

# The burden of Alzheimer disease in Finland: Evidences from medical and financial burden of Alzheimer in elderly population

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## SHORT COMMUNICATION

### 1 Introduction

The amount of Alzheimer's disease (AD) and other dementias are exploding worldwide. In 2015, it was estimated that there were 50 million people who suffer from dementias. It has also been estimated that this number will be doubled in every 20 years. There are estimation of 190 000 cases of Alzheimer's and other kinds of related diagnosis like dementias in Finland and we face to more 14 500 new patient with these diagnoses every year. Most of these patients are the people with over 80 years old. Also, there is also a group of 7000 people who are in the age between 35 and 65 and are diagnosed with AD. Of the elderly people who are involved in long term care three out of four patients have diagnosed with AD (Muistisairauksien yleisyys 2019).

A research study about hospital and drug care costs before and after the diagnosis of Alzheimer in Finland states that most of the treatment and care management costs of AD patients is due to hospital care costs. Interestingly, medications have a minor role in this healthcare cost (Taipale et al. 2015). THL also backs this up by stating that the cost of AD depends on the stage of the disease and it is estimated that about 85% of the total hospital costs is made up from round-the-clock care. The increasing amount of AD patients leads to a substantial rise in total cost of the Finnish social and healthcare system (Muistisairauksien kustannukset 2019).

It is important to note that the prevalence of AD may be reduced resulting from proper care management with targeting and eliminating the risk factors of AD which is known that it is possible to delay the outbreak of AD in an individual during a five-year period. Subsequently, proper AD care management may reduce the prevalence of AD with 50% during one generation (Kansallinen muistiohjelma 2012-2020, tavoitteena muistiystävällinen Suomi 2012, 7) which this would mount up to a substantial financial saving in AD care.

The aim of this letter article is to shed light to the burden of Alzheimer in Finland using Disability Adjusted Life Years (DALYs) lost due to Alzheimer in the past ten years and prepare a short overview of the factors that contribute to the cost of treating AD as well as how this cost can be reduced due to proper care. Moreover, this article verifies the evidence from the future of Finland's age structure and AD role in the ageing population.

### 2 The burden of AD in past and present

DALYs were developed by World Health Organization to measure the global burden of a disease. It measures the gap between the ideal of expected healthy long life and the current situation. DALY score adds the idea of loss of healthy life known as disability adjusted life, to the concept of premature loss of life. DALY score for a disease is calculated by adding the sum of the years of life lost based on premature mortality to the sum of the years lost resulting from disability (Green & Tones 2010, 65).

Institute for Health Metrics and Evaluation (IHME) has provided the data of DALYs in worldwide and also in Finland from different diagnoses and different diseases. The data is available up until the year 2017. IHME states is available in Fig. 1 and verify that Alzheimer is the second cause of the most deaths in Finland both in the years 2007 and 2017. The notable factor here is that the percentage of change during a ten-year period was 60.5 % rise in deaths caused by AD.

IHME also highlighted that Alzheimer in Finland is the cause of the third most burden in 2017 - see Figs. 2 and 3. There is a rise in DALYs from 2007 to 2017 by 42%. This very high and rapid trend suggests that AD has had a significant impact on the quality of Finnish people's life based on the years spent living healthy life.

### 3 The cost of AD

According to WHO, the total worldwide cost of dementia is about 604 billion US dollars. This is an equivalent of 1% of the aggregated worldwide GDP which is a quite huge amount. In high income countries such as Finland, the total health care expenditure as a proportion of GDP varied up to 1.24% for treating AD (Dementia: a public health priority 2012, 25).

In the year 2010, the average cost of round-the-clock care of AD per person in Finland was about 46 000 euros per year. The cost of homecare for the patients diagnosed with AD was 19 000 euros per year. Delaying the threshold in transitioning from homecare to round-the-clock care is a factor which may cut the cost of AD care in Finland and other developed countries. Nevertheless, it will require organized actions in prevention, in early diagnosis and in supporting homecare. In a Finnish efficacy study the cost of the social- and healthcare services utilized by the person with AD and his or her family members were 23 600 euros (comparison group).

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JAMK Journal of Health and Social Studies

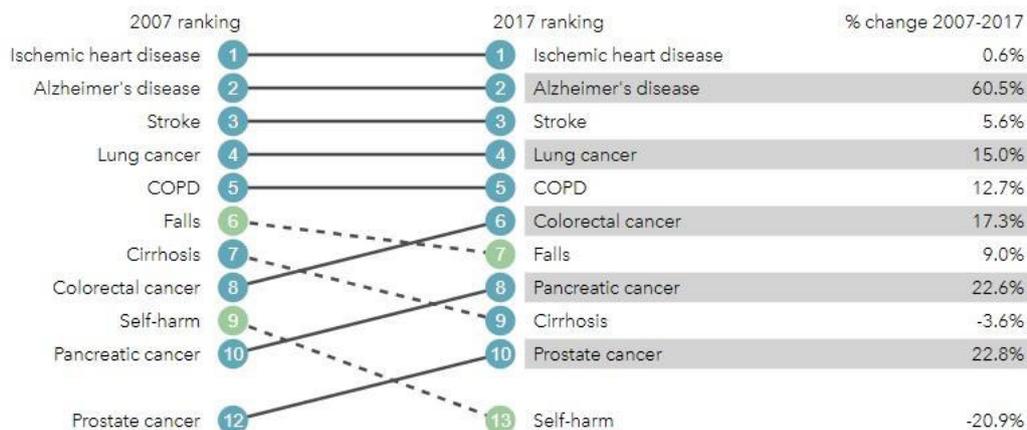
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URN: <http://urn.fi/urn:nbn:fi:jamk-issn-2490-029X-14>

Citation: Koljander, V. (2019) The burden of Alzheimer disease in Finland: Evidences from medical and financial burden of Alzheimer in elderly population, JAMK Journal of Health and Social Studies, e16-e19.



## What causes the most deaths?

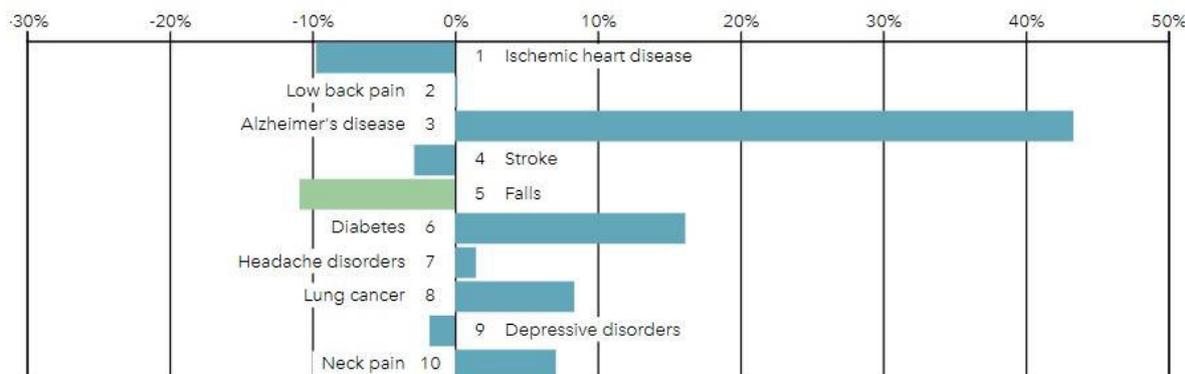


Top 10 causes of death in 2017 and percent change, 2007-2017, all ages, number

Figure 1. Top 10 causes of death in 2017 and percent change, 2007-2017, all ages, number. 2019. Source: IHME (2019a).

## What causes the most death and disability combined?

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries



Top 10 causes of disability-adjusted life years (DALYs) in 2017 and percent change, 2007-2017, all ages, number

Figure 2. Top 10 causes of disability-adjusted life years (DALYs) in 2017 and percent change, 2007-2017, all ages, number. 2019. Page on the Global Burden of Disease website. Accessed on 15 November 2019. Retrieved from <http://www.healthdata.org/finland>

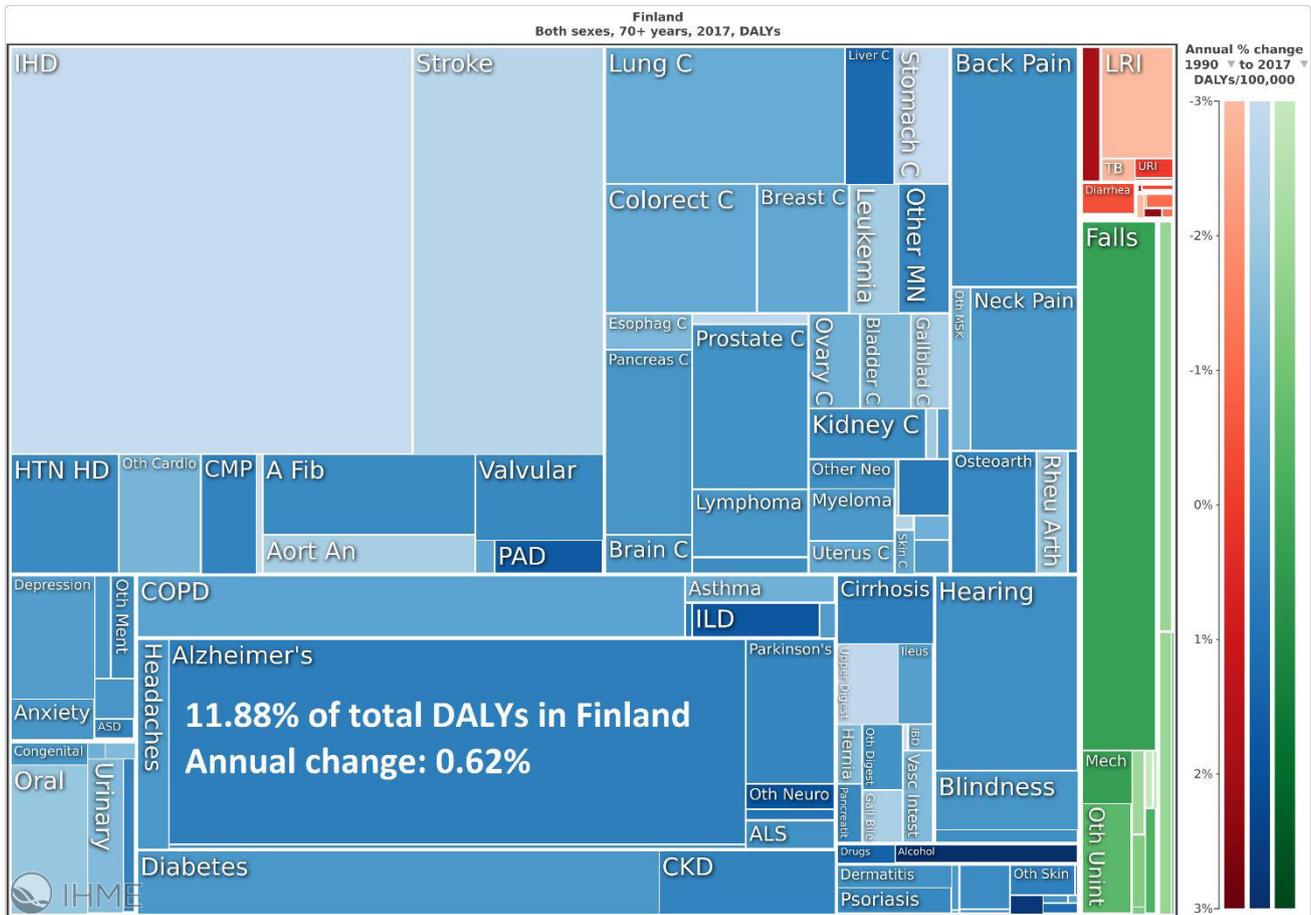


Figure 3. The map of burden of diseases in year 2017 in Finland for the age group of over 70 years old. Source: IHME (2019b).

Another group that had received the needed services and supports from professional coordinators, who tailored individually suitable services for patients, had significantly reduced the cost of 15 600 euros per year. Moreover, developing homecare turned out to be cost-effective, supported the quality of life and delayed the transitioning to around-the-clock-care may significantly reduce the cost of Alzheimer care management in Finland (Kansallinen muistiohjelma 2012-2020, tavoitteena muistiystävällinen Suomi 2012, 7).

Even though there is no new cure insight for AD or other dementias, there is still a lot of modifying care management that can be planned and implemented in Finland. Everyone can improve their brain health with their own choices with targeting the risk factors that are overweight, high blood pressure, high cholesterol and diabetes. All the above can be treated quite efficiently by every individual. Promoting physical activity, healthy diet, reducing smoking and alcohol consumption protect elderly population from AD and other dementias as well. Based on our well-organized outpatient clinics and other healthcare services for elderly people, there is a very good capacity to treat AD in Finland. Early diagnostic is very important factor in proper treatment and care management, so it is possible to slow down the progression of symptoms, keep up the ability to function and subsequently improve the quality of life of the person with AD (Kansallinen muistiohjelma 2012-2020, tavoitteena muistiystävällinen Suomi 2012, 7-8).

Directing government funds to the prevention of the risk factors in the care of elderlies can delay the outbreak of AD with five years and after

having AD, delay the threshold in transitioning from cheaper homecare to the more costly and not as patient friendly round-the-clock-care. Government funds should be directed in supporting homecare and hiring professional coordinators to tailor the needed services in the care of aged population. These actions would mount up to more healthy life years and lower death rate caused by AD. The total amount of disability adjusted life years could be reduced as a result.

#### 4 The age structure and Alzheimer´s future trend in Finland

The variation in the birth rate and mortality changes the level of the population growth and age structure. When the relative proportions of children, working aged people and elderly change, the interaction between production and consumption and age structure changes the economic dependency ratio, savings level and the emphasis on capital in the economy. The relative growth of the working aged population would make it possible for the increase in productivity per capita with the given level of productivity and employment rate (Riihelä, Vaaitinen and Vanne 2014, 29).

In 2010, the overall dependency ratio due to the ageing population in Finland, will exceed at the highest level in history. Moreover, it is forecasted that this ratio will decline until 2030. In 2030, it will settle to a level that will be commonly achieved by industrialized nations in year 2050 (Riihelä and others 2014, 33). The ageing nature of Finnish age structure can be seen in Table 1 (Tilastokeskus, Väestöennuste 2019).

Table 1. The ageing nature of Finnish age structure from 2020 to 2070. Source: Tilastokeskus Väestöennuste (2019).

	2020	2030	2040	2050	2060	2070
Population, thousands	5 543	5 612	5 602	5 532	5 448	5 371
Age, %						
0-14 years	15.6	13.5	13.1	12.8	12.0	11.6
15-64 years	61.7	60.3	59.7	58.5	56.9	55.3
65-84 years	19.9	22.3	21.1	21.8	23.9	24.4
above 85 years	2.8	3.9	6.1	6.9	7.2	8.7

The burden of Alzheimer and other dementias will increase dramatically on the future as the population of the world will live longer. According to European study, it is forecasted that the number of people who have Alzheimer or other dementias will multiply until the year 2050.

In regions that occupy a lot of ageing population also have more cases of Alzheimer's (Muistisairauksien yleisyys 2019). Hence, in comparison to the rest of the world Finland has a good chance to influence the risk factors of AD that seem to increase in global perspective. Finland has a functioning healthcare system that does already target the risk factors of AD in a continuous healthcare project to manage the needed care in the future.

According to WHO, it is difficult to make any claims of future economic costs due to increasing AD and other dementias. Even though we could even assume that every background factor attributing to AD and other dementias would stay at the same level. The only changing factor would be the amount of people who are getting diagnosed and this would rise the societal cost of AD up to 85% by the year 2030. As we can see, the reality is quite more complex. The financial burden of AD is impacted with a lot of factors like macroeconomics and the changes in the prevalence of Alzheimer and dementias, people seeking help for the disease and the developing diagnosis, the access to social- and healthcare services, developing the care-systems and developing new treatments that are effective (Dementia: a public health priority 2012, 32).

## 5 Epilogue

In 2010, the worldwide cost of dementia was 604 billion US dollars. The medical costs in other high-income countries is in line with the Finnish findings i.e. the medical cost takes only 15 % of the total cost and most of the cost is due to homecare 45% or formal social care 40%. (Dementia: a public health priority 2012, 2). As the Finnish dependency ratio is leaning towards the elderly, it is no surprise that AD burden shows no stopping signs in the future. As the cost of round-the-clock care is 46 000 euros per year and there is an estimated amount of 190 000 cases of AD in Finland, the price tag of treating that number of people in the hospital may be around 8,7 billion euros. It is also obvious that it is not cost-effective, and

we do need to focus on preparing funds and supporting actions in home care and actions delaying the outbreak of AD as stated before.

The ageing population and the dependency ratio are political questions and the problem is multi layered and complex involving employment and the whole economic system of Finland. The future solutions in that regards lay also in the hands of the Finnish problem solving in general and possible solutions could be found from labor migration, elder care robots and other creative options.

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