the household to a partner. Changes in female labour force participation are expected to have only a marginal impact due to two facts: 1) female activity rates are similar to that of males among high educated people, slightly lower for middle educated people, but significant lower for males and females with low education level. Thus, further changes in female labour force participation are almost due to increase in education; 2) informal care is predominately provided inside the household by elderly (not working) people to their partner. However, below we also discuss the relationship between female employment and informal caregiving.

Changing living arrangements

The NEUJOBS demographic scenarios provide information on the changes in living arrangements of the population by age-groups and gender. The NEUJOBS demographic projections distinguish between following living arrangements: singles, children under the age of 15, children between 15 and 24 of age living in parental home and are economically dependent, single parents, couples with children, couples

without children and other households. The living arrangements differ between the age-groups and gender, but they are also influenced by education levels. The projected changes in living arrangements are calculated using the changes in population by age, gender and education level. Other influencing factors, like changes in household building behaviour and changes in divorce behaviour, are not taken into account. Thus, the demographic development and the changes in education levels determine the changes in living arrangements.

The Table 10 shows the living arrangement of people aged 50+ in 2010 and the changes between 2010 and 2025 for the two demographic scenarios. The category 'other' comprises single parents, couple living with children and other households. In 2010, around 60 % of people 50+ lived with a partner and 26 % lived alone. The share of single households increases with age. Due to the higher LE of females, women are to a higher share singles than men, in particular in the highest age-groups.

Table 10 Living arrangement of the elderly in Denmark in 2010 and changes between 2010 and 2025

Age-groups	Population	Living arrangements			Population	Living arrangements			Population	Living arrangements		
	Total in 1000	Single Share in %	Couple (changes in %-points)	Other	Males in 1000	Single Share in %	Couple (changes in %-points)	Other	Females in 1000	Single Share in %	Couple (changes in %-points)	Other
2010												
50-59	714	16.6	50.6	32.7	358	17.3	46.3	36.4	356	15.9	55.0	29.1
60-64	373	20.2	73.3	6.5	185	15.9	75.6	8.5	187	24.4	71.0	4.5
65-69	299	21.5	75.4	3.1	146	16.1	79.9	3.9	153	26.5	71.1	2.4
70-74	217	30.2	68.1	1.6	102	17.6	81.2	1.2	115	41.5	56.4	2.0
75-79	160	41.5	56.9	1.6	71	23.1	75.9	1.1	89	56.2	41.8	2.0
80-84	118	51.6	45.8	2.7	47	27.9	70.5	1.7	70	67.5	29.2	3.3
85+	110	63.6	32.9	3.5	34	32.9	65.8	1.3	76	77.1	18.5	4.4
Sum	1 990	26.2	59.7	14.1	943	18.4	65.2	16.4	1 047	33.2	54.8	12.0
Changes between 2010 and 2025 in the tough scenario												
50-59	55	0.2	-1.3	1.2	26	-0.3	-0.3	0.6	30	0.7	-2.5	1.8
60-64	-8	0.7	-0.7	0.0	-5	-0.1	0.2	0.0	-3	1.4	-1.6	0.1
65-69	16	-0.8	0.9	-0.1	7	0.0	0.1	-0.1	9	-1.6	1.7	-0.1
70-74	62	0.5	-0.6	0.0	29	-0.2	0.4	-0.2	32	1.3	-1.5	0.2
75-79	92	-0.9	0.9	0.0	44	-1.9	2.0	-0.2	48	0.6	-0.7	0.1
80-84	30	0.7	-0.8	0.0	13	-0.2	0.3	-0.1	17	1.9	-2.0	0.1
85+	4	2.0	-2.1	0.1	1	0.9	-0.7	-0.3	3	2.5	-2.7	0.2
Sum	251	1.1	-0.9	-0.2	116	-0.1	0.8	-0.7	136	2.1	-2.3	0.2
Changes between 2010 and 2025 in the friendly scenario												
50-59	63	0.2	-1.3	1.2	30	-0.3	-0.2	0.5	33	0.7	-2.5	1.8
60-64	-3	0.7	-0.7	0.0	-2	-0.1	0.2	0.0	-1	1.4	-1.6	0.1
65-69	23	-0.8	0.9	-0.1	11	0.0	0.1	-0.1	11	-1.6	1.7	-0.1
70-74	70	0.4	-0.4	0.0	35	-0.2	0.4	-0.2	35	1.3	-1.5	0.2
75-79	106	-1.2	1.2	0.0	52	-1.9	2.0	-0.2	54	0.6	-0.7	0.1
80-84	46	0.0	0.0	0.0	22	-0.2	0.3	-0.1	24	1.9	-2.0	0.1
85+	39	0.6	-0.6	0.0	16	0.9	-0.7	-0.3	22	2.5	-2.7	0.2
Sum	344	1.7	-1.1	-0.6	166	0.2	1.0	-1.2	178	3.0	-3.0	0.0

Source: Huisman et al 2013; calculation of DIW Berlin.

The expected future changes in living arrangements are different between males and females. The share of females (50+) living with other persons in the same household is estimated to decline in both scenarios, while the contrary effect is expected for males. The increase in LE 65+ is estimated to be nearly the same for males as for females with the consequence that the gap in LE between elderly males and females will not change.

Females aged 65+ will still live 2.5 years longer than men. Thus, the ageing of the population is estimated to lead to a higher share of elderly females living as singles.

The share of females living as a couple will decline, but the number of couple-households will increase due to the growth in population size. The couple-households are expected to increase by 131,000 (tough) and 180,000 (friendly), but the single households by 90,000 (tough) and 129,000 (friendly). Only for the age-group 50-59 years an increase in 'other' households is expected. Thus, the potential of informal caregiving inside the household is estimated to increase, although the growth rate is higher for single households.

We calculated the changes in informal caregiver aged 50+ providing care on a regular or daily basis using constant probability rates of being a caregiver by age-groups and gender, but taking into account the changes in living arrangements. The number of informal caregiver will increase significantly in both demographic scenarios. In the tough scenario the increase amounts to 101,000, in the friendly scenario to around 106,000 (Table 11).

Table 11 Changes in informal caregiver aged 50+ providing personal care on a regularly basis taken changes in living arrangements into account in Denmark

	2010	2025		Changes between 2010 and 2025			
		tough	friendly	tough	friendly	tough	friendly
		in 1000 persons			in %		
Informal caregiver total							
50-59	28	30	31	2	2	7.6	8.7
60-69	30	30	31	0	1	1.3	2.9
70-79	18	25	26	7	8	39.0	44.8
80+	14	16	19	2	5	10.9	31.6
total	90	101	106	11	16	12.3	17.5
Informal caregiver outside the household*							
50-59	8	8	8	1	1	8.0	8.9
60-69	10	10	10	0	0	1.4	2.9
70-79	1	2	2	0	1	39.6	43.9
80+	2	2	3	0	1	16.3	42.7
total	21	22	23	2	2	7.6	11.5
Informal caregiver inside the household							
50-59	21	22	22	2	2	7.5	8.6
60-69	20	20	21	0	1	1.3	2.9
70-79	17	23	24	6	7	39.0	44.8
80+	12	13	16	1	4	10.0	29.8
total	70	79	83	9	13	13.6	19.3
*) Care giving to someone outside the household has to be interpreted with caution due to the small sample size.							
Source: SHARE wave 1 and 2; pooled data; calculation of DIW Berlin.							

The dynamic is higher for informal carer inside the household than outside the household. Inside the household an increase in informal caregiver of 13.6 % (tough) and 19.3 % (friendly) is expected. The ageing of the population has a higher effect on

the available informal care-force inside the household, because informal caregivers are mostly spouses in higher ages, whilst caregiver outside the household are in the majority aged 50-69 years. The increase of informal caregiver outside the household is 7.6 % (tough) and 11.5 % (friendly).

Impact of informal care on employment

The relation between informal caregiving and employment is broadly discussed in the literature. Care giving is often a physically and mentally demanding full-time job and the reconciliation of care giving to elderly and employment is a challenge for informal caregiver. The impact of informal caregiving on labour force participation is strongly related to the available public financed long-term care services and the supporting measures provided by the long-term care system or the social assistance system. The intensity of care provided and the type of needed help and care plays a significant role. Intensive personal care giving is expected to have a stronger impact on employment as help with household chores for a few hours the week. Several studies analysed the empirical evidence of informal caregiving on employment (for example Viitanen, 2005; Spiess and Schneider, 2003; Carmichael et al., 2008).

The study carried out by Gabriele, Tanda and Tediosi (2011) analyzing the labour market constraints due to caregiving to an adult using also the ECHP came to the result, that the extent of the effect of care giving on the labour force participation depends on the intensity of care giving and the co-residence with the people cared for. The heaviest burdens – characterized by higher informal-care intensity and co-habitation with the assisted person – hamper the caregiver from participation in the labour market as desired'. Crespo and Mira (2010) who analyzed the impact of daily care giving on the employment using the SHARE data confirms in general the negative effect of caregiving on employment, but the authors showed that for the Northern countries the effect was negligible and only for the Southern countries significant. The impact is larger for low educated peoples and for intensive caregiving to people with severe impairments.

Vilaplana Prieta (2011) estimated the effects of problems in labour force participation and unmet needs for formal care on informal caregiving using the information of the Eurobarometer 283. Informal care givers are all persons providing any kind of help and care. The probability of having labour force participation problems depends on the professional status and varies across the countries. In general lower qualified workers receive less labour market problems than white collar workers. Germany and Denmark show relatively low labour market problems due to the long-term care system. In Denmark caregivers can be employed by the municipality, in Germany care giving leave is available. But even if labour market problems exist women have a relatively low probability of being caregiver in Germany (14 %) and Denmark (12 %).

Unger (2013) analysed the impact of caregiving on labour market participation in the Nordic countries. He shows that only intensive elderly care has a statistical significant negative effect on employment in Nordic countries, like Denmark. This is in line with the results of Vilaplana Prieta (2011) and Crespo (2010) that the long-term care system in Denmark which provide personal care and help with domestic tasks supports (indirect) the labour market participation of informal caregiver.

Jakobsson et al. (2013) analysed the relation between informal eldercare and employment in three Nordic countries, Denmark, Norway, and Sweden. Based on a survey of people aged 18-65, they found a large negative correlation between being a caregiver and the probability of being employed in Denmark. In Denmark caregiving is almost caregiving to a partner in old age. Thus, the share of caregiver aged 18-65 is low. With regard to parental care, they find no general relationship between the provision of care and employment. But those providing substantial amounts of care are less likely to work than others.

To sum up: The different studies show, that in Denmark with a generous social assistance system in general only a small effect of informal care giving on employment exist. The expected further increase in female labour force participation due to the higher share of high educated females is expected to have no significant negative effects on the potential of informal caregiver.

4.3 Impact on the need of formal care and the long-term care workforce

The demographic development and to a lower extent also the changes of available informal carer will have an impact on the required formal care and its workforce. In the following sub-section the development of people receiving formal care based on the current available services and their provision rates is shown. This allows comparing the number of people in need of care and the number of people receiving help and care under the current home help system. Under consideration of the development of informal caregiver the situation on the care market can be shown. This is of course an approximation as normally formal and informal care are used jointly and informal care may an imperfect substitute of formal care (Bonsang, 2008)

4.3.1 Changes in the number of people receiving formal care

The pure demographic effect on the number of people receiving home help at home and in nursing homes or nursing dwellings is calculated by combining the constant shares of people receiving home help in each age-group (provision rates) of the base year with the population by age-groups and gender for the two NEUJOBS scenarios tough and friendly. No changes in the kind and amount of home help available in the single municipalities or in the assessment of care need are assumed. The estimations were carried out for people receiving home help at home and in nursing homes or nursing dwellings.

Under constant provision rates the number of recipients of permanent home help will increase by around 37,000 in the tough and 71,000 in the friendly scenario (Table 12). This is an increase of 17 % (tough) and around 33 % (friendly).

Table 12 Recipients of permanent home help at home and in nursing homes in Denmark in 2010 and 2025

	2010	2025		changes 2025/2010			
				1000 or %-points		in %	
		tough	friendly	tough	friendly	tough	friendly
Recipients of permanent home help* - total							
Recipients (1000)	219.0	256.2	290.2	37.3	71.3	17.0	32.5
thereof receiving personal care or both**	131.7	152.8	175.4	21.0	43.7	16.0	33.2
Share 65+ (%)	0.9	0.9	0.9	0.02	0.03		
Share 80+ (%)	0.6	0.5	0.6	-0.03	0.01		
Share females (%)	0.7	0.7	0.7	0.00	-0.01		
at home							
Recipients (1000)	176.9	207.9	233.5	31.0	56.6	17.5	32.0
thereof receiving personal care or both**	90.2	105.1	119.4	14.8	29.2	16.5	32.4
Share 65+ (%)	0.84	0.87	0.88	0.03	0.04		
Share 80+ (%)	0.53	0.51	0.54	-0.03	0.01		
Share females (%)	0.68	0.68	0.67	0.00	-0.01		
in nursing homes and home care dwellings							
Recipients (1000)	42.0	48.3	56.7	6.3	14.6	15.0	34.8
thereof receiving personal care or both**	41.5	47.7	56.0	6.2	14.5	14.9	34.8
Share 65+ (%)	0.95	0.95	0.96	0.01	0.01		
Share 80+ (%)	0.72	0.69	0.72	-0.04	0.00		
Share females (%)	0.70	0.69	0.68	-0.01	-0.02		
*) for the elderly or disabled.							
**) Personal care and help with necessary practical duties.							
Source: StatBank Denmark; Huisman et al., 2013; calculations of DIW Berlin.							

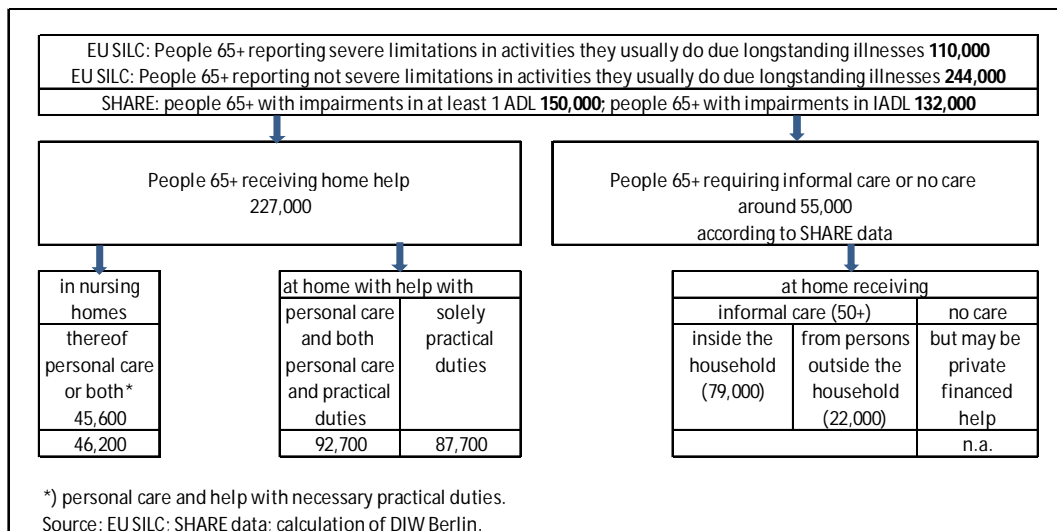
The future development is characterized by

- An increase in the share of elderly (65+) receiving home help at home
- A slightly decline in the share of female recipients in both settings
- An increase in the share of people receiving home help in nursing homes or nursing dwellings in the friendly scenario, while the contrary effect appears in the tough scenario.

The results allow comparing the estimated number of elderly with limitations in activities they usually do or with impairments in ADL and IADL and the number of persons receiving home help under constant provision rates. Table 13 shows the results for the tough scenario and Table 14 shows the results for the friendly scenario. In 2025, in the tough scenario around 138,000 people are estimated to receive personal care or both personal care and help with practical duties. This is more than the number of people with severe limitations. Thus, around 28,000 people with not severe limitations are also expected to receive home help. Compared to the number of people with

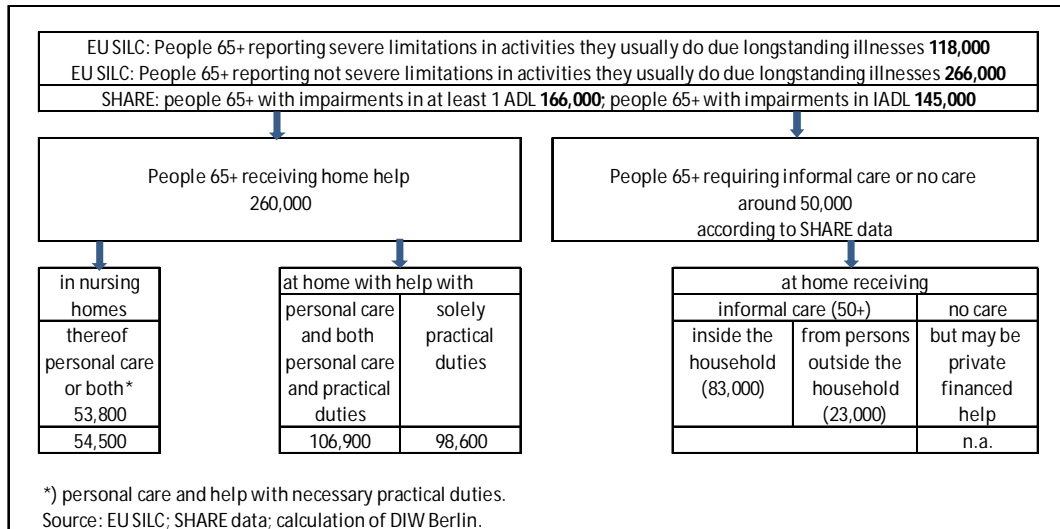
impairments in ADL (150,000) a small part (12,000) will not receive personal care. This can be traced back to the use of constant provision rates. But as the municipalities are obliged to provide the necessary help and care, the provision rates have to be increased to meet the demand. Around 88,000 people are expected to receive solely help with practical duties. Compared to the number of people with impairments in IADL around 45,000 people receive no home help and they rely on informal care or they are able to cope with their impairments themselves. Taking into account the number of people calculate to receive no help in ADL the gap amounts to some 55,000. As people with impairments in ADL or IADL often receive simultaneously formal home help and informal help and care by family members, the number of informal carer is higher than the gap between persons in need of care and persons receiving home help. According to the EU SILC data 79,000 persons receive informal care inside and around 22,000 from outside the household.

Table 13 People aged 65+ in need of care and care giving arrangements in 2025 (tough scenario)



In the friendly scenario the number of persons in need for care as well as the number of persons receiving home help is higher than in the tough scenario due to the higher population size. In 2025, 166,000 people are estimated to have impairments in ADL compared to around 161,000 people receiving personal care or both. The calculated gap is smaller than in the tough scenario and it can be assumed that all people in need of will receive personal care. 145,000 people will be impaired in IADL, and around 99,000 are estimated to receive help with practical duties. The gap is as high as in the tough scenario, but in total the calculated difference between people on need of care and people receiving home help is lower (50,000). It is calculated that 106,000 people will receive informal care (83,000 inside and 23,000 from outside the household).

Table 14 People aged 65+ in need of care and care giving arrangements in 2025 (friendly scenario)



4.3.2 Changes in the demand for (public financed) formal care workforce

The estimation of people receiving formal care is based on the current provision rates of home help at home and in nursing homes or nursing dwellings. The needed personal can be calculated using constant ratios of recipients related to staff employed in nursing and care with the main account care. The underlying assumption is, that the current amount of staff engaged in nursing care activities is adequate, that means no shortage of staff exists.

Under constant ratios of home help recipients to employees the demand for staff working in nursing and care will increase by around 24,000 in the tough and 45,000 in the friendly scenario (Table 15). That is an increase of 17 % (tough) and 32.5 % (friendly). In 2025, additional 18,300 (tough) and 35,000 (friendly) social and health workers are required to meet the demand, and around 2,000 (tough) and 3,500 (friendly) additional nurses.

**Table 15 Demand for staff in nursing and care in 2010 and 2025 in Denmark
(persons in the main account care)**

Occupations	2010	2025		Changes 2025/2010	
		tough	Friendly	tough	Friendly
Main account care					
Total	139 547	163 292	184 956	23 745	45 409
Management	497	582	659	85	162
Nurse	10 894	12 747	14 438	1 854	3 545
Physiotherapist	581	680	771	99	189
Catering officer etc. (matron)	4 643	5 433	6 154	790	1 511
Occupational therapist	829	970	1 098	141	270
Teacher	4	4	5	1	1
Pedagogue	1 572	1 839	2 083	267	511
Psychologist	28	33	38	5	9
Social worker etc.	69	81	92	12	22
Administrative work	2 571	3 009	3 408	438	837
Office and secretary work	1 834	2 146	2 431	312	597
Caretaker etc.	1 775	2 077	2 352	302	577
Pedagogue assistant etc.	121	142	160	21	39
Social and health workers etc.	67 616	79 122	89 619	11 505	22 003
Social and health care assistants etc.	40 121	46 948	53 176	6 827	13 055
Cleaning etc.	5 625	6 582	7 456	957	1 830
Assistant in kitchen etc.	767	897	1 016	130	249
*) Staff in all measures for elderly, handicapped and juveniles with special problems, but no child care.					
Source: Statistics Denmark.					

4.3.3 Discussion of demand results

The demand for staff working in nursing and care is estimated using constant disability rates as well as constant provision rates of home help by the municipalities. The scenarios show the pure demographic effect. Under these assumptions the demand for long-term care workforce will increase significantly in both demographic scenarios. To meet the demand additional around 31,000 employees are needed in the tough and around 49,000 in the friendly scenario. These numbers include beside the calculated increase in staff needed under constant provision rates the additional staff needed due to changes in people with impairments in ADL.

The estimation of staff needed is based on the assumption that the current amount of care workforce is sufficient. This may be not in all municipalities the case, and the Danish Ministry of Employment reported a shortage of qualified nurses. Qualified nurses are one occupation on the Positive List, which is a list of occupations that are of shortage in Denmark. Foreign workers from outside the EU are eligible for work and

residence permits under the Positive List scheme if they have a job offer of a Danish employer (Ministry of Employment, 2013). The FOA (trade Union organisation representing most public sector employees, e.g. in health and social services) and the Danish Ministry of Employment are working together on an active recruitment strategy, e.g. with an active information strategy showing the job opportunities and the supporting measures for foreign workforce (for example FOA, 2009). One target group are nursing and care workers.

Another point is that we cannot take into account the intensity of care needed due to missing information. The high increase in the number of oldest old will also lead to a growing share of people with mental illnesses like dementia. These people need special support and advice and care giving is more time consuming. Additionally, oldest old people suffer from multi-morbidity with impairments in more than one field of ADL. In total, the growth in demand for care and nursing hours provided by care workers is expected to be higher than calculated increase in personal.

5 Changes in labour force supply

5.1 Development of overall labour force

In the NEUJOBS project the NEMESIS model (**New Econometric Model of Evaluation by Sectorial Interdependency and Supply**) constructed by the ERASME team (Boitier et al., 2013) is used to show some quantitative socio-economic and environmental results to reveal the main challenges for EU in the framework of the “socio-ecological transition” without policy intervention and according to the global context. The NEMESIS model is based on detailed sectorial models for each of the EU27. It provides results for the economic development, changes in industrial structures, labour supply and sectorial employment. The NEMESIS model also provides an estimation of the labour force. As the model is based on data from National Accounts, the labour force calculation uses the employment and unemployment figures from the National Accounts. In 2010, the labour force based on National Accounts differs only slightly from the labour force estimation of the labour force survey (Eurostat, 2013). The total labour force is expected to decline by 17,000 in the tough scenario (-0.6 %) and to increase by 61,000 in the friendly scenario (+2 %) (Table 16). The expected changes in labour force are in line with the estimation based on EU LFS data using constant activity rates (Schulz, 2013).

An advantage of the NEMESIS model is that the model provides an estimation of the total employment as well as the employment broken down by broad industries. One of the broad NEMESIS sectors is the grouped sector “non-market services which consists of the NACE2 industries O “Public administration and defense, compulsory social security”, P “Education”, Q86 “Human health services”, Q87+88 “residential care activities and social work activities without accommodation”, R90-92 “Creative, arts and entertainment activities, libraries, museums, cultural activities etc.”, R93 “Sports

activities, amusement + recreation activities” and S94 “Activities of membership organizations”. For countries for which input-output-tables are available a downscaling of the employment to NACE2 sectors was carried out. But that could not be done for Denmark. For Denmark the NEMESIS model provide information on the total labour force, the total employment by education level, the unemployment and the employment in the NEMESIS sector ‘non-market services’. To show the development of the employment in residential care and social work we had to carry out a kind of downscaling ourselves. We used the information at the NACE2 level from the National Accounts and calculated the historic shares of Q87+88 sectors. We used constant shares to calculate the employment in 2025.

Table 16 Employment by sectors in Denmark– estimations based on the results of the NEMESIS model

	2010	2025		changes 2025/2010			
		tough	friendly	tough	friendly	tough	friendly
		in 1000			in %		
Employment							
total	2 758	2 757	2 865	-1	107	0.0	3.9
high skilled	900	1 101	1 242	201	342	22.4	38.0
low skilled	1 858	1 656	1 624	-202	-234	-10.9	-12.6
Unemployment	224	208	178	-16	-46	-7.1	-20.5
Labour force*	2 982	2 965	3 043	-17	61	-0.6	2.0
Population	5 535	5 657	5 829	122	294	2.2	5.3
Share labour force (%)	53.9	52.4	52.2				
Employment							
non market services	973	1 037	1 099	64	126	6.6	12.9
share in total employment (%)	35.3	37.6	38.3				
high skilled	463	457	523	-6	60	-1.4	12.9
low skilled	510	580	576	70	66	13.7	12.9
Employment in							
health care and social work (Q)	496	529	560	33	64	6.6	12.9
share in non market services (%)	51.0	51.0	51.0				
Employment							
human health care (Q86)	169	180	191	11	22	6.6	12.9
share in non market services (%)	17.4	17.4	17.4				
Employment in residential							
care and social work (Q87+88)	327	348	369	22	42	6.6	12.9
share in non market services (%)	33.6	33.6	33.6				
*) Labour force definition: employment + unemployment.							
Source: Boitier, B., Lancesseur, N. and Zagamé, P. "Global scenarios for European socio-ecological transition", NEUJOBS Deliverable D9.2, 2013, for scenarios results.							

In 2010, the total employment amounted to around 2.8 million; thereof 973,000 in the non-market sector and 496,000 in sector Q (Table 16). According to the NEMESIS model, in the tough scenario the total employment is expected to be nearly constant while the employment in non-market services will increase by 64,000. As the

employment in 'residential care and social work' is calculated using constant shares, also the employment in Q87+88 will increase by estimated 22,000. The importance of 'residential care and social work' employment in total employment will increase, too.

Employment in the friendly scenario shows a positive trend in total economy (3.9 %) and a significant increase in 'non-market services' (12.9 %). The increase in employment in 'residential care and social work' is expected to be in line with the non-market services. Around 42,000 new jobs are expected in sector Q87+88.

There are no estimations for the employment in nursing and care. Under the assumption that the change of staff in nursing and care is in line with the change in residential care and social services, additional around 9,200 persons in the tough and 18,000 persons in the friendly scenario are employed in nursing and care activities (with the main account care).

5.2 Shortage of care workforce expected

The NEMESIS model provides estimations of the employment by industries and sectors taking into account the framework conditions and assumption of the two NEUJOBS scenarios. The results have to be interpreted in this context.

Comparing the estimations on the demand for staff working in nursing and care and the expected changes in employment allows for calculating the gap on the long-term care labour market. Assuming that currently in general (beside the shortage of qualified nurses) no imbalances on the care labour market exists, the differences in the growth rates in demand and supply indicates a gap on the labour market in 2025. In the tough scenario the demand for staff working in nursing and care is estimated to increase by 22 %, while the supply will increase by 6.6 %. As a result, in 2025 the shortage of care workers amounts some 21,000.

But also under the optimistic framework conditions of the friendly scenario with an estimated increase in employment in residential care and social work by 12.9 % a gap at the care market is expected. Under the assumption that the expected changes in employment in residential care and social work (in %) can be also applied for the long-term care personnel, the shortage of care workers will amount around 31,000 in the friendly scenario in 2025.

6 Summary and discussion

This paper shows the impact of societal change on the demand and supply of staff working in nursing and care assuming constant provision rates of home help and constant disability rates. No changes in the existing home help systems, in particular the available amount of help and care provided and the assessment criteria for

receiving home help in the single municipalities are assumed. Under these assumptions, the help and personal care is still the tasks of public suppliers of home help in the municipalities. Informal care is expected to remain relatively low and is almost care giving inside the household to partners.

The estimation shows that the demand for care workers will grow significantly due to the increase in the number of people with limitations or impairments in ADL and IADL is increasing. In the next 15 years also an economic growth and an increase in employment is estimated. However, the increase in employment will not meet the growing demand for care workforce. In 2025 a significant shortage of staff working in nursing and care is expected.

The increasing need of care workers is a challenge for the Danish municipalities. The Danish Ministry of Social Affairs and Integration reported that in the next 10 years every fourth public sector employee will retire (Ministry of Social Affairs and Integration, 2011). Even today a high workload of care workers is reported due to high absenteeism. The high demand for public employees in nursing and care may increase the pressure on public and private suppliers to care for more persons with fewer employees.

Several measures are discussed to meet the future care demand (Hohnen, 2011; NSR, 2012; Ministry of Employment, 2013; EWCO, 2012):

- a) Increasing use of new technologies (NSR, 2012)
- b) new ways of addressing, organizing, and thinking about elderly care (priority of rehabilitation measures to conventional home help) (Hohnen, 2011)
- c) improvement of working conditions to improve the recruitment of domestic and foreign care workforce (EWCO, 2012)
- d) Recruitment of nursing and care workers from abroad (Ministry of Employment, 2013)
- e) Increase in the domestic labour force by increase in education and training (NSR, 2012)
- f) Changes in the financing of home care services – increase in the share of private financed help with domestic tasks and related services (meal on wheels)
- g) Encourage more family members to take over care tasks

The future demographic development leads to a general discussion of the way of organizing elderly care in Denmark. The Danish welfare state system is approaching a break point where a decision has to be made between further increases in taxes or reorganization of care tasks between the family and the state taking into account the possible increase in productivity due to new technologies and the improvements in disability among elderly.

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