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RESEARCH PAPER

Dementia in Czechia: Prevalence Estimations Until 2050

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Introduction: The Czechia is facing population aging. The number of people with dementia is increasing. Conflicting conclusions of European studies confirm the difficulties of quantifying the disease.
Aims: We aim to estimate the number of people with dementia in Czechia until 2050: a) projecting dementia prevalence using prevalence rates from EURODEM and EuroCoDe studies, b) projecting dementia based on mortality tables of individuals living with dementia. Comparing both approaches to dementia estimation.
Methods: We conducted a literature review. The projection is based on socio-demographic and health variables; construction of life tables for people with dementia.
Results: According to the results a) projecting the prevalence of dementia; over 300,000 seniors aged 60+ will suffer from dementia by 2050; b) estimating the number of individuals living with dementia: The number of men and women with dementia aged 65+ was estimated at over 120 thousand.
Conclusions: Czech society is not prepared for this intense increase in the number of individuals living with dementia. We argue early diagnosis as well as appropriate health and social care are urgent.

Keywords: Czechia, aging, dementia, prevalence of dementia, projection of dementia

Introduction

Population aging and the changes in the age structure belong to this century's most discussed topics. In developed European countries, including Czechia, the proportion of people aged 65+ is increasing (see Appendix). Changes in the age structure will result in increasing senior needs and a targeted approach to improve policy efficiency and public spending, health promotion, disease prevention and healthcare. A rapid increase in the number of a post-productive population above 65 years of age will be reflected in the increased need for social services and healthcare. Population aging and the significant share of seniors aged 65+ evoked a need to address this issue, since age constitutes the major risk factor for dementia. The future numerical growth of people with mental disorders invokes serious economic and health challenges for the country. In Czechia, the problem

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of an aging population is primarily linked to the maintenance of the pension system. International studies, however, call attention to the seriousness of the dementia issue as a result of aging populations. Research on dementia is becoming increasingly important as this disease has far-reaching economic and health implications. It is currently known that dementia's economic costs soar higher than in the case of heart disease and cancer altogether (Alzheimer's Disease International [ADI], 2015). In the past, the overwhelming majority of people did not live up to the high age typical for dementia onset, and it was therefore considered as a natural consequence of aging. Dementia looms as a modern epidemic of the 21st century, however, with a doubling of patients over the next 20 years. According to estimates, 46.8 million people with dementia existed worldwide in 2015. By 2050 this could be 131.5 million people. By 2030, the number of patients with Alzheimer's disease in Czechia will exceed 200 thousand (CALS, 2015). Dementia and Alzheimer's disease belong to the leading causes of death. The aim of this present article is to create projection scenarios for the future development in the number of Czech individuals living with dementia by 2050. We, the authors, will base this projection on a unique dataset concerning the number of deaths by Alzheimer's disease and other mental illnesses, and the number of people hospitalized for the diagnosis of Alzheimer's disease, and other mental illnesses. All data are age-specific and sex-specific. We will calculate unique mortality tables in order to extrapolate the future development of dementia in the population. Available projections on dementia's prevalence are exclusively based on EURODEM and EuroCoDe prevalence studies. No epidemiological data exist on the prevalence of dementia in Czechia based on sufficiently large data sets, as is typical for large epidemiological studies in other European countries. Results available in this paper constitute a recommendation to the professional public and to the Czech Alzheimer's Society, which regularly draws attention to the absence of research studies on dementia issues.

Two main research questions were formulated:

Research question 1: How many men and women will suffer from dementia in 2050?

Research question 2: How do the projection results differ when a) using prevalence rates from the EURODEM and EuroCoDe studies and b) based on mortality tables of people living with dementia?

Literature Review

Worldwide, the number of people with dementia in 2009 was estimated at 34.4 million people (Wimo et al., 2010). In the following decades, due to an aging population, a significant number of people reach the age at which the incidence of dementia is highest. People aged 60+ are the fastest growing population. In 2000, around 600 million people in the world had reached the age of 60, representing 10% of the world's population. By 2050, this figure is expected to increase to almost 2 billion seniors, representing in relative terms 22% of the world population (UN, 2007). The aging of the population undoubtedly leads to an increased number of people living with dementia. The age structure in Europe is regressive and the proportion of people suffering from dementia stands higher. In the world's other regions, especially in Asia, the age composition of the population remains younger than in Europe; in the coming decades, however, the aging process will accelerate at a much faster pace. For this reason, the number of people with dementia will increase (Ziegler, 2010). Most of the existing projections do not provide reliable results that would be interpretable regarding the current trend in life expectancy. The available studies of the 20th century underestimated the rapid increase in the average life span that took place in the 21st century and thus predicted a lower dementia number than exists in reality (Häfner & Löffler, 1991, as cited in Ziegler, 2010). At the same time, research often stems from the same prevalence rates of dementia that apply to different populations. Wimo et al. (2003), in researching *The magnitude of dementia occurrence in the world*, used the same prevalence rates derived from the Fratiglioni and Rocca study (2001) and applied them to different populations. They thereby estimated the number of dementia afflicted people to rise to 63 million in 2030 and 114 million in 2050 (Wimo et al., 2003, as cited in Ziegler, 2010). Findings in the study *The effect of different diagnostic criteria on the prevalence of dementia* support the need for validating the criteria used to diagnose dementia. For example, differences in validity exist when using DSM, CAMDEX and ICD-9 or ICD-10 criteria. The proportion of subjects with dementia varied from 3.1% using ICD-10 to 29.1% using DSM-III criteria. Universal standards and the same classification criteria are needed for diagnosis (Erkinjuntti et al., 1997). The obtained prevalence rate of dementia came to 13.7% when using the DSM-IV criteria and 38.2% according to CAMDEX criteria. A wide heterogeneity in the reported prevalence rates of dementia was observed across studies (Bacigalupo et al., 2018). Table 1 illustrates the selected projections of dementia in the world and in Europe.

Table 1. Projection of the Number of People with Dementia Worldwide (in Millions)

Author, publication year	Region of projection	Beginning of the projection (year) and the projected number of people with dementia	2020	2030	2040	2050
Wancata et al., 2003	Europe	7.1 (2000)				16,2
Wimo et al., 2003	World	25.5 (2000)		63		114
Ferri et al., 2005	World	24.3 (2001)	42		81,1	
Brookmeyer et al., 2007	World	26.6 (2006)				106,8
Bickel et al., 2008	Germany	0.94 (2000)	1,55	1,82	2,20	2,62
Ziegler, 2010	Germany	0.96 (2002)				2,38

Source: Ziegler, 2010.

Within the comparison of the results from several studies, Table 2 shows the population size in different regions of the world in 2015, the prevalence of dementia, and the number of people with dementia in 2015, 2030 and 2050. The results were published in the *World Alzheimer Report* (ADI, 2015). On the population projection prepared by the United Nations (UN, 2015), organizations applied the age-specific prevalence rates. This produced an estimated worldwide number of persons living with dementia in 2015 of 46.78 million people. This figure almost doubles by 2030 (74.69 million), and in the year 2050 it is estimated to stand at 131.45 million people suffering from dementia.

According to the project results in 2015, the proportion of people having dementia stands the highest in East Asia (9.77 million) and Western Europe (Germany, Italy) (7.45 million). The results of the dementia projections predicted in 2015 match the results of the 2009 projection – developed regions were based on a high level of expected dementia, and therefore there will be only relatively modest growth in these areas (compared to developing countries) (ADI, 2015).

Currently, we possess extensive knowledge regarding dementia issues, but there remains a lack of important data on the prevalence of dementia-related illnesses for service planning. Missing data often gets replaced by qualified estimates, not only in Czechia, but also in other countries. Table 3 shows the rapid increase in the number of dementia cases in Czechia according to the Alzheimer Europe and ADI 2050, published by the Ministry of Health and the Ministry of Labour and Social Affairs (Ministry of Health, MoLSA [Ministry of Labour and SocialAffairs], 2012). According to estimates prepared by international organizations, approximately 180,000 people will acquire dementia in 2030, and by 2050, they will number approximately 227-thousand in Czechia.

Methods

a) Projection of the prevalence of dementia in Czechia until 2050 for men and women was calculated. For the projection, we used the medium variant of the population projection published by the Czech Statistical Office (CZSO, 2013b) and age-specific prevalence rates of dementia from EuroCoDe and EURODEM studies (see Table 4). Dementia prevalence rates from the EuroCoDe study were employed to calculate dementia prevalence in the age category 60–95 and older. Dementia prevalence rates from the EURODEM study were used to calculate dementia prevalence in the age group 30–59. In the calculations, Constant dementia prevalence rates developed in EuroCoDe 2009 and EURODEM 1991 were employed (Czech Alzheimer's Society, 2009). The projection was constructed for five-year age intervals until the age 95+. Dementia prevalence rates (see Table 4) were applied to the population projection results of the Czech Statistical Office (2013b), indicating the impact and character of the Czech population' age structure. Considering the unchanged rates of dementia prevalence, the number of people with dementia is affected only by the expected number of old people.

Dementia prevalence rates studies (EURODEM and EuroCoDe) vary in method and sampling. Hofman et al. (1991) pooled data from 12 European studies conducted between 1980 and 1990, which included the institutionalized population, and used DSM-III or equivalent criteria. Twenty research groups working on the epidemiology of dementia and participating in the European Community Concerted Action on the Epidemiology and Prevention of Dementia Group (EURODEM) provided 23 data sets. Age specific and gender specific prevalence rates were compared within and across studies, and the overall prevalence was computed. Prevalence

Table 2. Number of People with Dementia and Prevalence of Dementia Worldwide (2015-2050)

Regions of the world	Population aged 60+ (2015)	Estimated prevalence (%)	The number of persons with dementia			Increase (in %)	
			2015	2030	2050	2015-2030	2015-2050
Asia	485,83	4.7	22.85	38.53	67,18	69	194
Australasia	5.80	6.7	0.39	0.62	1.02	59	163
Asia and the Pacific	52,21	7.0	3.64	5.68	7.81	56	115
Oceania	0.64	3.5	0.02	0.04	0.09	83	289
Asia, middle	7.43	4.2	0.31	0.44	0.88	43	184
Asia, east	218,18	4.5	9.77	16.60	28.64	70	193
Asia, south	139.85	3.7	5.13	8.61	16.65	68	225
Asia, southeast	61.72	5.8	3.60	6.55	12.09	82	236
Europe	176.61	5.9	10.46	13.42	18.66	28	78
Europe, west	107.89	6.9	7.45	9.99	14.32	34	92
Europe, middle	26.92	4.0	1.07	1.39	1.90	30	78
Europe, East	41.80	4.6	1.94	2.03	2.44	4	26
America	147,51	6.4	9.44	15.75	29.86	67	216
North America	74,88	6.4	4.78	7.28	11.74	52	145
The Caribbean	5.78	6.5	0.38	0.60	1.07	60	183
Latin America, Cent	26.64	5.8	1.54	2.97	6.88	93	348
Latin America, South	9.88	7.6	0.75	1.15	2.05	52	172
Tropical South America	24.82	6.7	1.66	3.11	6.70	88	305
Africa	87.19	4.6	4.03	6.99	15.76	74	291
North Africa / Middle East	38.93	6.0	2.34	4.35	10.04	86	329
Sub-Saharan Africa, Cent	4.78	3.3	0.16	0.26	0.54	60	238
Sub-Saharan Africa, East	19.86	3.5	0.69	1.19	2.77	72	300
Sub-Saharan Africa, south	6.06	3.9	0.24	0.35	0.58	46	145
Sub-Saharan Africa, west	17.56	3.1	0.54	0.85	1.84	58	241
World	897.14	5.2	46.78	74.69	131.45	60	181

Source: ADI, 2015.

estimates differed across studies; the general age distribution and gender distribution was similar for all studies. In subjects under 75 years, the prevalence of dementia stood slightly higher in men than in women (Hofman et al., 1991).

In the EuroCoDe prevalence study (2009), raw data was obtained from 17 studies and utilized in the collaborative analysis of dementia prevalence rates in Europe. Total age specific prevalence rates were calculated by pooling data on prevalence case numbers and the underlying population for males and females in each 5-year age category (for the age range 60–64, the total prevalence rate was 0.6%; for the age 95+, the total prevalence came to 46.3%).

b) When constructing age and gender specific population projections, the component method is employed very often (see Fiala, 2002), supplemented by certain assumptions about the development of mortality, fertility, or expected migration. The component method remains an important tool, which is based on the assumptions we possess for the analyzed population. We have fairly accurate conjectures about the development of the expected mortality rate, which are supported by literature (Lee, 2000). A convincing scenario can be established for the development of the expected total fertility (see Fiala & Langhamrová, 2009). Migration was not included in the projection of dementia. In the present study, projecting the number of persons with dementia in Czechia will be carried out in three variants (high, middle, low) demonstrating an approach to take into account the expected development if there is a limited amount of available information and input data.

Table 3. Estimated Number of People with Dementia in Czechia, 2000–2050 (in Thousands)

Year	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Number of people with dementia	88	95	111	124	138	157	180	202	213	218	227

Source: Ministry of Health, MoLSA, 2012.

Table 4. Prevalence of Dementia According to EuroCoDe and EURODEM

Age	Males		Females	
	EuroCoDe 2009	EURODEM 1991	EuroCoDe 2009	EURODEM 1991
30–59		0.16		0.09
60–64	0.2	1.58	0.9	0.47
65–69	1.8	2.17	1.4	1.10
70–74	3.2	4.61	3.8	3.86
75–79	7.0	5.04	7.6	6.67
80–84	14.5	12,12	16.4	13.5
85–89	20.9	18.45	28.5	22.76
90–94	29.2	32.10	44.4	32.25
95+	32.4	31,58	48.8	36.00

Source: Czech Alzheimer's Society, 2009.

The projection will be performed from 1.1.2010 and its horizon will be 40 years. The remaining assumptions and subsequent construction of the projection represent the methodology.

To estimate the number of people living with dementia, shortened mortality tables of men and women living with dementia were calculated (see Appendix). Age groups are 0–4, 5–9, 10–14, 15–19, ..., 85+ completed years. The number of survivors is calculated from the formula:

$$l_{t,0} = l_{t+5,0} = l_{t+10,0} = \ldots = 100\,000, \tag{1}$$

Using the coefficients of the probability of death q_x we can calculate the number of survivors for each year of t:

$$l_{t,x} = l_{t,x-h} \times \left(1 - k \times \frac{l_{t-5,x-h} - l_{t-5,x}}{l_{t-5,x-h}}\right), \tag{2}$$

where k is the coefficient of decrease in the probability of death q_x and h is the width of the age period (5 years). The death probabilities q_x for every age x, are also known as the (age-specific) risk of death. It is the probability that a person's exact age x will die within one year. Coefficient q_x is derived as the number of deaths between exact ages x and $x+1$ (referred to as dx), divided by the number of persons surviving to the exact age x (referred to as lx).

The coefficient of decline in the probability of death was calculated based on the findings of the Czech Statistical Office expert estimate. After calculating the l_x in the accelerated mortality tables it is possible to calculate the number of surviving people in the middle of the time intervals. The calculation is carried out by linear interpolation:

$$l_{t,x} = \frac{4 \times l_{t-1,x} + l_{t+4,x}}{5}. \tag{3}$$

Linear interpolation exists due to the fact that for some future estimates, a certain constant has been chosen to increase the proportion of people in the population and a certain constant in the increase in life expectancy – a population with no mental illness and a mental illness population. The reason why this constant to medium-life growth was also chosen for people with dementia is that it looks likely that the person will survive the next lifetime as healthy and then the mental illness will manifest. According to the Czech Statistical Office (CZSO), the projection for the whole prediction is also the middle version of the projection, which is also based on the linear interpolation of scenarios, and further on the shifting of age and sex-specific demographic components. It is important to note that the proportion of mean life expectancy in non-dementia is the same as the proportion of mean life expectancy.

With the use of table counts for surviving individuals, it is possible to calculate the mean life expectancy at birth, one of the options being to use the relationship mentioned by Keyfitz (1964):

$$e_0^0 = \frac{\sum_{x=0}^{85+} l_x - \alpha \times l_0 + (\alpha - 0{,}5) \times l_1}{l_0}, \tag{4}$$

where α is the share of the lower elementary set of deaths (The Czech Statistical Office recommends setting 0.85).

Due to the considered shortened mortality tables, it is possible to use a simpler relationship, which is adapted to the needs of the analysis in the form of:

$$e_{0,t}^0 = h \times \frac{\sum_{x=1-4}^{85+} l_{t,x} - \frac{l_{t,1-4}}{2}}{l_{t,1-4}}, \tag{5}$$

where h is the width of the age period (5 years).

Using the aforementioned assumptions and formulas, we constructed mortality tables of persons with dementia. Demographic projections regarding the population number of people with dementia in 2050 were calculated. Demographic projections therefore consider a decrease in the likelihood of death q_x (resp. increased life expectancy e_x^0).

Some publications state that people with dementia have higher rates of mortality than those without dementia (Bickel, 2005; Jagger et al., 2000; Wimo et al., 2003; Ziegler, 2010). However, the mortality rate of dementia sufferers and non-demographic persons is significantly influenced by the nature of the data and the size of the sample being examined. Czechia exhibits significant variability. Specific mortality rates for dementia were calculated as the proportion of dead males (or females) according to the causes of death and the number of patients hospitalized by age group.

Results

a) Projection of the prevalence of dementia in Czechia until 2050 for men and women was calculated. The middle variant of the Czech population projection was used (Czech Statistical Office, 2013b) together with age specific prevalence rates of dementia (see EuroCoDe and EURODEM prevalence rates in Table 4). The projection was constructed for 5-year age categories until the age 95+. Projection of dementia (EURODEM) also includes the age group 30–59 years. Dementia prevalence rates were applied to the results of the population projection, which pointed to the impact and character of the Czech population's age structure. When considering dementia's constant prevalence, the change in the number of people with dementia is only affected by the expected number of elderly people.

Number of people with dementia aged 60+ increased from 139,000 in 2013 to 357,000 persons with dementia in 2050 solely due to the changing age structure (prevalence rates of dementia are fixed for the entire period; see Figure 1 and 3). The number of people with dementia aged 30+ will increase the value of 130,000 in 2013 to 314,000 persons with dementia in 2050 (see Figure 2 and 4). Differences in results for age categories 30+ and 60+ is due to dissimilar prevalence rates that were used (EuroCoDe and EURODEM). Another fact is the high proportion of elderly people in the Czech population. By comparing the results for women shown in Figures 1 and 2, in the year 2050, there will be 230,000 women living with dementia (according to EuroCoDe, 2009) and 185,000 women living with dementia (according to EURODEM, 1991). Differences in female outcome are due to different prevalence rates from the EuroCoDe and EURODEM study (see Table 4). For men, the difference between prevalence rates from EuroCoDe 2009 and EURODEM 1991 is not so significant, thus the results are more similar. Results of the projection in Figures 3 and 4 point to 127,000 men living with dementia (according to EuroCoDe, 2009), respectively 128,000 men living with dementia (according to EURODEM, 1991) by 2050.

The application of prevalence rates of dementia based on European studies on the results of the population projection of the Czech Republic is necessary due to the fact that the Czech Republic does not have specific prevalence rates. Differences in outcomes are due to a deviation in method and different prevalence rates obtained from EuroCoDe and EURODEM studies.

To explain the differences in results regarding the number of people with dementia using EuroCode and EURODEM prevalence rates, we can further rely on conclusions made by Alzheimer Europe (2019). A cumulative

difference exists on the prevalence estimates of the population number living with dementia in Europe, including Czechia, as it is stated by Alzheimer Europe report (2019) using their updated prevalence estimates and EuroCoDe estimates for the total population: Total age specific prevalence rates of dementia: age range 60–64 (prevalence 0.6%); 65–69 (1.3%); 70–74 (3.3%); 75–79 (8.0%); 80–84 (12.1%); 85–89 (21.9%); 90+ (40.8%). Alzheimer Europe estimates were provided for 2050, whereas current prevalence rates were to remain the same in each of the years. When applying the 2019 prevalence estimates and EuroCoDe prevalence rates to population data for European countries, there is a significant difference in the estimated number of people living with dementia in 2018 (the difference comes to more than 1 million people with dementia). Applying the EuroCoDe prevalence estimates, 10,935,444 people exist with dementia, compared to 9,780,678 when using 2019 Alzheimer Europe estimates. The difference shows more than 1 million people in 2018. Despite this shift from the EuroCoDe estimates, the number of people living with dementia will continue to increase rapidly. Assuming no change in prevalence rates appears in future years, the number of people with dementia in Europe will almost double by 2050 (up to 18,846,286 people with dementia using Alzheimer Europe 2019 prevalence rates; 3% of population). In Czechia, the overall number of people with dementia (population aged 30–90+) will almost double from 149,633 in 2018 to 279,983 in 2050 (Alzheimer Europe, 2019). According to results in our study, there will be 313,000 people living with dementia by 2050 (population aged 30+). Studies indicate a trend towards a decline in the prevalence of dementia in recent years, and findings of Alzheimer Europe 2019 align with this assessment (compared with our results that indicate a higher number of people with dementia by 2050; difference is 33,017 people with dementia).

Results of the estimation of women with dementia above 60 years of age are shown in Figure 1. Results are also presented in table format (see Appendix).

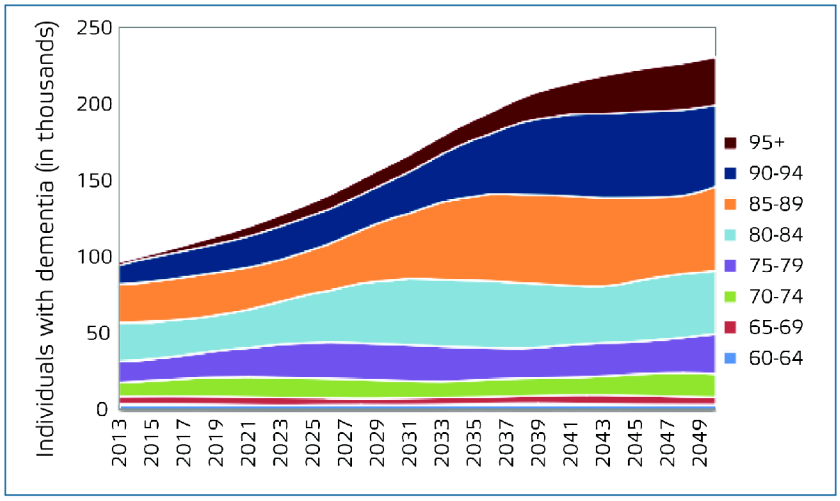
Results of the estimation of women with dementia above 30 years of age are shown in Figure 2.

Projection results regarding the number of men with dementia above 60 years of age are situated below (Figure 3).

Projection results regarding the number of men with dementia above 30 years of age are situated below (Figure 4).

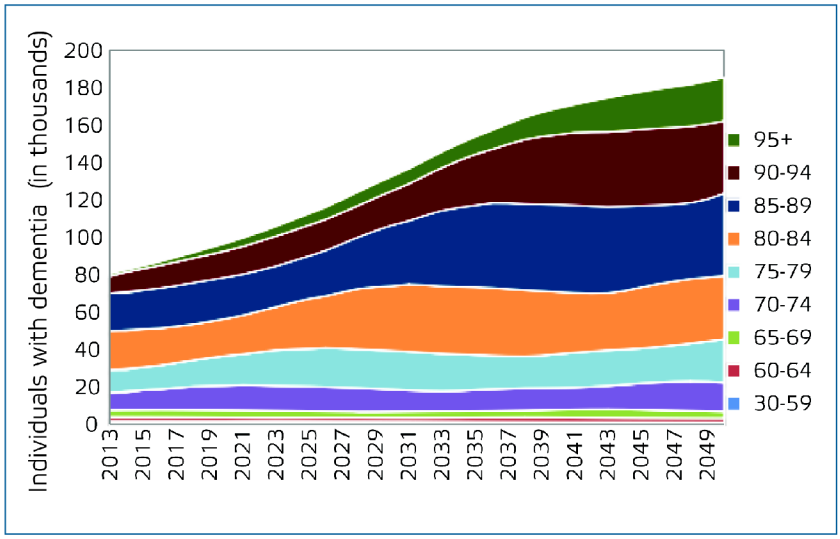
b) Estimates for the number of individuals with dementia aged 65+ in Czechia by 2050 are based on data from the Population census and on the population forecast prepared by the Czech Statistical Office (CZSO, 2013b). For screening, it was important to distinguish between mortality rates of people living with/without dementia. We constructed our own mortality tables for men having dementia and women with dementia (see Appendix).

Figure 1. Projection of Number of Women with Dementia Aged 60+



Source: data Czech Statistical Office, EuroCoDe 2009, own calculations.

Figure 2. Projection regarding the Number of Women with Dementia Aged 30+

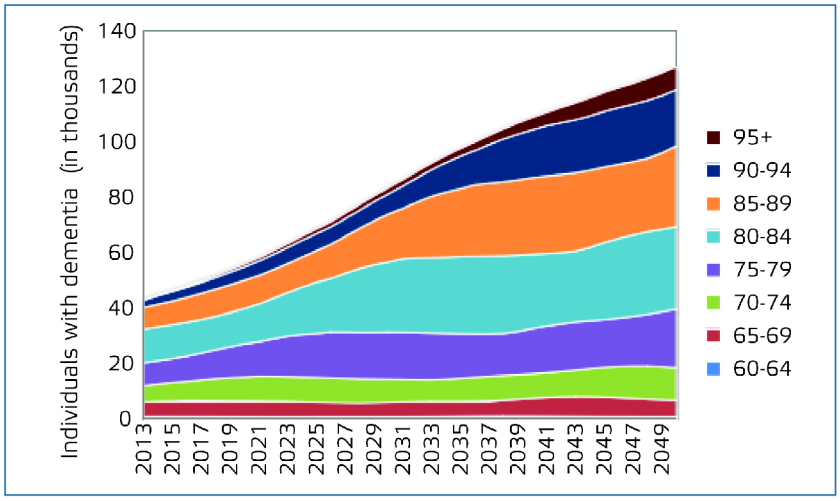


Source: data Czech Statistical Office, EURODEM 1991, own calculations.

When calculating mortality rates for people with dementia, we drew source data from the Czech Statistical Office (the number of deaths by causes of death) and from the National Registry of Hospitalized Patients, available in the database of the Institute of Health Information and Statistics of the Czech Republic and the report Hospitalization in hospitals in the CR. (IHIS [The Institute of Health Information and Statistics of the Czech Republic], 2011).

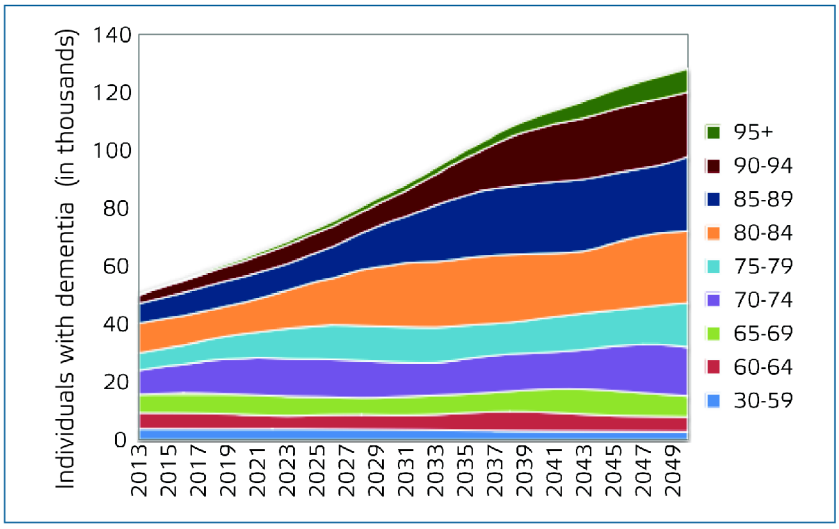
These are numbers of hospitalized in inpatient facilities classified by major a diagnostic category, i.e., sex and age. Calculations for the diagnostic category "*01-Diseases and disorders of the nervous system* "and "*19-Mental diseases and disorders"* in 2010 were chosen (IHIS, 2011). Migration was not included in the model. In 2006–2010, the total number of hospitalizations for dementia increased by 22% (from 6,549 to 7,981 hospitalizations). The highest increase occurred in Alzheimer's disease (by more than 41%; 489 hospitalizations) (IHIS, 2011).

Figure 3. Projection regarding the Number of Men with Dementia Aged 60+



Source: data Czech Statistical Office, EuroCoDe 2009, own calculations.

Figure 4. Projection regarding the Number of Men with Dementia Aged 30+



Source: data Czech Statistical Office, EURODEM 1991, own calculations.

An indirect indicator of prevalence is the number of patients hospitalized with a particular disease, as well as visiting the doctor. However, it should be remembered that this is an indirect method of estimation because it remains difficult to distinguish whether it is a single visit (hospitalization) during the period or a recurrent one. It is equally important to remember that not all patients with a given disease visit a doctor and are included in statistics. These studies also take into account the age composition of the population (IHIS, 2011).

The basic input data of the CZSO projection (2013b) is the population of the Czech Republic by gender and age at 1.1.2013. The medium variation of the projection is generally considered the most likely, but the results need to be interpreted in terms of the definition of the expected development of the extreme variants (low and high variants) (CZSO, 2013b). The results of the projection must be understood in relation to entry parameters, sudden unpredictable changes in the economic and social system, or the epidemic of diseases can significantly affect the level of fertility and mortality and overall population development. The expected future development of the age structure will be dynamic in the direction of the population's intense aging. The biggest changes will occur in the age group 65+.

Results of the projection are interpreted for the age category 65 and older. Number of seniors aged 65+ will rise from 1.8 million in 2015 to 3.2 million in 2050 (1.7 million women and 1.5 million men), representing a nearly double increase. Thus, a significant increase in the share of men 65+ is expected. The projection assumes further increase in life expectancy. Changes in life expectancy at birth are most likely to improve the mortality rate of men aged

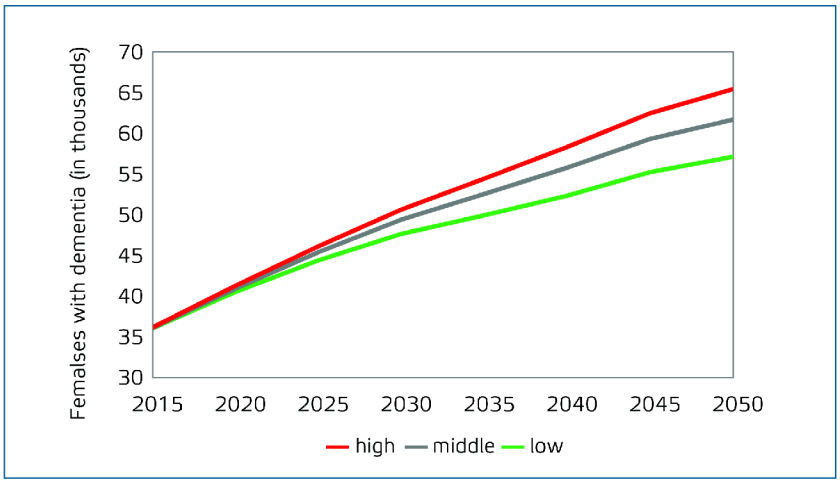
60+ (for women especially at age 80+). A more significant improvement in mortality is expected for men (CZSO, 2013a).

Figure 5 and 6 show an increase in the number of men and women with dementia aged 65+ based on three variants of possible development. The share of people with dementia will increase according to all variants of the projection. The number of women with dementia aged 65+ is estimated to be over 61 thousand (in view of increase in life expectancy at the age of 65). Contribution of women in this age group with dementia aged 65+ will almost double by 2050.

The number of men with dementia aged 65+ is expected to increase from 28,000 in 2015 to nearly 60,000 in 2050. The contribution of males with dementia by 2050 is 114% more compared to 2015.

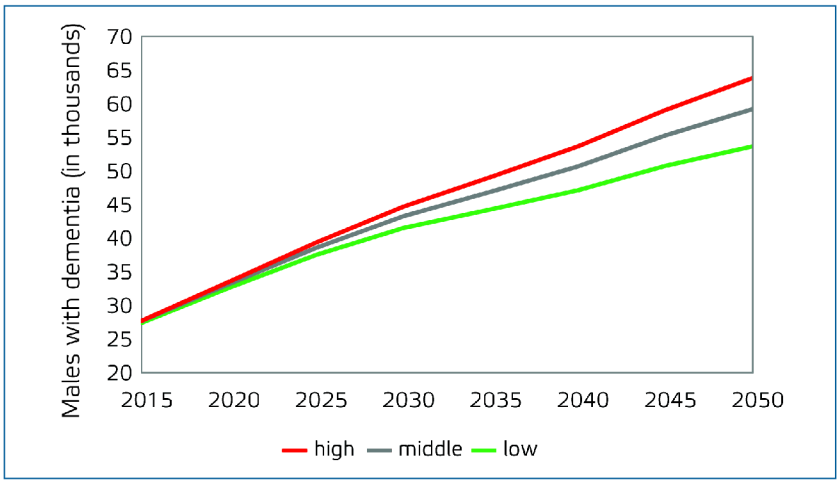
Answering our main research questions – how many men and women will suffer from dementia until 2050 comparing results according to methods used in this study – in our research we proceeded in the same way as professional publications, and data for predicting the number of people with dementia have been modeled using various prevalence studies or other approaches. For the Czech Republic, data on the number of people suffering from dementia can be traced. For example, estimates are available for dementia from Alzheimer's Europe (2013) based on the European population on which most other studies, including those from the Czech Alzheimer's Society, are based. The Czech Alzheimer's Society published estimates for 2020 of 183,000 people with Alzheimer's disease or another type of dementia and for 2050 of 383,000 people with dementia. The Interior Ministry of the Czech Republic states that in 2050 this number could more than double: i.e., almost 400,000 people with dementia.

Figure 5. Estimation of Men with Dementia Aged 65+ by 2050



Source: dataCzechStatistical Office, IHIS, own calculations.

Figure 6. Estimation of Men with Dementia Aged 65+ by 2050



Source: dataCzechStatistical Office, IHIS, own calculations.

We focused on the age category 65+ in section b) *Estimates of the number of individuals with dementia*, and according to this projection there will be more than 120,000 people suffering from dementia by 2050 in Czechia. This relatively low number may be affected by the selected diagnostic categories (see Methods) in our study. Different results may be obtained when using for example the diagnostic category G30: *Number of deaths caused by Alzheimer's disease.* It is important to notice that in b) we constructed our own mortality tables for people with dementia and calculated mortality rates according to our selected criteria. From this reason the results vary from results when using generally known prevalence rates in a). According to a) *Projection of the prevalence of dementia*, we obtained 357,000 people with dementia aged 60+ (using EuroCoDe, 2009) and 313,000 people with dementia aged 30+ (EURODEM). Both approaches a) and b) were compared. For the Czech Republic, to our knowledge, no validated prevalence study for Alzheimer's disease and other forms of dementia is yet available. Results may vary significantly due to the character of the disease, the proportion of which is more or less based on estimates.

Discussion

Preparing for the upcoming situation Czechia has to face makes it important, moreover, necessary to estimate the number of people with dementia. Applying prevalence rates of dementia based on European studies (EURODEM and EuroCoDe) on the Czech Republic's population projection results is necessary due to the fact that the Czech Republic does not have specific prevalence rates. Some current studies suggest that international prevalence rates of dementia may be slightly lower than previously thought. Even if the existing prevalence rates of dementia were overestimated, the number of people with dementia seems likely to at least double in the Czech Republic during the next 35 years.

As noted by Stephan and Brayne (2010, as cited in Zeilig et al., 2014) in the study *Prevalence and projections of dementia,* due to cultural, ethnic and demographic variability in the incidence and prevalence of dementia, a need for further studies at national and international level exists (Stephan & Brayne, 2010, as cited in Zeilig et al., 2014). Regardless of the methods used, it remains necessary to calculate an element of uncertainty being present until the moment of the projection horizon occurs. This is because the projection involves too many determinants and random influences (Ziegler, 2010). The projection aims to point to the likely development should all the factors that may affect future developments be considered (Vaupel et al., as cited in Ziegler, 2010). Estimating the specific prevalence rate of dementia in each country is essential to appropriately plan prevention strategies, since potential differences in the prevalence of dementia could be due to differences in potentially modifiable risk factors (Bacigalupo et al., 2018). Risk factors in early life under 45 years (education; RFP [Risk factor prevalence] 40.0%), midlife age 45–65 years (hypertension RFP 8.9%, obesity RFP 3.4%, hearing loss RFP 31.7%, traumatic brain injury RFP 12.1%, alcohol consumption RFP 11.8%) and later life above 65 years (smoking RFP 27.4%, depression RFP 13.2%, physical inactivity RFP 17.7%, social isolation RFP 11.0%, diabetes RFP 6.4%, air pollution RFP 75.0%) may contribute to an increased risk of dementia (Livingston et al., 2020). Risks are particularly higher in low-and-middle income countries compared to high income countries. Dementia risk reduction can be affected by: childhood education, social public health policies reducing hypertension risk, policies encouraging social, cognitive, and physical activity, reducing the risk of brain trauma in employment and transport, and reducing air pollution (Livingston et al., 2020).

Since dementia is intensely rising with age, projections include the assumptions about the development of life expectancy. According to Ziegler (2010), the projection results primarily depend on assumptions about life expectancy. According to Romero et al. (2014), it is necessary to know the extent of dementia as a cause of death from the death certificate. Respiratory problems are listed as the most frequently reported cause of death among people who were demented, yet were not reported as demented on death certificates. The use of death certificates for studying dementia grossly underestimates dementia's occurrence in the population (Romero et al., 2014). This difficulty in using death certificates to determine the number of deaths from Alzheimer's and other dementias has been referred to as a "blurred distinction between death with dementia and death from dementia". One in three seniors dies with Alzheimer's or another dementia (Alzheimer's Association, 2022). Among people over the age of 65, one in thirteen suffers from dementia (Musílek et al., 2019).

One of the main problems in Czechia is the necessity to increase current social and health service capacities to take care of the dependent part of patients. Population aging and the increase in the number of elderly individuals aged 65+ evoked a need to address this issue, since age remains the major risk factor for dementia and severe cognitive impairment. The increase in the number of people aged 65+ will reflect the age structure's irregularities and the expected future prolongation of the mean length of life (Cséfalvaiová, 2017).

Strength and Limitations

It is important to point out the accuracy of the estimates for the number of people with dementia in relation to the nature of the available input data. Statistics on dementia in the Czech Republic have significant shortcomings in comparison with, for example, Germany, where data analyses are based on the statutory health insurance system that provides these data.

Knowledge about risk factors and potential prevention as well as diagnosing dementia is improving although significant gaps remain. The current state of knowledge is complicated by the fact that not all people with dementia have a diagnosed disease. Population aging with particular emphasis on a more than twofold increase in the number of people living with dementia must be understood as a call for public and private institutions to act. In addition to the necessary medical care, the goal for an aging society must be to increase long-term care capacity.

Conclusion, Implications, and Future Directions

In this paper, we estimated the number of individuals living with dementia: a) projection of dementia prevalence using prevalence rates from the EURODEM and EuroCoDe studies; b) dementia projection based on mortality tables of individuals with dementia. Our aim was to apply the prevalence rates from two foreign studies – EURODEM and EuroCoDe – and to compare these dementia prevalence projection results with the results of the dementia projection using the available data for the Czech Republic and our own mortality tables of individuals living with dementia. According to the projection results, the number of men and women living with dementia will more than double by 2050. The ongoing trend leads towards a decline in the prevalence of dementia (the number of people with dementia above 30+ by 2050 in our study is 313,000 people using EURODEM and 357,000 when EuroCoDe estimates were used). A number of factors exist which may explain this decrease: i.e., improvements in public health and efforts to decrease some risk factors of dementia (smoking, alcohol consumption, lifestyle changes, cardiovascular diseases). The most endangered category consists of people in the older age groups; a very important group in terms of population aging will be people aged 65+ and 80 and older. For this reason, we selected the age category 65+ in the section b) estimation of people with dementia by 2050. According to this projection, there will be more than 120,000 people suffering from dementia by 2050 in Czechia.

Governments must be aware of age structural changes that will not only lead to increasing numbers of people with dementia and increased costs associated with the care of patients and their treatments, but also unwanted gains in associated problems, such as the varying population structure and burdens on the family caregiver or institutional care. From the public health perspective, interventions, including how to organize care facilities for such a complex physical illness and its attendant social needs, to support people affected by dementia, can have a huge effect.

Our future study will analyze risk factors of dementia (obesity, depression, alcohol consumption, hypertension, smoking, social contacts, education, etc.) from the perspective of the Czech Republic. Data from the SHARE database (Survey of Health, Aging and Retirement in Europe) will be used.

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Author contributions
Kornélia Svacinova: conceptualization, design, methodology, funding acquisition, investigation, project administration, data management, formal analysis, interpretation, supervision, writing original draft, writing review and editing.
Markéta Pechholdova: conceptualization, design, methodology, funding acquisition, project administration, interpretation, supervision, writing review and editing.
All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Ethical statement
This manuscript is the authors' original work.
Human participants have been not involved in this study.
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Appendix

Appendix 1: Mortality tables of men with dementia

	2015			
	lx	Lx	Tx	ex
0-4	100 000	498 495	7 407 933	74,08
5-9	99 398	496 499	6 909 438	69,51
10-14	99 201	491 893	6 412 939	64,65
15-19	97 556	485 247	5 921 046	60,69
20-24	96 543	477 080	5 435 799	56,30
25-29	94 289	468 737	4 958 720	52,59
30-34	93 206	462 065	4 489 983	48,17
35-39	91 620	454 679	4 027 917	43,96
40-44	90 251	446 002	3 573 238	39,59
45-49	88 149	433 116	3 127 237	35,48
50-54	85 097	415 579	2 694 121	31,66
55-59	81 135	398 094	2 278 543	28,08
60-64	78 103	381 346	1 880 448	24,08
65-69	74 435	363 805	1 499 103	20,14
70-74	71 087	346 675	1 135 298	15,97
75-79	67 583	328 845	788 624	11,67
80-84	63 955	309 833	459 778	7,19
85+	59 978	149 945	149 945	2,50

	2020			
	lx	Lx	Tx	ex
0-4	100 000	498 525	7 431 313	74,31
5-9	99 410	496 568	6 932 788	69,74
10-14	99 217	492 054	6 436 220	64,87
15-19	97 604	485 539	5 944 165	60,90
20-24	96 611	477 530	5 458 626	56,50
25-29	94 401	469 347	4 981 096	52,77
30-34	93 338	462 800	4 511 749	48,34
35-39	91 782	455 550	4 048 948	44,11
40-44	90 438	447 030	3 593 398	39,73
45-49	88 374	434 372	3 146 368	35,60
50-54	85 375	417 135	2 711 996	31,77
55-59	81 479	399 937	2 294 861	28,17
60-64	78 496	383 447	1 894 924	24,14
65-69	74 883	366 162	1 511 477	20,18
70-74	71 582	349 265	1 145 315	16,00
75-79	68 124	331 662	796 050	11,69
80-84	64 540	312 869	464 388	7,20
85+	60 607	151 518	151 518	2,50

	2025			
	lx	Lx	Tx	ex
0-4	100 000	498 555	7 454 350	74,54
5-9	99 422	496 637	6 955 796	69,96
10-14	99 233	492 213	6 459 159	65,09
15-19	97 652	485 826	5 966 946	61,10
20-24	96 678	477 972	5 481 120	56,69
25-29	94 511	469 946	5 003 148	52,94
30-34	93 468	463 522	4 533 202	48,50
35-39	91 941	456 406	4 069 680	44,26
40-44	90 622	448 040	3 613 274	39,87
45-49	88 594	435 606	3 165 234	35,73
50-54	85 648	418 665	2 729 628	31,87
55-59	81 818	401 750	2 310 963	28,25
60-64	78 882	385 516	1 909 212	24,20
65-69	75 324	368 486	1 523 697	20,23
70-74	72 070	351 821	1 155 211	16,03
75-79	68 659	334 443	803 390	11,70
80-84	65 119	315 872	468 946	7,20
85+	61 230	153 075	153 075	2,50

	2030			
	lx	Lx	Tx	ex
0-4	100 000	498 583	7 477 046	74,77
5-9	99 433	496 704	6 978 463	70,18
10-14	99 248	492 368	6 481 758	65,31
15-19	97 699	486 107	5 989 391	61,30
20-24	96 744	478 406	5 503 284	56,89
25-29	94 618	470 534	5 024 878	53,11
30-34	93 595	464 230	4 554 345	48,66
35-39	92 097	457 245	4 090 115	44,41
40-44	90 802	449 031	3 632 870	40,01
45-49	88 811	436 819	3 183 838	35,85
50-54	85 917	420 170	2 747 019	31,97
55-59	82 151	403 534	2 326 849	28,32
60-64	79 262	387 553	1 923 315	24,27
65-69	75 759	370 776	1 535 762	20,27
70-74	72 551	354 343	1 164 986	16,06
75-79	69 186	337 190	810 643	11,72
80-84	65 690	318 839	473 453	7,21
85+	61 846	154 614	154 614	2,50

	2035			
	lx	Lx	Tx	ex
0-4	100 000	498 612	7 499 403	74,99
5-9	99 445	496 770	7 000 792	70,40
10-14	99 263	492 520	6 504 022	65,52
15-19	97 744	486 382	6 011 502	61,50
20-24	96 808	478 831	5 525 120	57,07
25-29	94 724	471 110	5 046 289	53,27
30-34	93 720	464 924	4 575 179	48,82
35-39	92 250	458 069	4 110 255	44,56
40-44	90 978	450 005	3 652 186	40,14
45-49	89 024	438 010	3 202 181	35,97
50-54	86 180	421 649	2 764 170	32,07
55-59	82 479	405 290	2 342 521	28,40
60-64	79 637	389 559	1 937 232	24,33
65-69	76 187	373 032	1 547 673	20,31
70-74	73 026	356 830	1 174 640	16,09
75-79	69 706	339 902	817 811	11,73
80-84	66 255	321 773	477 909	7,21
85+	62 455	156 136	156 136	2,50

	2040			
	lx	Lx	Tx	ex
0-4	100 000	498 640	7 521 425	75,21
5-9	99 456	496 835	7 022 786	70,61
10-14	99 278	492 668	6 525 951	65,73
15-19	97 789	486 652	6 033 283	61,70
20-24	96 872	479 247	5 546 630	57,26
25-29	94 827	471 675	5 067 383	53,44
30-34	93 843	465 606	4 595 708	48,97
35-39	92 400	458 878	4 130 102	44,70
40-44	91 152	450 961	3 671 224	40,28
45-49	89 233	439 181	3 220 263	36,09
50-54	86 440	423 103	2 781 082	32,17
55-59	82 801	407 016	2 357 980	28,48
60-64	80 005	391 534	1 950 963	24,39
65-69	76 609	375 256	1 559 429	20,36
70-74	73 494	359 282	1 184 174	16,11
75-79	70 219	342 578	824 891	11,75
80-84	66 812	324 671	482 313	7,22
85+	63 057	157 642	157 642	2,50

	2045			
	lx	Lx	Tx	ex
0-4	100 000	498 667	7 543 114	75,43
5-9	99 467	496 898	7 044 448	70,82
10-14	99 292	492 814	6 547 550	65,94
15-19	97 833	486 917	6 054 735	61,89
20-24	96 934	479 656	5 567 818	57,44
25-29	94 929	472 229	5 088 162	53,60
30-34	93 963	466 274	4 615 933	49,13
35-39	92 547	459 672	4 149 659	44,84
40-44	91 322	451 899	3 689 987	40,41
45-49	89 438	440 330	3 238 087	36,20
50-54	86 694	424 532	2 797 757	32,27
55-59	83 118	408 715	2 373 225	28,55
60-64	80 367	393 478	1 964 511	24,44
65-69	77 024	377 446	1 571 032	20,40
70-74	73 955	361 701	1 193 586	16,14
75-79	70 726	345 220	831 885	11,76
80-84	67 362	327 536	486 665	7,22
85+	63 652	159 130	159 130	2,50

	2050			
	lx	Lx	Tx	ex
0-4	100 000	498 693	7 564 474	75,64
5-9	99 477	496 960	7 065 780	71,03
10-14	99 307	492 958	6 568 821	66,15
15-19	97 876	487 177	6 075 863	62,08
20-24	96 994	480 057	5 588 686	57,62
25-29	95 028	472 773	5 108 629	53,76
30-34	94 081	466 930	4 635 856	49,28
35-39	92 691	460 451	4 168 926	44,98
40-44	91 489	452 821	3 708 475	40,53
45-49	89 639	441 459	3 255 655	36,32
50-54	86 945	425 937	2 814 195	32,37
55-59	83 430	410 385	2 388 259	28,63
60-64	80 724	395 392	1 977 874	24,50
65-69	77 433	379 604	1 582 482	20,44
70-74	74 409	364 085	1 202 878	16,17
75-79	71 225	347 827	838 793	11,78
80-84	67 906	330 365	490 965	7,23
85+	64 240	160 600	160 600	2,50

Appendix 2: Mortality tables of women with dementia

	2015			
	lx	Lx	Tx	ex
0-4	100 000	498 814	7 874 934	78,75
5-9	99 526	494 735	7 376 120	74,11
10-14	98 368	490 944	6 881 385	69,96
15-19	98 009	489 417	6 390 441	65,20
20-24	97 758	487 573	5 901 025	60,36
25-29	97 271	484 389	5 413 452	55,65
30-34	96 484	480 859	4 929 062	51,09
35-39	95 859	477 821	4 448 203	46,40
40-44	95 269	472 086	3 970 382	41,68
45-49	93 565	464 963	3 498 297	37,39
50-54	92 420	457 555	3 033 334	32,82
55-59	90 602	445 639	2 575 779	28,43
60-64	87 654	429 951	2 130 140	24,30
65-69	84 327	412 865	1 700 189	20,16
70-74	80 819	395 637	1 287 323	15,93
75-79	77 436	375 311	891 686	11,52
80-84	72 689	349 049	516 376	7,10
85+	66 931	167 327	167 327	2,50

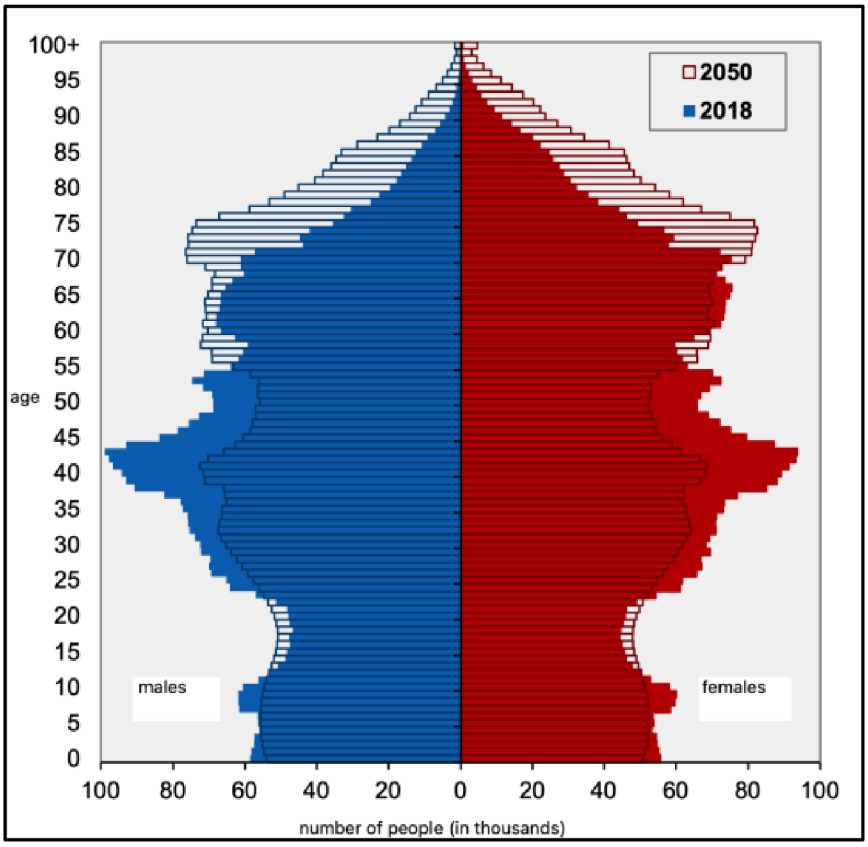
	2020			
	lx	Lx	Tx	ex
0-4	100 000	498 838	7 890 823	78,91
5-9	99 535	494 840	7 391 985	74,27
10-14	98 401	491 124	6 897 145	70,09
15-19	98 049	489 627	6 406 021	65,34
20-24	97 802	487 819	5 916 394	60,49
25-29	97 326	484 698	5 428 575	55,78
30-34	96 554	481 236	4 943 877	51,20
35-39	95 941	478 256	4 462 641	46,51
40-44	95 362	472 630	3 984 385	41,78
45-49	93 690	465 642	3 511 754	37,48
50-54	92 567	458 371	3 046 112	32,91
55-59	90 782	446 673	2 587 741	28,50
60-64	87 887	431 263	2 141 068	24,36
65-69	84 618	414 467	1 709 805	20,21
70-74	81 169	397 518	1 295 339	15,96
75-79	77 838	377 502	897 821	11,53
80-84	73 162	351 612	520 319	7,11
85+	67 483	168 707	168 707	2,50

2025	lx	Lx	Tx	ex
0-4	100 000	498 861	7 906 453	79,06
5-9	99 544	494 943	7 407 592	74,42
10-14	98 433	491 301	6 912 649	70,23
15-19	98 087	489 833	6 421 348	65,47
20-24	97 846	488 061	5 931 515	60,62
25-29	97 378	485 000	5 443 455	55,90
30-34	96 622	481 605	4 958 454	51,32
35-39	96 021	478 683	4 476 849	46,62
40-44	95 453	473 165	3 998 166	41,89
45-49	93 813	466 309	3 525 001	37,57
50-54	92 710	459 173	3 058 692	32,99
55-59	90 959	447 688	2 599 519	28,58
60-64	88 116	432 551	2 151 831	24,42
65-69	84 904	416 042	1 719 280	20,25
70-74	81 512	399 368	1 303 238	15,99
75-79	78 235	379 660	903 870	11,55
80-84	73 629	354 141	524 210	7,12
85+	68 028	170 069	170 069	2,50

2030	lx	Lx	Tx	ex
0-4	100 000	498 884	7 921 828	79,22
5-9	99 553	495 044	7 422 944	74,56
10-14	98 464	491 474	6 927 900	70,36
15-19	98 126	490 035	6 436 426	65,59
20-24	97 889	488 297	5 946 391	60,75
25-29	97 430	485 297	5 458 094	56,02
30-34	96 688	481 968	4 972 797	51,43
35-39	96 099	479 102	4 490 829	46,73
40-44	95 542	473 689	4 011 727	41,99
45-49	93 934	466 963	3 538 038	37,67
50-54	92 852	459 960	3 071 075	33,08
55-59	91 132	448 684	2 611 115	28,65
60-64	88 341	433 817	2 162 431	24,48
65-69	85 186	417 590	1 728 614	20,29
70-74	81 851	401 190	1 311 024	16,02
75-79	78 625	381 786	909 834	11,57
80-84	74 089	356 635	528 048	7,13
85+	68 565	171 413	171 413	2,50

2035	lx	Lx	Tx	ex
0-4	100 000	498 906	7 936 950	79,37
5-9	99 562	495 143	7 438 044	74,71
10-14	98 495	491 644	6 942 902	70,49
15-19	98 163	490 233	6 451 258	65,72
20-24	97 930	488 530	5 961 025	60,87
25-29	97 481	485 587	5 472 495	56,14
30-34	96 754	482 323	4 986 908	51,54
35-39	96 176	479 513	4 504 584	46,84
40-44	95 629	474 203	4 025 072	42,09
45-49	94 052	467 605	3 550 869	37,75
50-54	92 990	460 732	3 083 264	33,16
55-59	91 303	449 663	2 622 532	28,72
60-64	88 562	435 061	2 172 869	24,53
65-69	85 462	419 113	1 737 808	20,33
70-74	82 183	402 982	1 318 695	16,05
75-79	79 009	383 879	915 713	11,59
80-84	74 542	359 095	531 834	7,13
85+	69 096	172 739	172 739	2,50

2040	lx	Lx	Tx	ex
0-4	100 000	498 928	7 951 824	79,52
5-9	99 571	495 240	7 452 896	74,85
10-14	98 525	491 810	6 957 656	70,62
15-19	98 199	490 427	6 465 846	65,84
20-24	97 972	488 757	5 975 418	60,99
25-29	97 531	485 873	5 486 661	56,26
30-34	96 818	482 672	5 000 789	51,65
35-39	96 251	479 915	4 518 117	46,94
40-44	95 715	474 707	4 038 202	42,19
45-49	94 168	468 234	3 563 494	37,84
50-54	93 126	461 490	3 095 260	33,24
55-59	91 470	450 624	2 633 770	28,79
60-64	88 779	436 283	2 183 146	24,59
65-69	85 734	420 610	1 746 863	20,38
70-74	82 510	404 745	1 326 253	16,07
75-79	79 388	385 941	921 509	11,61
80-84	74 989	361 520	535 568	7,14
85+	69 619	174 048	174 048	2,50



Appendix 3: Czech population by age and sex 2018 and 2050

Appendix 4: Results of the projection of prevalence of dementia by 2050 using EuroCoDe and EURODEM prevalence rates

Females	*EuroCoDe*							
Age	2015	2020	2025	2030	2035	2040	2045	2050
60-64	3 415	3 019	2 858	2 914	3 509	3 837	3 159	3 001
65-69	5 083	5 091	4 521	4 301	4 400	5 314	5 825	4 811
70-74	10 339	12 859	12 976	11 612	11 131	11 437	13 884	15 279
75-79	14 044	18 267	23 085	23 653	21 402	20 705	21 409	26 195
80-84	24 723	24 002	32 346	42 067	43 994	40 275	39 592	41 364
85-89	26 039	27 828	28 753	40 739	54 726	58 459	54 547	55 102
90-94	15 641	19 395	22 630	25 175	37 451	51 527	56 178	53 273
95+	2 214	5 574	8 316	10 671	12 815	19 224	27 385	31 635
Total	101 498	116 035	135 484	161 132	189 429	210 779	221 980	230 661

Females	*EuroCoDe*							
Age	2015	2020	2025	2030	2035	2040	2045	2050
30-59	2 007	1 996	1 977	1 890	1 751	1 628	1 565	1 496
60-64	1 783	1 577	1 492	1 522	1 832	2 004	1 650	1 567
65-69	3 994	4 000	3 552	3 379	3 457	4 176	4 577	3 780
70-74	10 502	13 062	13 181	11 795	11 307	11 618	14 103	15 520
75-79	12 325	16 031	20 260	20 759	18 783	18 171	18 790	22 990
80-84	20 351	19 758	26 626	34 629	36 215	33 153	32 591	34 049
85-89	20 795	22 223	22 962	32 534	43 704	46 685	43 561	44 005
90-94	11 361	14 088	16 437	18 286	27 203	37 427	40 805	38 695
Total	84 753	96 846	112 622	132 666	153 706	169 043	177 843	185 440

Females	*EuroCoDe*							
Age	2015	2020	2025	2030	2035	2040	2045	2050
60-64	696	630	615	634	761	824	688	652
65-69	5 561	5 711	5 237	5 178	5 383	6 493	7 059	5 925
70-74	6 721	8 639	9 034	8 428	8 453	8 839	10 739	11 735
75-79	8 623	11 962	15 795	16 912	16 049	16 310	17 207	21 136
80-84	12 273	12 786	18 548	25 350	27 823	26 839	27 851	29 778
85-89	8 527	10 161	11 331	17 294	24 485	27 584	27 219	29 147
90-94	3 436	4 857	6 203	7 343	11 782	17 314	20 080	20 259
95+	406	1 007	1 575	2 106	2 666	4 437	6 827	8 378
Total	46 242	55 752	68 337	83 244	97 401	108 640	117 670	127 009

Females	*EuroCoDe*							
Age	2015	2020	2025	2030	2035	2040	2045	2050
30-59	3 701	3 682	3 634	3 462	3 209	2 999	2 895	2 787
60-64	5 496	4 976	4 855	5 005	6 010	6 509	5 437	5 152
65-69	6 704	6 885	6 313	6 242	6 489	7 828	8 510	7 143
70-74	9 682	12 445	13 015	12 141	12 177	12 734	15 471	16 905
75-79	6 208	8 613	11 372	12 176	11 555	11 743	12 389	15 218
80-84	10 259	10 687	15 503	21 189	23 257	22 433	23 280	24 891
85-89	7 527	8 969	10 002	15 266	21 615	24 350	24 029	25 730
90-94	3 777	5 340	6 819	8 072	12 953	19 034	22 074	22 271
Total	53 750	62 579	73 049	85 608	99 863	111 955	120 738	128 262