



# The future need for care

Results from the LEV project



REGERINGSKANSLIET

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# Foreword

By 2050 the proportion of elderly people in the population is expected to have increased from the present level of 17 per cent to 25 per cent.

The population is ageing, health is improving and life expectancy is rising. This is a positive trend to which society must adapt. The Ministry of Health and Social Affairs has therefore compiled a description of how demographics, health, morbidity and mortality will develop over the next 40 years, and what impact this has on the need for health and elderly care. A unique model is used to simulate how a statistically representative population of 300 000 individuals ages year by year up to 2050. The result is summarised in this document.

The fact that we are living longer and that our health is improving is positive. The results of the simulations show that it is possible to meet the needs of the ageing population for health care and care of the elderly, but that strategic and resolute efforts are required in several areas.

The work which was initiated through a Government decision in the autumn of 2006 has been pursued under the LEV project (Long-Term Demand for Welfare Services: Health Care and Care of the Elderly up to 2050). The project group has consisted of Lisa Brouwers (from 2007), Nils Janlöv (from 2008), Josepha Lindblom (from 2009), Karin Mossler (from 2010) and Kalle Mäkilä (2007–2008). Pontus Johansson was project manager from 2006 to August 2009, since when Lisa Brouwers has acted as project manager. The project group has been chaired by Anders Ekholm. Lina Maria Ellegård and Björn Lindgren, both Lund University, Mårten Lagergren, ARC, Mats Talbäck and Bengt Haglund, both National Board of Health and Welfare, Einar Holm, Umeå University, and Therese Räftegård Färggren, Swedish National Institute of Public Health, have contributed data and valuable comments.

Many individuals at the Government Offices of Sweden have contributed data and valuable comments to the project, including Kjell Ellström, Tomas Pettersson, Thomas Pettersson and Lena Unemo, Ministry of Finance and Anna Brooks, Åsa Elffors, Elin Feldt, Karin Hellqvist, Niclas Jacobson, Patrik Nylander, Jesper Olsson and Minga Orkan, Ministry of Health and Social Affairs. A reference group has contributed valuable points of views during the course of the project: Kjell Asplund and Maria Danielsson, National Board of Health and Welfare, Mats Brommels, Karolinska Institutet, Roger Molin, Swedish Association of Local Authorities and Regions, Mårten Lagergren, Ageing Research Council (ARC), Clas Rehnberg, Karolinska Institutet, and Nina Rehnqvist, Swedish Council on Health Technology Assessment (SBU).

This sub-report has been produced by Lisa Brouwers, Anders Ekholm, Nils Janlöv, Josepha Lindblom and Karin Mossler (coordinating editor), officials at the Ministry of Health and Social Affairs. The working group itself is responsible for the results, arguments and conclusions presented.

*Stockholm, 24 June 2010*

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# Summary

The Ministry of Health and Social Affairs has used a unique model (SESIM) to simulate how 300 000 individuals age from year to year up to 2050 and what role their health plays for their future needs for health care and care for the elderly.

Average life expectancy for a 65-year-old, according to Statistics Sweden projections, is expected to rise by 2.6 years to around 87 in 2050. With better health, the costs of health and elderly care per individual will decrease. The total costs will nevertheless increase, as there will be more elderly people. The costs of care for the elderly in the ageing population are expected to rise by around 70 per cent and health care costs by nearly 30 per cent between now and 2050. Assuming new treatment options and a higher level of ambition in health care, the increase will be around 80 per cent. The need for staff will increase by around 50 per cent, most in care for the elderly, and a shortage of around 65 000 full-time equivalent staff is expected by 2030.

GDP is also expected to grow. In view of the demographic changes, the share of care for the elderly in GDP would increase by just over one percentage point, but the share of health care in GDP would remain relatively unchanged. With an increased level of ambition, however, the share of health care in GDP would increase by just over two percentage points. That would mean an increase in the share of health and elderly care in GDP from the present-day level of around 13 per cent to 16 per cent in 2050, which is equivalent to a further addition of approximately SEK 110 billion at current prices.

Most countries fund health and elderly care with a combination of taxation and charges, and some have insurance-based systems. All countries face the same challenge to varying degrees. The choice of funding model in our view does not, however, answer the question of how the need for health and elderly care is to be met. A new way of funding the operation does not solve the fundamental problems. This report therefore focuses on what options exist for changing the picture in the future through better health, lower morbidity and a more efficient health- and elderly care system; i.e. a focus on the efficiency gap instead of the funding gap.

Resolute efforts are required to achieve this. The future society needs to be available, with local services, modern use of assistive devices, adapted housing and communications. Systematic efficiency improvements are required in health care and care for the elderly, as well as continued strategic commitments to research and development. Collaboration, management, control and follow-up are areas in which improvements are urgently needed. Work processes need to be adapted to current knowledge and the new opportunities presented by integrated IT systems.

With an increase in productivity of 0.6–0.7 per cent per year in the health and elderly care sector, the increased need can be met without increasing the share of health and elderly care in GDP. It is possible to combine measures to meet the increasing needs in 10–15 years' time:

- Better health and functional capacity reduce the need for health care and care for the elderly.
- Accessibility and assistive devices.
- More hours worked contribute to growth.
- More efficient health and elderly care may mean better results and/or reduced costs.
- New ideas, development and research.

The simulations show that there is time to implement these changes and meet future needs.

# Introduction

The proportion of elderly people in the population is expected to increase by 30 per cent between 2010 and 2050, according to the Statistics Sweden population forecast.<sup>1</sup> This means that a quarter of the population will be over the age of 65 in 2050. The elderly need elderly care but also more medical care than younger individuals. At the same time, the demographic trend means that there are more young and old people in relation to the number of working age population. It is therefore a challenge for society to be able to meet the future needs of the ageing population for health and elderly care.

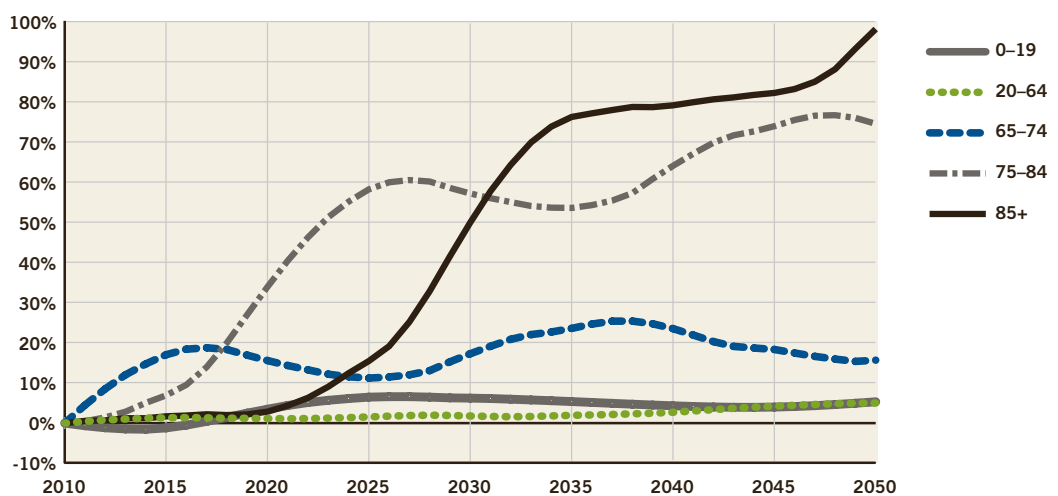
This has been described in many reports over the past 25–30 years. The proposals for solutions – apart from reduced public commitment, cuts and savings – have often related to new ways of funding health care and care for the elderly. Sharply increased charges and a switch to insurance systems or individual account saving have been proposed as possible ways of reducing the growing gap between needs and resources. This report presents some examples of what would be required in tax rises or increased charges at current unit costs for health and elderly care.

A new way of funding health and elderly care does not, however, solve the fundamental problems. This report therefore focuses on what options there are for changing the picture in the future through better health and more efficient services. The first step is, however, to illustrate the level of cost increases that can be expected.

The results presented below are based on a micro-simulation model known as SESIM [1]. The model is used to study how trends in demographics, health, morbidity and mortality affects the future need for health care and care for the elderly. The result is summarised in this document. Another report is planned at the end of the year.

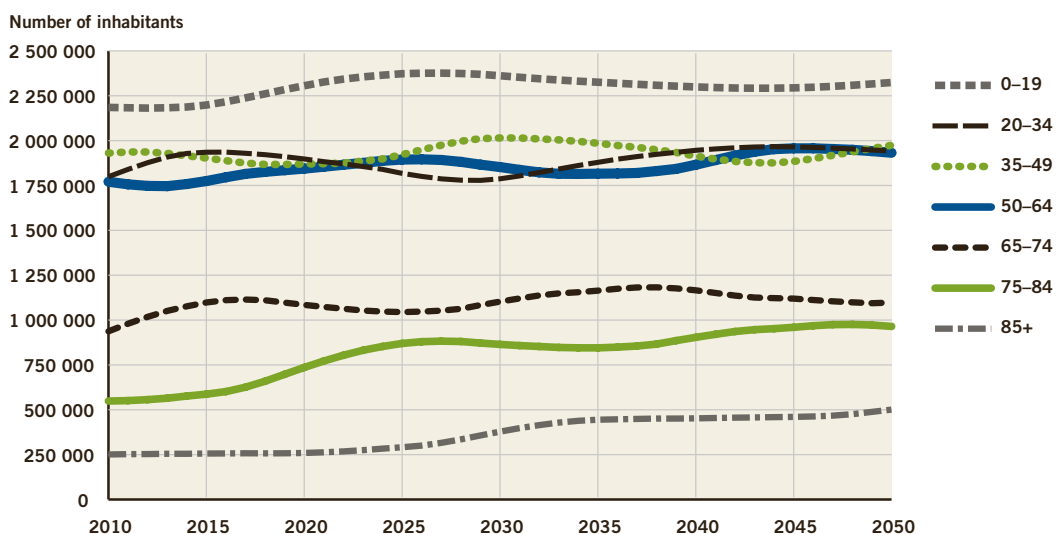
# Health in an ageing population

The average life expectancy of the population has steadily increased over the past century and consequently so too has the number of very old people. Over the next 40 years, increased life expectancy will mean that the number of very old people will increase sharply. Figure 1 shows that the number of people aged 85 and over increases by 100 per cent, i.e. twofold. The number of people aged 75–84 increases almost as much.



**Figure 1.** Percentage change in number of people per age group 2010–2050. *Source: Statistics Sweden 2010.*

However, the percentage increase in the number of elderly people provides one picture of the trend, while the change in the number of elderly people presents another. As shown by Figure 2, there are fewer people in the very oldest age groups. Although the number of people over the age of 95 is expected to show an almost threefold increase by 2050, they will still only be 45 000.



**Figure 2.** Number of people per age group in 2010–2050. *Source: Statistics Sweden 2010.*



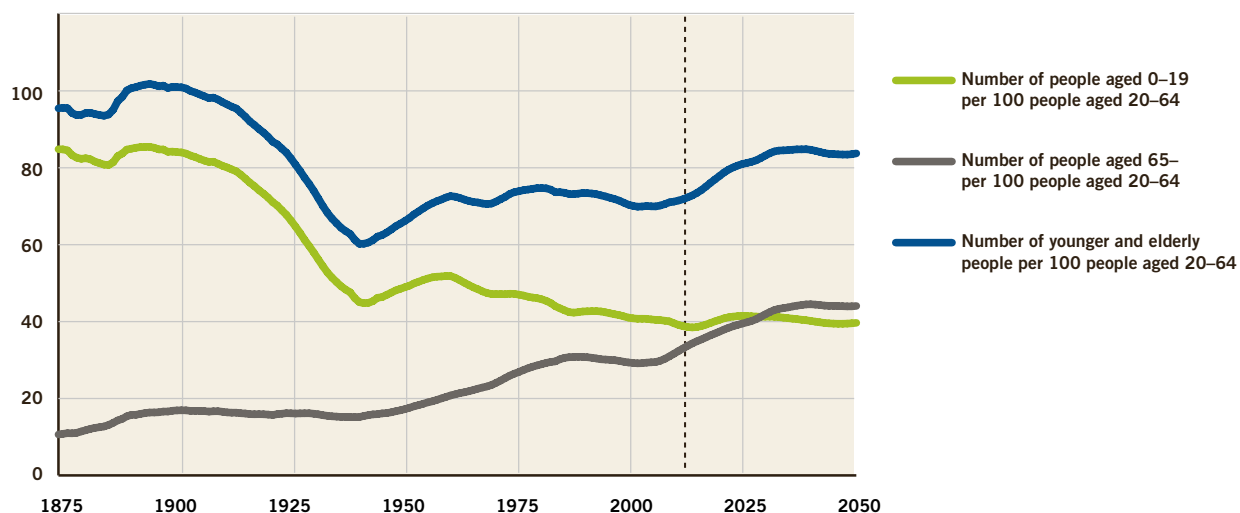
Together, the ageing of the population represents the greatest challenge for the health and elderly care sector over the period 2020–2030. From the point of view of health care, the demographic pressure is at its greatest around 2020 and for care of the elderly it is 2025–2030.

### More younger and elderly people in working age

The increase in the population over the past 40 years has principally consisted of persons in working age. Over the next 40 years a smaller proportion (around a quarter) of the increase in population is expected to be of working age.

When the number of elderly people increases continuously while the number of people of working age increases at a slower pace, a change takes place in the dependency ratio. This measure indicates how many children, young people and elderly people there are per 100 people of working age.<sup>2</sup> The dependency ratio has varied widely from the historical point of view. It fell from a high level in the early 1900s until the 1940s. It has since increased to the present-day level of 71, meaning that there were 71 young and elderly people per 100 working age people in 2008. The dependency ratio is expected to continue to rise to 83 in 2030 and 84 in 2050, see Figure 3.

The dependency ratio was previously determined principally by the number of children and adolescents. However, the significance of the elderly in the ratio has steady increased, and around 2030 there will be more elderly people than younger people. This increases the need for health and elderly care and may also lead to increased political pressure in this area.



**Figure 3.** Number of people aged 0–19 and 65+ per 100 people of working age (20–64).

The dependency ratio shows the sum of these two groups in relation to the working population.

The broken vertical line indicates the changeover from actual data to projections.

Source: Statistics Sweden 2010.

### **Simulation of the ageing and care consumption of individuals**

Up to 2050 the ageing of the population will mean that there are fewer people of working age in relation to elderly and younger people, while the costs of health and elderly care rise. The dynamic microsimulation model SESIM has been used to calculate what this can be expected to lead to.<sup>3</sup>

The dynamic model SESIM

The model is based on a representative sample of the population including 300 000 individuals with various characteristics and circumstances. Using this society in miniature, the life paths of the individuals from year to year is simulated, up to 2050. Analyses are performed for women and men of different ages, with varying health and levels of education. Some characteristics such as age are updated by simple rules. The income of the individuals is simulated on the basis of background conditions (with estimated regression models) and updated annually on the basis of assumptions on income trend. Some characteristics are only updated when a change occurs, for example on graduating, retiring or marrying. The probability of changes has been estimated from register data and takes the individuals' other characteristics and their life histories into account.

SESIM has previously been expanded to include a description of the individuals' health, in what is known as the BabyBoom project [2]<sup>4</sup>. In our project we are building on this work and have added models that describe, for each year, the individuals' consumption of health care<sup>5</sup> (divided into primary care, specialist outpatient care, inpatient care and medication) and care of the elderly. Consumption of care is influenced, in addition to gender, health status and age, among other things by level of education, income and marital status. Consumption of care of a particular type also explains another type of care consumption, for example the probability of days of inpatient care increases if the person has many outpatient visits in the same year, and many days of inpatient care in the previous year increases the probability of many days in the next years.

The individuals' elderly care is divided into home care services and special housing with 24-hour care services. The degree of functional impairment is of great significance for the need for elderly care. Other explanatory factors include age, gender, cohabitation and level of education.<sup>6</sup> Developed dementia greatly increases the likelihood of special housing. Finally the mortality risks of the individuals have been linked to their health status, functional impairment and consumption of health care and elderly care.

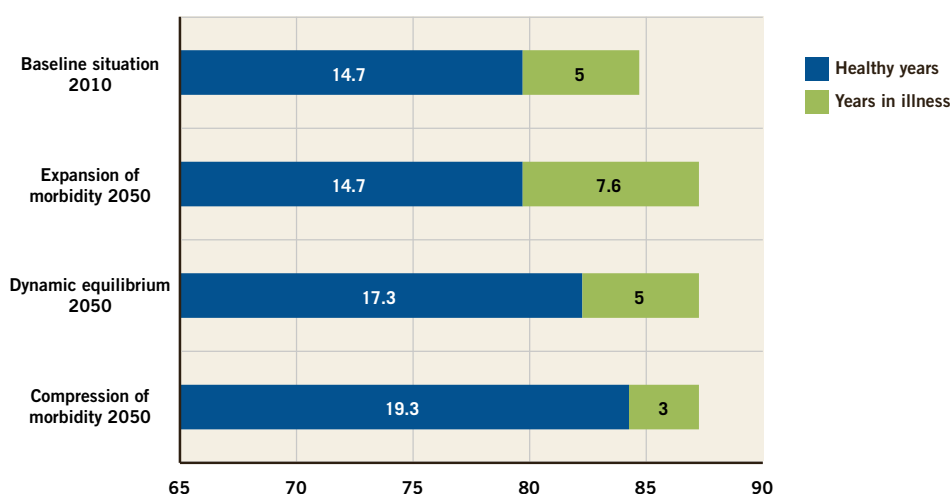
### **Increased average life expectancy according to Statistics Sweden projection**

According to the Statistics Sweden projection, average life expectancy will rise over the next few decades. A 65-year-old is expected on average to live 2.6 years longer in 2050 than in 2010. For men aged 65 and over, average life expectancy rises by around 3.2 years to 86.3 years and for women over the age of 65 by 2.2 years to 88.2 years.

This increased life expectancy is consistent with different trends on population health development. There is extensive international research on how likely it is that the future increased life expectancy implies more years of good or poor health, but there is not yet any international consensus [2b]. Three alternative scenarios have been simulated to illustrate the effects of how health develops (see Figure 4).<sup>7</sup> They all show increased life expectancy and population growth in accordance with the Statistics Sweden projection.

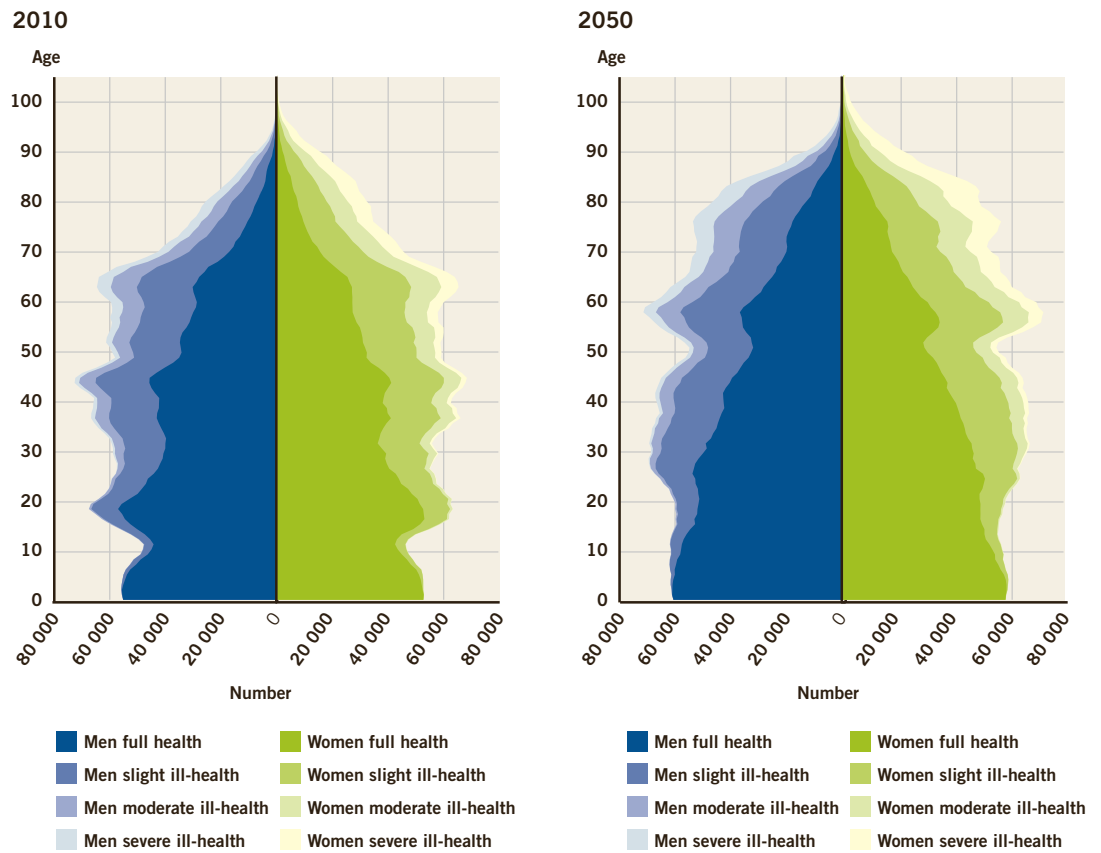
### Three health scenarios

The three different scenarios are referred to as *expansion of morbidity*, *dynamic equilibrium* and *compression of morbidity*. All the scenarios entail an increase in life expectancy of 2.6 years for a 65-year-old, which is in agreement with the Statistics Sweden population forecast. The differences between them are the health of the population in the final stage of life, see Figure 4. In expansion of morbidity people live longer but become ill at the same age as today. This is achieved in the model by providing people with mortality risks as if they were younger. In the dynamic equilibrium scenario, both morbidity and death are deferred equally much by giving the model individuals a health status as though they were younger. In the most positive scenario, compression of morbidity, the years of frailty at the end of life are reduced by a further improvement in health.<sup>8</sup>

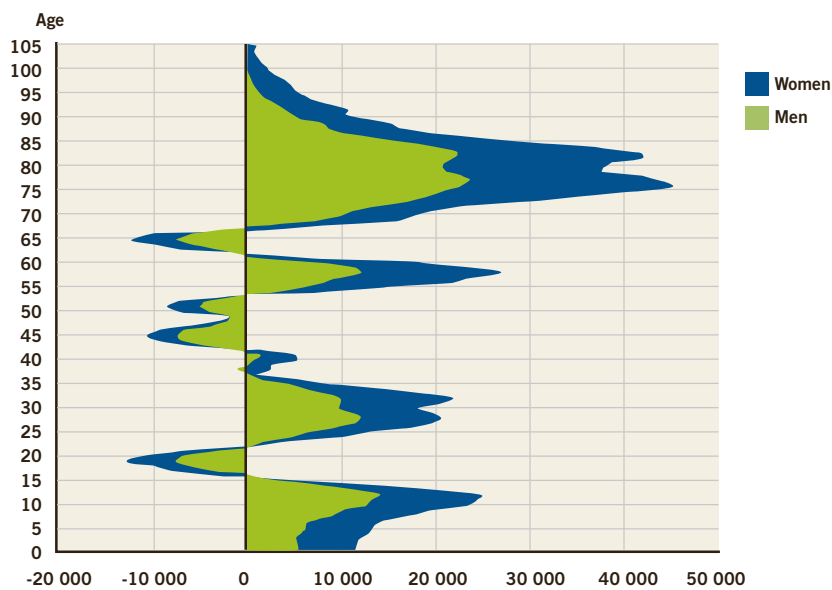


**Figure 4.** Remaining life expectancy at the age of 65 in 2010 and 2050 divided into healthy and unhealthy years according to three theories. *Source: Statistics Sweden 2010.*

Figure 5 shows how many men and women of different ages have full health, slight, moderate or severe ill-health in 2010 and 2050, if morbidity increases, i.e. the expansion of morbidity scenario. It is then shown how the number of people of different ages in the population changes between 2010 and 2050. Figure 6 shows that the number of men and women aged 70–85 increases sharply.



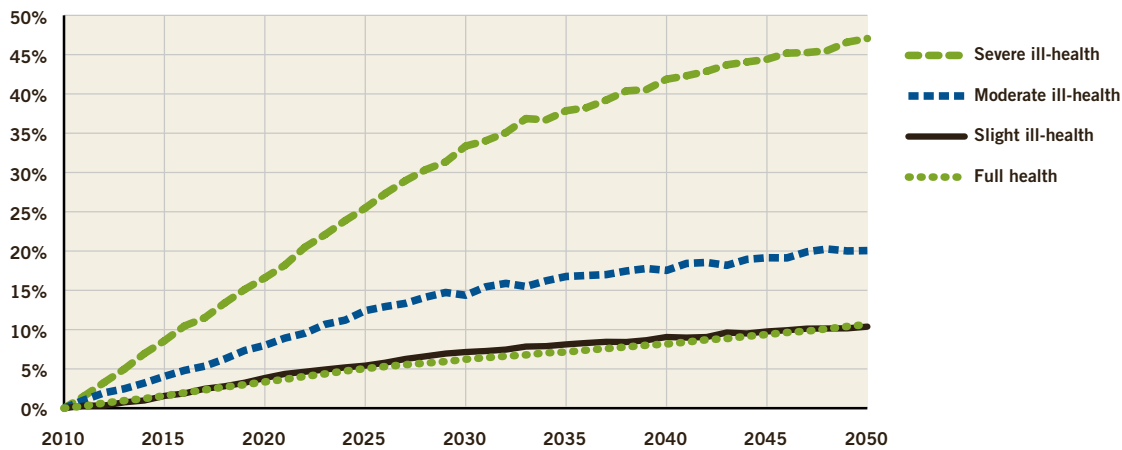
**Figure 5.** Number of individuals in the population in 2010 and 2050 in the expansion of morbidity scenario, divided by men (left) and women (right) and health status (dark colour signifies better health).  
*Source: Calculations by Ministry of Health and Social Affairs.*



**Figure 6.** Difference in the number of men and women of different ages in 2010–2050 in the expansion of morbidity scenario. The number of men is indicated furthest in and the number of women furthest out; they do not overlap (the number of women starts where the number of men ends).  
*Source: Calculations by Ministry of Health and Social Affairs.*

Most people in the population are healthy or have slight ill-health. Around 14 per cent of the population have severe (5 per cent) or moderate (9 per cent) ill-health in 2010. The proportion increases somewhat between 2010 and 2050 (from 14 per cent to 15.9 per cent) in the expansion of morbidity scenario. As it is more common for elderly people to have moderate or severe ill-health, and the number of elderly people is increasing, the number of people with severe ill-health increases by 45 per cent between 2010 and 2050. .

Figure 7 shows the percentage change in the number of people with differing health status for the scenario of expansion of morbidity. Other scenarios display a more positive health development .



**Figure 7.** Percentage trend in number of individuals with differing health status in 2010–2050 in the expansion of morbidity scenario.

# Consumption of health and elderly care

What effects does a change in health have on the needs of the ageing population for health care and elderly care and how is the trend in costs affected? The costs may increase as a consequence of:

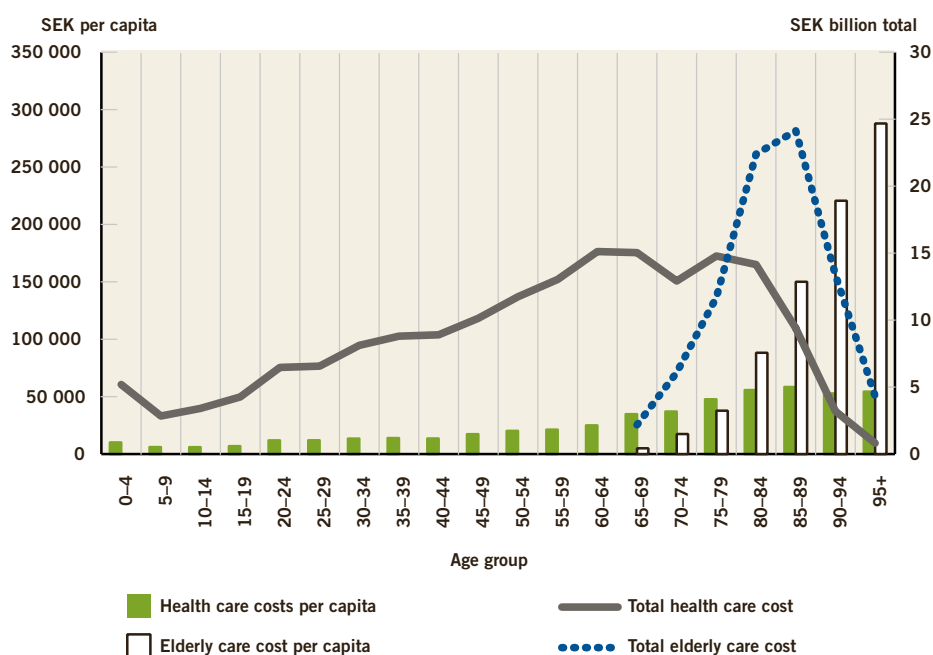
- the population grows (given the same average life expectancy)
- the population ages
- health changes
- the level of ambition in health and elderly care rises.

A description is first given below of how the costs vary with age, followed by the trend in consumption per individual and the trend in total consumption.

## Cost of health and elderly care increases with age

It is not just the number of young and elderly people per person in working age that affects our prospects of meeting future needs for health and elderly care. There is a clear age correlation between people's health and functional impairments and their need for health care and care for the elderly as well as the costs of these services.

Figure 8 shows that the per capita cost of health care rises continuously to the age of 85–90. The per capita cost of elderly care increases steadily with age. But as the number of people in the oldest age groups is lower (see Figure 2), the total cost – the per capita cost in the age group multiplied by the number of people – is more evenly distributed across the ages.

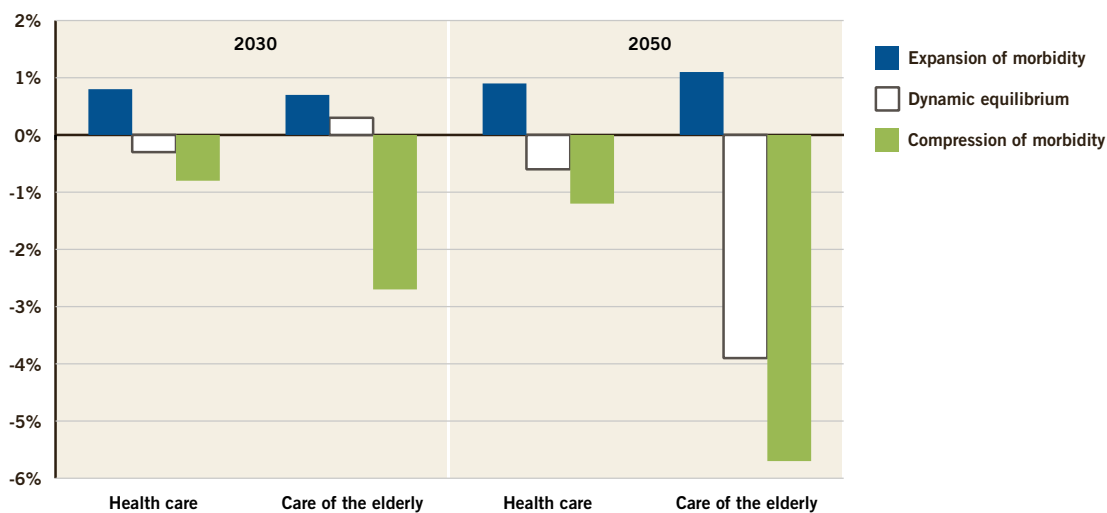


**Figure 8.** Cost of health and elderly care, total cost and cost per capita divided by age group in 2006. (1000 SEK=108 EUR, 28 September 2010, European Central Bank).  
 Source: HEK (household finances survey) 2006, Ministry of Finance 2006.

The total cost of health care increases up to the age of 65 and decreases from 75. The costs of care of the elderly rise quickly to reach their maximum value for the 85–89 age group.

### Costs of health care per capita

As expected, increased ill-health also results in greater consumption of health care<sup>9</sup>. In expansion of morbidity, age-standardised consumption per individual (i.e. when the effect of the age composition of the population differing between 2010 and 2050 is deducted) of both health care and care of the elderly increases.<sup>10</sup> Consumption decreases in the other two scenarios, most in compression of morbidity.<sup>11</sup> As shown by Figure 9, this produces a great effect in 2050, particularly for care of the elderly. The higher level of education in the population generally contributes to reducing consumption per individual in different age groups up to 2050 (see Figure 9).

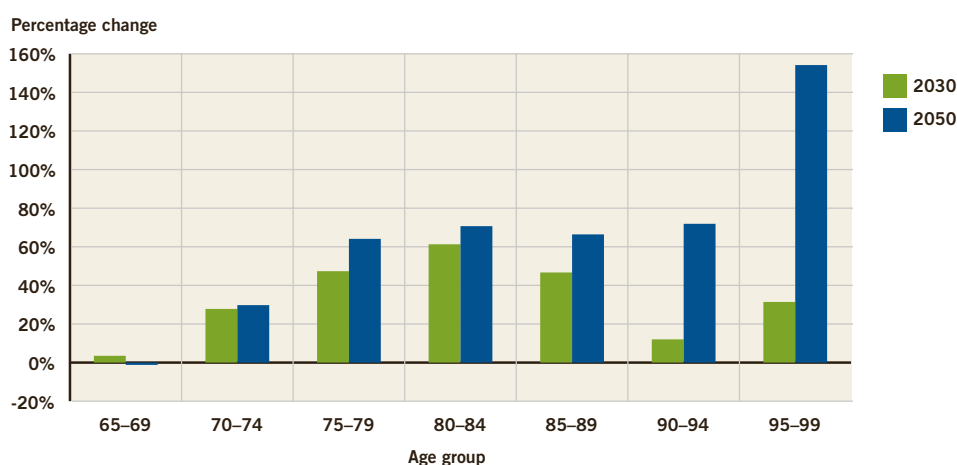


**Figure 9.** Percentage difference in age-standardised consumption of care and social services per individual in 2030 and 2050 in relation to 2010. Age standardisation means that the population in the three different scenarios has the same size and age composition.

Source: Calculations by Ministry of Health and Social Affairs.

### Total costs increase when the number of elderly people rises

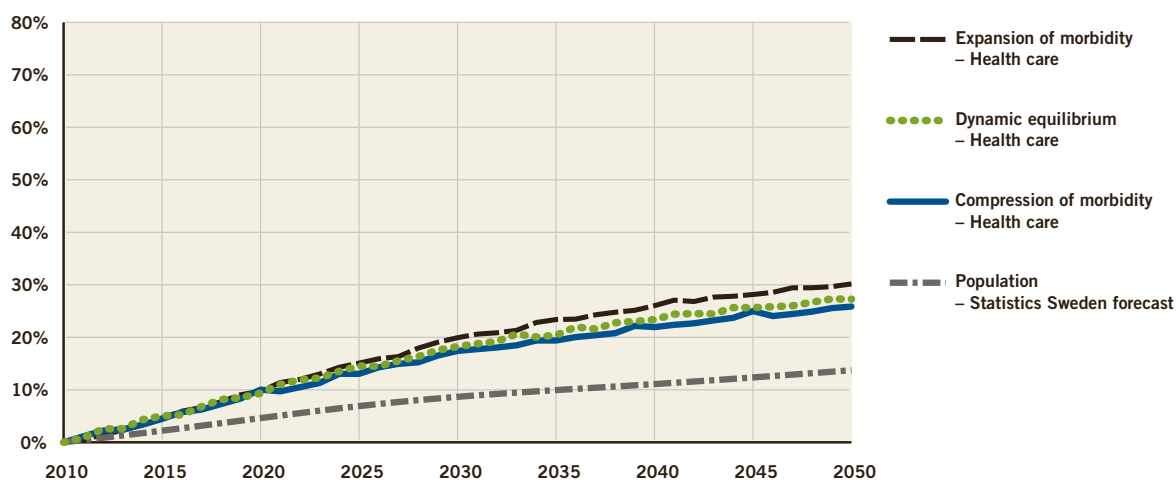
The number of elderly people will, however, increase with an ageing population. Figure 10 shows that the future age distribution is shifted towards an ever larger proportion of very old people, which brings about increased consumption of health and elderly care in all scenarios.



**Figure 10.** Percentage increase in elderly people in different age groups 2010–2030 and 2010–2050. *Source: Calculations by Ministry of Health and Social Affairs.*

### Health care

The simulations show that the consumption of health care by the ageing population is expected to rise by around 0.6–0.7 per cent per year up to 2050, see Figure 11. Expressed in current prices, this means an average increase in cost over the period of SEK 2–2.4 billion per year. Up



**Figure 11.** Percentage trend in costs of consumption of health care due to demographic factors in 2010 to 2050 in different scenarios. 2010 fixed prices. *Source: Calculations by Ministry of Health and Social Affairs.*

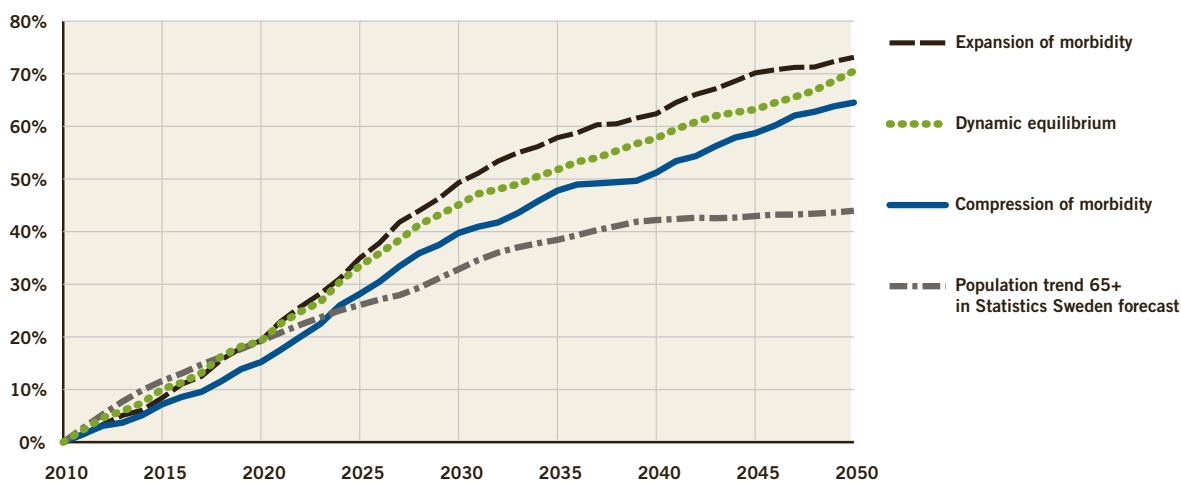


to 2030 the demographic pressure is greater (see Table 1). Around half the future increase in consumption of health care is due to the growth in population and half to an older population. The costs increase most for inpatient care and medication, which have a more pronounced age profile than outpatient care and primary care.

### Care of the elderly

The number of households receiving elderly care will increase sharply in the future, by 40 per cent up to 2030 and by 60 per cent up to 2050. The need for care of the elderly, in particular for special housing, will therefore increase more than the need for health care in all the scenarios, assuming the same pattern of care as today. The simulation shows that the consumption of elderly care increases on average by around 1.3–1.4 per cent per year up to 2050, depending on health scenario. Expressed in current prices, this means an average increase in costs over the period of SEK 1.7–1.9 billion per year. Up to 2030 the demographic pressure is greater (see Table 1).

Figure 12 shows the trend in costs due to demographic changes for the three scenarios. The increase in costs is greater than the increase in population in all the scenarios since there will be an increase among the oldest



**Figure 12.** Percentage increase in costs of consumption of care for the elderly due to demographic factors in 2010–2050 in different scenarios. 2010 fixed prices.

Source: Calculations by Ministry of Health and Social Affairs.

### Total consumption of care is increasing

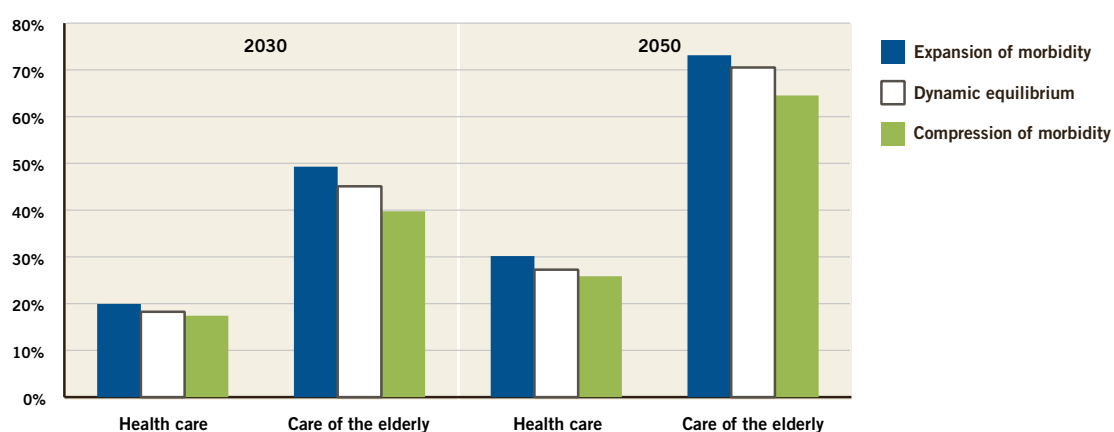
Table 1 shows how the costs of health care and care for the elderly are expected to change per year in percentage terms and in billions of SEK up to 2030 and 2050. The percentage increases in costs are compared with the increase in the number of people in the total population and the number aged 65+. As expected, the costs increase more than the growth in population. This assumes, however, that the level of ambition is unchanged, which is regarded as less realistic, see page 26.

**Table 1.** Annual average trend in costs of health care and care of the elderly

	2010–2030		2010–2050	
	Health care	Care of the elderly	Health care	Care of the elderly
Annual percentage change in costs	0.8–0.9	1.7–2.0	0.6–0.7	1.3–1.4
Change in costs billion SEK (2010 fixed prices)	2.7–3.1	2.0–2.5	2.0–2.4	1.7–1.9
Annual percentage growth in population	0.4		0.3	
Annual percentage growth in population 65+	1.4		0.9	

(1 000 SEK=108 EUR, 28 September 2010, European Central Bank)

To summarise, the ageing of the population brings about an increased need for health and elderly care. Health-care costs increase from 2010 to 2050 by a total of 26–30 per cent and costs of care of the elderly by around 65–73 per cent, i.e. more than twice as much as health care. The increase is greatest up to 2030, see Figure 13. Costs of health care increase most around 2020 and the costs of care of the elderly most around 2025. As expected, the need for health and elderly care increases more in the case of expansion of morbidity than for compression of morbidity.



**Figure 13.** Percentage increase in costs of consumption of health and elderly care in 2030 and 2050 in relation to 2010 expressed in 2010 fixed prices.

Source: Calculations by Ministry of Health and Social Affairs.

### **Higher costs with raised level of ambition and technological progress**

Population changes is not the only factor influencing the trend in costs of health care and care for the elderly. Historically, other factors have been of greater significance: the country's wealth and income development, progress in medical technology, changed patterns of treatment, increased expectations of and demands on the contents and quality of services and access to staff with various qualifications. The cost development is thus due to a combination of a change in the composition of the population, an increase in wealth and advances in medical technology (which in turn may be dependent on the country's economic situation).

Changes in medical technology influence the trend in costs in various ways. They provide opportunities for new treatments that have previously not been possible. Diagnostic methods are developed, and more people can receive a correct diagnosis or have shorter periods of treatment, which in turn can increase the number who receive medical care. However, this often leads to a greater need for staff with specialist skills (and receiving higher levels of pay). Technological progress may also save costs through a reduction in unit costs for treatments, i.e. it becomes cheaper to provide treatment.

There are many examples of procedures which previously led to a long period of hospitalisation being replaced by medication or outpatient care. In addition, treatments can be given to more patients and in some cases different patient groups, which may lead to increased costs or lost savings for health care. At the same time, the new advances – as well as increased benefit for patients and positive effects for patients' families – can reduce the need for and costs of nursing, for example in care of the elderly. However, this is not captured when it is illustrated how the cost per patient in medical care changes in relation to those who benefit from the treatment.

It is difficult to measure the impact of development in medical technology on costs. In some WHO studies, technological development is estimated to account for 50–75 per cent of the increase in health care costs [3]. It is therefore more realistic to assume an increase in costs beyond the demographic trend. This also ought to be required in order to achieve health improvements and increased life expectancy. An extra increase in costs of 0.8 per cent per year has therefore been assumed on the basis of a historical perspective. This is equivalent to the actual trend in costs between 1980 and 2003, which according to the Swedish Association of Local Authorities and Regions cannot be explained by demographic changes [4]. This increase in costs is referred to increased level of ambition/effect of technology.

The assumption that costs will increase by an additional 0.8 per cent per year is of great significance to the total cost for health care, as it increases by 80 per cent instead of by 30 per cent in the expansion of morbidity scenario. If, on the other hand, productivity increases by 0.8 per cent per year, it means that the increase in cost is back to the rate of increase due to demographic factors of 30 per cent. It is difficult to judge the trend in future increased assumptions and the potential for cost reductions through new more effective methods of treatment. The trend in GDP and the way in which health and elderly care are valued over the next decades are of great significance.<sup>12</sup>

### **Increased growth contributes to funding**

As indicated above and as shown by many studies [5], there is a link between the wealth of a country and the proportion of a country's total income spent on health care. When wealth increases, decisions are often taken to allocate more money to health care. The share of private

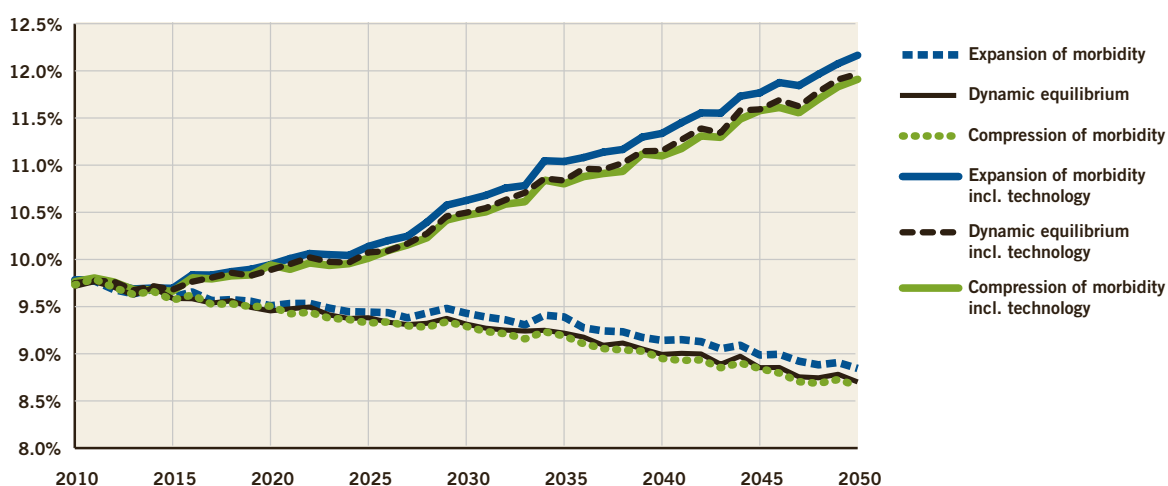
consumption in GDP thus decreases. Figure 14 illustrates the trend in costs of health care and care for the elderly in relation to the trend in GDP.<sup>13</sup>

The trend in the projection of GDP is based on the trend in income created in the SESIM-model. This in turn is due to macroeconomic assumptions according to the Ministry of Finance's projections.<sup>14</sup> Prices for health and elderly care are assumed to follow the same trend in labour and capital as the rest of the economy.<sup>15</sup>

It is often assumed that the public sector, which is labour-intensive, has less opportunity to rationalise its production than other areas of activity. The same ought also to apply to private activity which is labour-intensive. If wages have to increase just as much for competition reasons, but productivity cannot be improved, the price of services will rise in relation to the price of goods. If the tax levy for tax-funded services remains constant, it will not be possible for production to increase at the same rate as growth in the economy as a whole.

This effect was highlighted by the economist Baumol in the 1960s and has come to be known as Baumol's effect or cost disease. It has often been assumed that productivity in the public service sector cannot increase, which has recently come to be questioned. It is possible to increase productivity both in the public sector and in health and elderly care (see next section), but it is more difficult to measure the trend in productivity in the service sector than, for example, in the manufacturing industry.<sup>16</sup>

According to the economic assumptions of the Ministry of Finance, GDP in fixed prices is expected to increase by 2.16 per year in the model projection. GDP is thus expected to increase more rapidly than the costs of health care, in turn due to only demographic factors (see Figure 14). The proportion of GDP spent on health care for the ageing population thus falls. If an increased level of ambition is assumed (0.8 per cent per year), as a result of developments in medical technology, among other factors, the share of health care in GDP instead increases from 9.7 per cent in 2010 to 12 per cent in 2050, see Figure 14. This increase in share of GDP would be equivalent today to SEK 69-77 billion more for health care at 2010 prices.

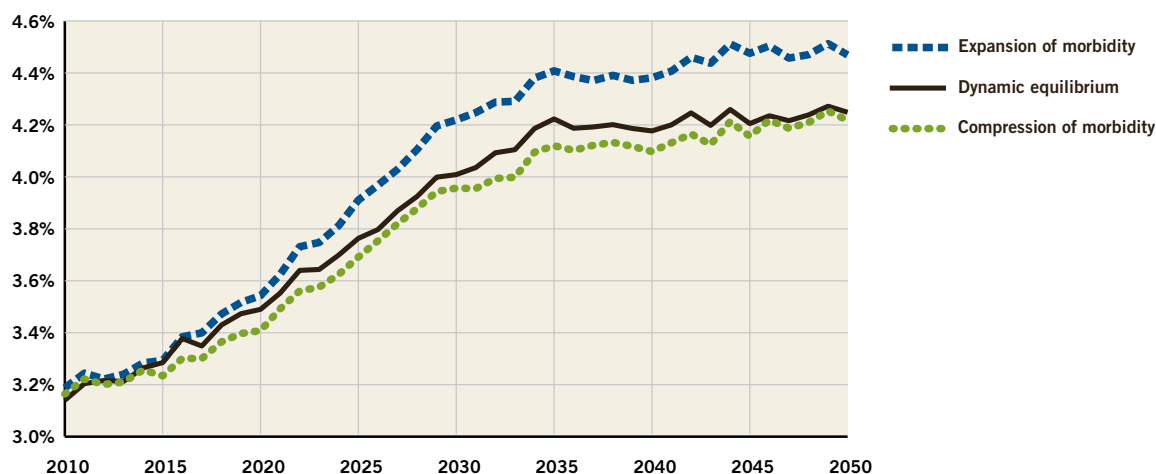


**Figure 14.** Costs of health care in relation to GDP in 2010–2050, trend due demographic factors, including and excluding increased level of ambition/technology effect in different health scenarios. Current prices. *Source: Calculations by Ministry of Health and Social Affairs.*

### Share of care of the elderly in GDP is growing

However, new technology is also of significance in care of the elderly. Several technical advances have reduced the need for care. Cataract operations and knee and hip surgery have given more elderly people back their mobility and have reduced the need for care of the elderly. With the aid of adaptation of housing, more modern communications, personal safety alarms and microwave ovens, more people are able to continue to live in their own home without assistance. Many assistive devices, such as rollators, have improved the prospects of elderly people living an active life.

Care of the elderly is therefore assumed not to be the object of costly technological development as in health care. There is rather a possibility that continued development of advanced assistive devices will increase quality and/or reduce costs. However, the costs associated with the fulfilment of the ageing populations need for elderly care will increase more quickly than GDP. Labour costs are assumed to increase faster than capital costs. This has an impact as care of the elderly is more labour-intensive than health care. The share of care of the elderly in GDP thus increases from just over 3 per cent to just over 4 per cent<sup>17</sup> This increase in share of GDP would be equivalent today to SEK 37–41 billion more for care of the elderly (at 2010 prices), see Figure 15. If the health of the elderly worsens, this implies a higher share of GDP.



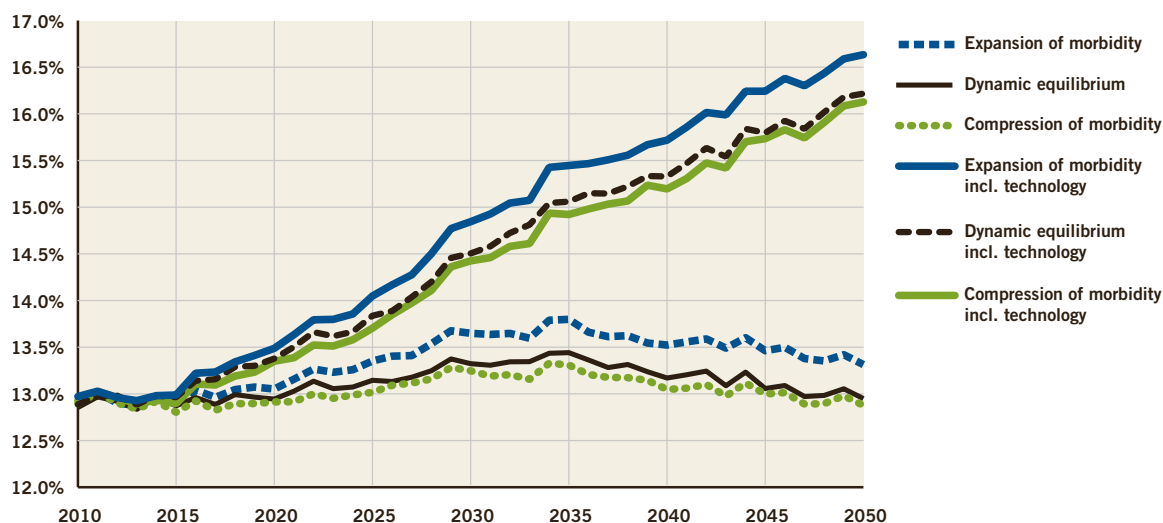
**Figure 15.** Costs of long-term care of the elderly in relation to GDP in 2010–2050, trend in costs due to demographic factors in different scenarios. Current prices.

Source: Calculations by Ministry of Health and Social Affairs.

### Total share of health and elderly care in GDP is increasing

In relation to the trend in GDP there is almost no demographic cost pressure for health care. With a more realistic projection which also includes costs of technological development (see p. 19), the share of GDP rises by just over 2 per cent up to 2050. The improvement in health which prolongs the average life expectancy of a 65-year-old by 2.6 years presupposes technological development, with more effective medicines and methods of treatment. This is assumed to require more resources. On the other hand, regarding elderly care only the demographic cost trend poses a challenge.

Together, the increased needs of the ageing population for health and elderly care and the assumed increase in level of ambition mean that costs are expected to increase faster than GDP, i.e. it is expected that the share of GDP will increase. Figure 16 and Table 2 show that the costs of health and elderly care, in relation to GDP, are expected to increase from the current level of around 13 per cent to around 16 per cent in 2050. If we do not anticipate any increase in costs as a result of an increased level of ambition and technological development, the share of GDP in 2050 is unchanged.



**Figure 16.** Factors only (three bottom lines) and trend including increased level of ambition/technology effect (the top three lines). Current prices.

Source: Calculations by Ministry of Health and Social Affairs.

How our aggregate incomes develop is of great significance to the prospects of funding the future need for health and elderly care. If the projection of GDP up to 2050 is based instead on average growth in GDP per capita over the past 40 years, the share of GDP increases by around 2 percentage points in each scenario. It is assumed here that the difference compared with the previously described trend in GDP consists solely of a change in the number of hours worked.

**Table 2.** Total costs of health and elderly care in relation to GDP in 2010-2050. Percentage.

Year	2010	Demographically driven cost trend	Demographically driven cost trend including increased level of ambition/technology effect
		2050	2050
Health care	9.7	8.7–8.8	11.9–12.2
Care of the elderly	3.2	4.2–4.5	4.2–4.5
Total	12.9	12.9–13.3	16.1–16.6

### Differences between the scenarios

As shown by Figure 16 and Table 2, relatively small differences in the share of GDP are expected to be earmarked for health care and care for the elderly in different health scenarios. The most favourable health trend in relation to the most unfavourable implies a cost saving for health and elderly care of around SEK 16.3 billion in 2050, at current prices. Why is there not a greater difference in consumption of health and elderly care between the scenarios?

The scenarios have been modelled as *general* changes in the health and mortality risk of the population. At the same time we know that the need for health care is very unevenly distributed in the population. The trend in cases of certain serious diseases is of great significance for future costs<sup>8</sup> and targeted improvements in health for those people who are at risk are therefore expected to have a particularly great effect.<sup>19</sup> In addition, the results of the simulations show that health-related rejuvenation does not fully impact on consumption of care, as health and consumption in previous years are also significant. A once started pattern of consumption tends to persist even when a health-related rejuvenation is introduced. The results can thus be interpreted as indicating that it is important for health improvements to occur early in life so that all the consequential effects of good health have time to make an impact. Finally a dynamic simulation method, unlike simpler types of projections, also takes account of a number of other factors determining the consumption of health and elderly care, alongside health.

### Increasing need for staff

In 2008 there were around 400 000 full-time equivalents in publicly funded health care and care of the elderly.<sup>20</sup> Around 60 per cent of these were employed in health care. According to the different scenarios, the need for staff is expected to increase by around 50 per cent between 2010 and 2050, somewhat less in the case of good health and somewhat more in the case of poorer health. The need for staff increases three times as much in long-term care of the elderly as in health care.

The need for staff is expected to increase over the period 2010–2050 by 24–28 per cent in health care and by 67–76 per cent in care of the elderly, with an overall increase of 46–53 per cent.

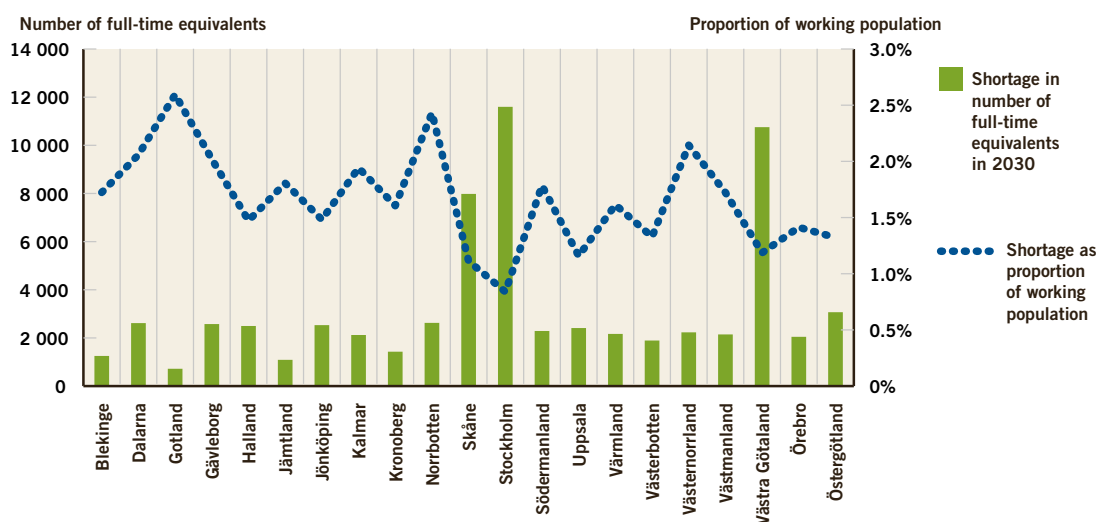
In 2006 there were around 32 500 active medical doctors in the health service [6]. This is equivalent to 0.4 doctors per 100 people. As indicated by the box, the number of doctors needs to be increased by 26–28 per cent by 2050 to meet the needs of the ageing population.

By 2050 there is a need on average for:

- 0.3 per cent more doctors per year (total 14 per cent) solely due to population growth,
- 0.5–0.6 per cent more doctors per year (total 26–28 per cent) due to the population growing and ageing, i.e. in 2050 there is a need for 6 600–7 900 more doctors (full-time equivalents).

#### Shortage of staff in elderly care in 2030

If we assume that the increase in average life expectancy would consist of years in ill-health, the projection<sup>21</sup> shows a large shortage of staff in care of the elderly in future decades, around 65 000 full-time equivalents in 2030. However, the shortage is particularly notable in county councils with a declining population of working age. The shortage in relation to the working population is greatest on the county of Gotland and in Norrbotten, Västernorrland and Dalarna, as indicated by Figure 17 (blue dotted line)



**Figure 17.** Shortage of staff per county in elderly care in 2030 expressed as number of full-time equivalents and as a proportion of the working population.

Source: National Board of Health and Welfare NPS and population projection per county by Einar Holm, Umeå University and the Ministry of Health and Social Affairs' own calculations.



# Revenue through hours worked, tax and charges

The increased need for health and elderly care up to 2050 can be met through *increased revenue and/or reduced costs*. Revenue can be increased by using part of the growth in GDP for health and elderly care, and growth can increase through more hours worked. Those who receive health and elderly care can pay more in charges, and various types of taxation can be raised.

The costs can be reduced by improved population health, which reduces the need for (and therefore costs of) health care and care for the elderly. This can be brought about, for instance, through preventive and health-promoting efforts. The costs can also be reduced through improved efficiency (obtaining more for the money spent) or a reduced public commitment.

Different methods of funding have different effects and affect the economy in different ways. This in turn must be assessed on the basis of the politically established goals which exist for – or which it is decided will apply to – the activity.

Various ways of increasing revenue to meet the future need for health and elderly care are compared below. Ways of influencing costs are discussed in the next section.

## More hours worked improves the situation regarding means of support

A long-term way of increasing funding through taxation is to increase the tax base. One way of doing so is increased growth as a result of the number of hours worked increasing more than in the previous projection. Given that the share of GDP earmarked for health care and care for the elderly is not to increase from the current level, just over 30 per cent more hours worked are needed up to 2050. This can be done through more people working and/or each person working more and for a longer time.

The number of hours worked can increase through increased participation in the workforce of people born outside Sweden or among people with disabilities, or through labour immigration. A permanent increase in fertility rate would also lead to a more favourable age distribution.

Increased number of hours worked which is required for the share of health and elderly care in GDP to be unchanged:

Annual increase	0.7–0.8 per cent
Total 2010–2050	31–35 per cent

Length of working life can be extended by young people entering employment earlier and the participation of elderly people in the workforce being extended. The age of establishment for young people (i.e. the age at which 75 per cent of the population is employed) has risen from 20 in 1998 to 28 in 2005. The average age at which people quit working, if they are in the workforce at the age of 50, is estimated at 63.2 years for 2009. This is the highest age recorded since the early 1980s.

Given constant average hours of work and a two per cent real increase in wages, this means that time at work must be changed:

- given the current level of employment, each employed individual must work an extra 9–10 hours every year up to 2050. In other words, current working hours increase in Year One by 10 hours, in Year Two by 20 hours, in Year Three by 30 hours, and so on. In 2050 the extra hours worked have accumulated to a little more than the current number of holidays (43–49 days).
- A 0.4–0.5 percentage point increase in employment rate per year between the ages of 15 and 74, from approximately 70 per cent to 86–88 per cent. This is equivalent to around 1.5–1.7 million more full-time employees in 2050 compared with today.

This does not appear plausible, in view of the fact that leisure is valued ever higher.

### **Increased funding through charges?**

Charges for health and elderly care contribute to funding and to directing demand to the “correct” level of care. Present-day legislation indicates that charges must not lead to people who are ill or in need of care being unable to afford care. The share of charges in health care and care of the elderly at present is 3–4 per cent.

The SESIM model has been used to analyse the ability of households to pay for their own health and elderly care in 2050 in comparison with 2010 through various calculations. Two questions are illustrated:

- What proportion of households could fund their own health care and care for the elderly through charges?
- What share of the total costs would then be funded?

To provide an idea of the maximum level of charges that can be levied for health and elderly care, the households in the simulation example may only receive funds that cover their housing costs and basic consumption of food, clothing, leisure etc., in accordance with the national standard for economic assistance (“income support”). In addition, 70 per cent of municipal and county taxation spent on health and elderly care is returned to the households, so that the households do not pay twice for these services.

If people’s entire disposable income apart from this basic consumption was spent on health and elderly care, 80 per cent of households manage to fund their own health care, in both 2010 and 2050.

Among elderly people receiving elderly care, however, only around 10 per cent of households are able to pay for the health and elderly care they receive. As the number of elderly people with care needs increase in the future, the number of households receiving elderly care who cannot pay for their health and elderly care increases: 40 per cent more households in 2030 than in 2010, and in 2050 no less than 60 per cent more. Only just over a third of the total costs would be met in 2050, compared with 44 per cent in 2010.

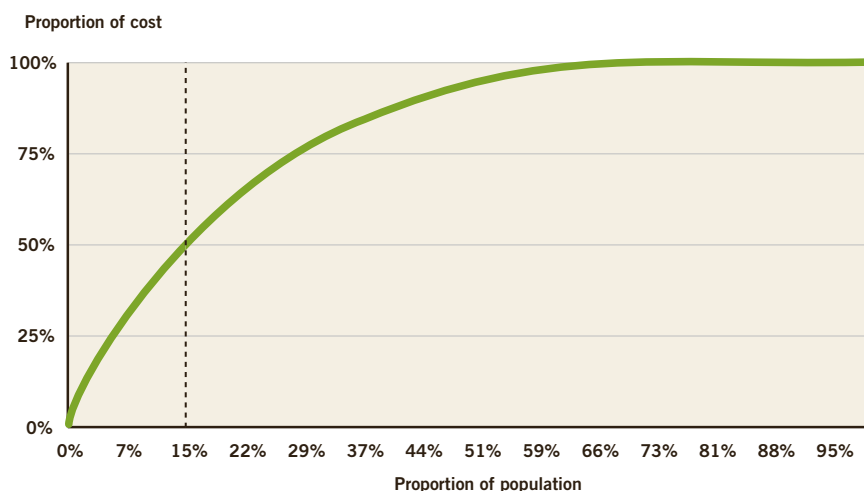
A study from the Swedish Association of Local Authorities and Regions [7] analyses how much a sharp rise in the charge for home help would provide. If the maximum tariff for home help was raised from approx. SEK 1 700 per month to SEK 13 600 per month, i.e. 8 times as much as today, it would provide just under SEK 4 billion.

### A small group accounts for half the cost of care

The difficulty for different individuals to fund their own health care and care for the elderly is due to the fact that the consumption of care is very unevenly distributed in the population. A small group needs a lot of care. Around half the cost of health care relates to the 3-4 per cent of the population who have the highest cost of care. Nine disease groups account for 40 per cent of care costs (the 'care-demanding' groups used in the cost equalisation system [8]).

### Large differences in cost of care from a life perspective

The distribution becomes less uneven if not just a particular year is studied but the costs of care of an individual during his or her life are added together. The aggregate costs of the health and elderly care up to 2050 have therefore been simulated using the model. Half the cost of health care relates to 22 per cent of the elderly population, while half the cost of elderly care relates to 15 per cent of the elderly. Viewed in a life-time perspective, the distribution of consumption of elderly care is thus more skewed than the consumption of health care. The cost distribution for care of the elderly is shown in Figure 18.



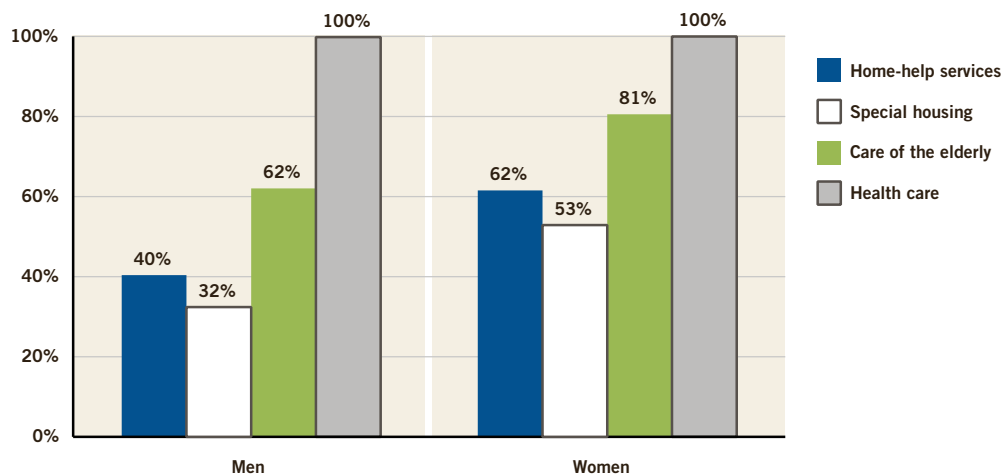
**Figure 18.** Consumption of elderly care divided by proportion of the population aged 65+.

15 per cent of the population aged 65+ consume 50 per cent of care of the elderly.

Source: Calculations by Ministry of Health and Social Affairs.

All elderly people receive health care but one in three do not receive elderly care

The simulations show that everyone in principle needs health care. As many previous studies have shown, there are differences in the utilisation of care of the elderly by men and women. Just over 70 per cent (81 per cent of women and 62 per cent of men) of those who have reached the age of 65 are expected to receive elderly care at some time during the rest of their lives, i.e. one in three do not receive any care for the elderly. It is more common for elderly people to receive home help than special housing, and more common for women to receive elderly care than for men. 62 per cent of women receive home help services for at least one year, compared with 40 per cent of men. Just over half of women, 53 per cent, and a third of men, 32 per cent, have special housing with 24-hour assistance for at least a year, see Figure 19.



**Figure 19.** Proportion of people aged 65+ who consume health and elderly care during their lifetimes. *Source: Calculations by Ministry of Health and Social Affairs.*

On a per-user basis, women consume 48 per cent more elderly care than men do during old age, this is equivalent to SEK 2.8 million compared with SEK 1.9 million at 2008 fixed prices. On the basis of amount per elderly person in the whole population over the age of 65, women consume almost twice as much as men (92 per cent more). This is due to there being more elderly women than men, women on average living four years longer than men, more women than men receiving care of the elderly (as they first care for their men who, however, die earlier than the women), they need more effort and to a greater extent receive special housing with 24-hour assistance over a longer period.

### Tax funding

Around 80 percent of all health and elderly care today are funded by taxation. If the future costs of health and elderly care were funded solely from increased county and municipal taxation through raised tax rates, this would mean an increase from the present-day level of 31.6 to 40–42 per cent in 2050.<sup>22</sup> A raised level of tax on work may, however, have adverse effects on the labour supply.

Other tax bases and tax rates can also be used to contribute to an increased funding of health and elderly care: changed real property tax, wealth tax, corporation tax and differentiated or raised VAT on goods and services. These have different effects than a change in income tax. If the VAT was raised from 25 per cent to 26 per cent, this would provide SEK 10 billion. If the VAT on food was raised from 12 per cent to 15 per cent, this would provide SEK 25 billion [7]. The increased costs of health and elderly care which are required with increased level of ambition in 2050 are, however, equivalent to around SEK 110 billion at current prices.

A study conducted by the Swedish Association of Local Authorities and Regions on the funding of welfare in 2008 [9] shows that there is a great willingness to pay for health care and care of the elderly. More than 90 per cent chose increased quality in these services ahead of lower taxes, and almost 70 per cent chose better care of the elderly over higher pensions.

How health and elderly care are to be funded is a political issue. However, the calculations above show the level of rises in taxes and charges that would be needed if these increases *alone* were to fund the health and elderly care needed by the ageing population.

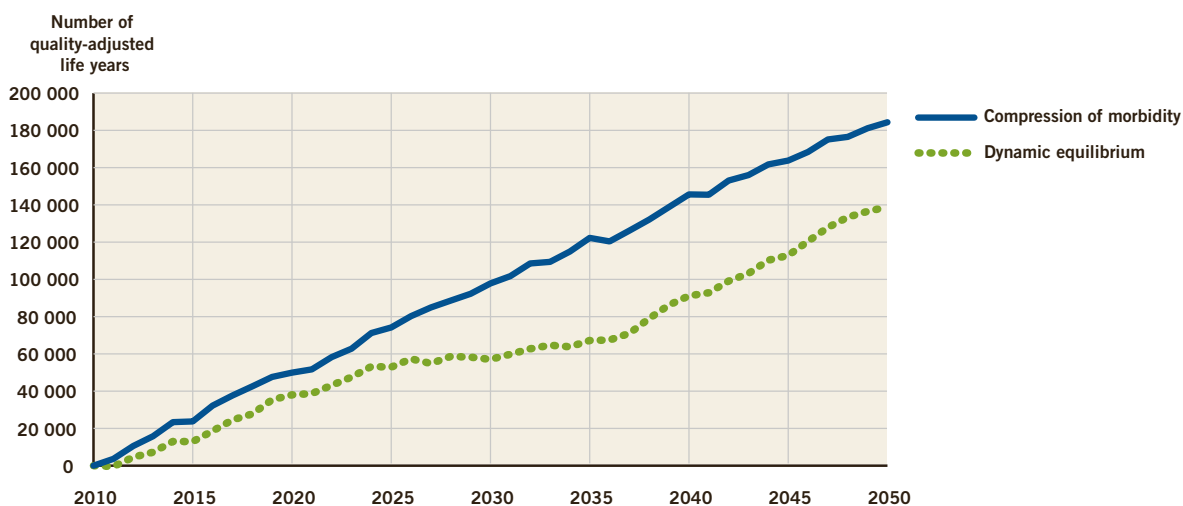
# Better health, fewer impediments and greater efficiency

As is apparent from previous sections, the health and functional status of the population has a great impact on the need for health and elderly care. There are several ways of meeting the needs of the ageing population. The health and functional capacity of the population can be influenced, reducing the need for and costs of health and elderly care. It is also possible to change how health and elderly care are operated. With improved efficiency, better results can be achieved at the same, or at a lower, cost level. It is also possible to reduce the impeding effect of disability through effective assistive devices and an adapted environment.

## Better health results in both health gains and lower costs

A longer life with good health provides great gains for the public. One way of trying to describe how great the health gains are is to use the measure of QALY (Quality-Adjusted Life Years) applied in health economics. This does not only measure the number of years of life but also takes account of health-related quality of life during these years. QALY ranges in principle between 0 (death) and 1 (in full health).

Figure 20 shows that there is a wide difference in the number of QALYs in the three different health scenarios.<sup>23</sup> In the compression of morbidity scenario the population has a total of 3.9 million more years of full health up to 2050 compared with the worst health scenario, expansion of morbidity. This is equivalent to another 49 000 people – the same number as the total population of the municipality of Borlänge – living 80 years in full health.



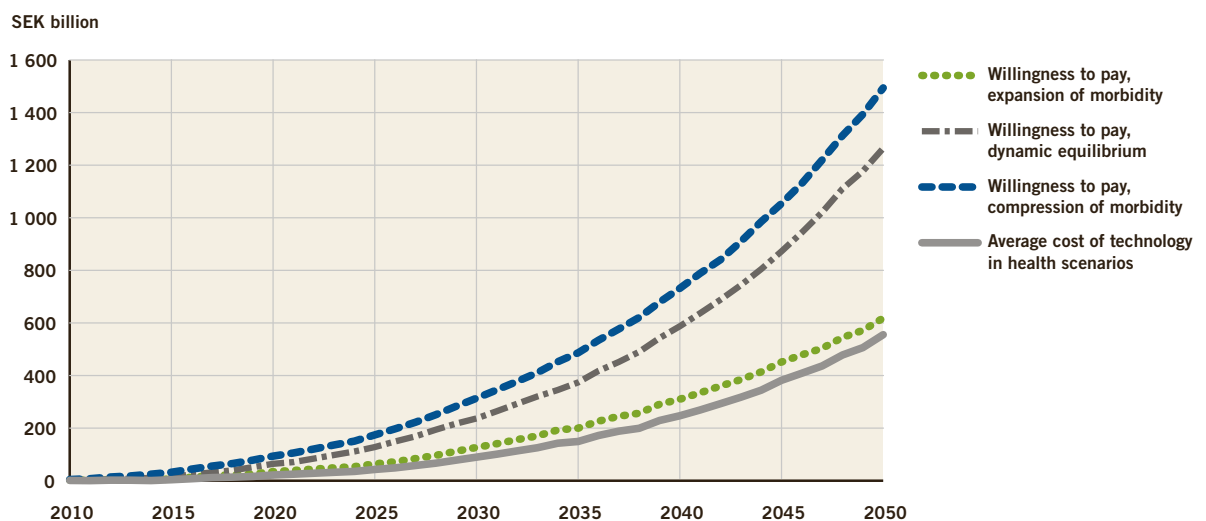
**Figure 20.** Number of quality-adjusted life years gained 2010–2050 in the dynamic equilibrium and compression of morbidity scenarios in relation to expansion of morbidity scenario.

Source: Calculations by Ministry of Health and Social Affairs.

How is this health gain to be valued? The level of resources we allocate to health and elderly care is an expression of how we currently value these provisions. There are methods of estimating what individuals would be prepared to pay to avoid diseases and disabilities that signify impaired health. Willingness to pay can be calculated per quality-adjusted life year (QALY).<sup>24</sup>

If a sum of SEK 655 000 per QALY is used, as in a number of other studies [10], (adjusted to 2010 price levels), people's total willingness to pay for different health gains is estimated to develop as shown in Figure 21.<sup>25</sup> The assumed costs of increased level of ambition and technological development (see p. 19) have also been highlighted here. As shown by the figure, the willingness of people to pay for the health gains in all three health scenarios (the top three lines in the figure) would be higher than the raised level of ambition for health care.

People thus value – and are prepared to pay for – increased health. This may be an argument for increased funding through charges or taxation. On the other hand, it is not necessary to exploit the whole or parts of the willingness to pay if it is possible to work successfully on efficiency improvements and/or other measures that result in better value for money.



**Figure 21.** Willingness to pay for gained quality-adjusted life years in different health scenarios and average cost of technology for all scenarios expressed in current prices. (1 000 SEK=108 EUR, 28 September 2010, European Central Bank)

Source: Calculations by Ministry of Health and Social Affairs.

Which of the three health scenarios described is the most likely? Can health be influenced and what role does it play?

Increased proportion of elderly people with good health and better mobility

The health of the population and the functional capacity of the elderly have improved in the past 20 years. This is indicated by the National Board of Health and Welfare's 2009 public health report [11]. Several of the major common diseases have been shifted further up the age scale, while a smaller proportion of people of a particular age state that they have diseases or complaints that impede their daily lives [12].

The most common causes of death among the elderly are cardiovascular diseases and cancer. Over the past 20 years the mortality rate from myocardial infarction has fallen by almost half and the mortality rate from strokes has decreased by a third. The risk of suffering myocardial infarction and stroke has also decreased at every age, and development of these diseases has

additionally been shifted to higher ages. The most common age for a first stroke has risen from 75 to 81 for men but has remained unchanged for women, at 83. The decrease in cardiovascular diseases is the most common reason for the increase in average life expectancy.

According to the ULF surveys of Statistics Sweden [13], the mobility of the elderly has appreciably improved.

The proportion of elderly people with impaired mobility has fallen since the 1980s. This may be due among other things to reduced numbers of strokes, fewer in the age groups below 84 suffering hip fractures and many hip and knee joint operations having been performed in recent years. [14]

### **Preventive and health-promoting measures**

It is possible to influence the future *need* for health care and care for the elderly through a continued improvement in the health and mobility of elderly people. By identifying groups at risk and influencing lifestyles and habits through preventive and health-promoting efforts, the risk of illness can be reduced. Some examples of this are given below.

#### Reducing the incidence of dementia

It is estimated that 149 000 people in Sweden have dementia. Dementia has a great impact on the need for long-term care of the elderly. The costs to society of dementia are estimated at around SEK 38 billion [15]. Around 20–25 per cent of cases of dementia are caused by arteriosclerosis.

Diabetes, stroke and hypertension in middle age are risk factors for dementia. Smoking, stress, physical inactivity and other risk factors speed up the development of arteriosclerosis. It is, however, possible to slow down the process of arteriosclerosis or even to cause it to recede. There is strong scientific evidence [11] that physical and mental activity late in life and treatment of hypertension are protective factors against dementia. An active and stimulating lifestyle for the elderly and reduced incidence of overweight and smoking are therefore significant.

Small decreases in the incidence of dementia are of great significance over time. An American study [16] shows, for example, that if the development of Alzheimer's disease can be delayed by up to five years, the incidence of the disease in the population can be halved in 50 years.

#### Preventing and delaying strokes

Strokes and hip fractures cause human suffering but also result in high care costs, in both health care and care of the elderly. These diseases are two of the nine care-demanding groups included in the cost equalisation system [8].

Arteriosclerosis is the most common cause of stroke. Abdominal obesity, hyperlipidemia, hypertension and hyperglycemia increase the risk of arteriosclerosis. Reduced smoking and lowered levels of lipids in the blood also reduce development of the disease. An example of the potential of effective preventive measures is that if everyone with hypertension could normalise their blood pressure around 6 000 people annually would avoid being affected by stroke [11].

### Common risk factors

Stroke, myocardial infarction, and diabetes share risk factors. Changes in lifestyle habits that reduce or remove hyperlipidemia, hyperglycemia, and abdominal obesity reduce the risk of these and several other diseases. Another means of prevention is to detect and treat hypertension. Half of all people with hypertension or hyperglycemia are not aware of this. Other measures are for instance optimal diabetes treatment advice on sensible drinking to persons with a risky consumption, and medical blood clot prevention and treatment.

Physical activity has the greatest positive impact on people's health, particularly for those who are inactive. Food habits and the level of daily physical activity together with smoking are of great significance for these diseases.

Stopping smoking reduces the risk of cardiovascular diseases almost immediately. The comparatively low proportion of smokers among men in Sweden contributes, according to the National Board of Health and Welfare's public health report [11], probably to the average life expectancy of Swedish men being among the highest in the world. As well as smoking being a risk factor for many diseases, society faces net costs relating to smokers due to increased costs in the medical insurance system and medical treatment [17].

### Healthy ageing

#### Lifestyle habits of the elderly

The elderly of today get significantly more *exercise* than previous generations. Smoking has long since decreased among elderly men, but not among elderly women. More than half of both women and men over retirement age are *overweight*, but there are also many underweight people among the oldest [11]. Studies of self-rated alcohol consumption show that consumption among elderly men has increased in recent years, while that of women has not changed. The mortality rate for alcohol-related diagnoses has increased since the start of the 1990s among people in the 65–74 age group [11].

There are many ways of preventing

Strengthening good health and preventing ill-health are important strategies for healthy ageing. Research emphasises four cornerstones for ageing well in order to attain this:

1. social interaction and support,
2. meaningfulness, participation, feeling needed
3. physical activity
4. good eating habits [19]

According to the Swedish National Institute of Public Health [19], efforts in these areas lead to both improved quality of life for the individual and gains for the economy. It is important to understand how people take decisions on their health and what guides healthy behaviour.

Social interaction and support also have positive effects on health and well-being at old age [20, 21, 22]. Being involved, feeling needed and the experience that what one is doing is meaningful have an impact on ageing and commitment to one's own health. Health gains from exercise are largely the same for elderly people as for other people. Good eating habits and convivial mealtimes are of great significance to health and well-being [19, 23]. Methods in which the



participants undertake practical activities related to food, for example cookery courses, as well as information, tips and recipes suited to elderly people have an impact on behaviour [24, 25, 26].

Health-promoting efforts focused on physical activity need to be flexible, with a broad range of activities [27, 28]. It is scientifically proven that self-recording of activity, training at moderate intensity in a group and close contacts with the activity leader are effective [29]. Other examples of efforts to promote good eating habits and physical activity among the elderly are conversations based on Motivational Interviewing (MI), physical activity on prescription, preventive home visits and food courses for the elderly. However, these methods and efforts have varying degrees of scientific support [19].

#### Reduced suffering as a result of fewer accidental falls

Physical activity also prevents accidental falls and reduces the extent of any injuries sustained in a fall. Every year one in three people over the age 60 and one in two people over the age of 80 suffer a fall. Of these falls, around 3 000–4 000 are so serious that they are designated accidental falls [30]. The direct costs to society are estimated at nearly SEK 5 billion in one year. The number of accidental falls among the elderly is expected to increase as a result of the demographic trend and to cost SEK 8 billion in 2050, expressed in terms of 2006 prices [30].

#### Reducing impediments

Health and functional capacity can thus be improved, but it is not possible to cure or alleviate everything. It is also important to reduce the impediments people encounter due to disabilities. The ability to cope with the activities of daily living is affected not just by functional capacity but also by how the world at large functions and how the environment is designed. The impediments can be reduced by assistive devices and an adapted environment.

# Efficient health and elderly care

In the previous chapters the future costs of health and elderly care have been simulated. Improved health and reduced morbidity lessen the need for health and elderly care. Health care and care for the elderly are intended to provide health and quality of life for those who need intervention and their families, and this also improves their labour market prospects. Health and elderly care of good quality can also reduce the future need for health and elderly care and consequently the costs of providing these.

How well health care functions is of great significance for the care of the elderly and vice-versa. New techniques in health care, for example hip and cataract surgery, also have an impact on the need for care of the elderly. Elderly care of good quality, with good nutrition and nursing, is in turn of great significance to the well-being of elderly people and can also reduce their need for medical care. Medical intervention also takes place that relieves the burden on county inpatient.

## **Good quality in health and elderly care**

Efficient publicly funded health and elderly care by definition means that the requirements of legislation and adopted targets and guidelines for the activity have to be met in accordance with the Health and Medical Services Act [31] and the Social Services Act [32]. Regarding health care, this means that the service has to meet the requirements for good care, which includes fulfilment of the requirements for a good hygiene standard and patients safety standards. There have to be staff with suitable training and experience in the elderly care. The quality level has in turn to be followed up in a systematic way so that it can be continuously enhanced and assured.

A number of measures can be taken to improve efficiency. The most evident measures are concerned with avoiding unnecessary costs, known as quality deficiency costs. Examples are adverse events in health care, and hospital acquired infections. These cause great suffering for those affected and generate high costs for society. The extra days of care due to preventable adverse events in somatic inpatient care are estimated to cost just over SEK 5 billion annually. The Swedish Association of Local Authorities and Regions has estimated that around 9 per cent of hospitalised patients in 2009 were affected by a health care associated infection [33]. The total and direct costs of care for all hospital acquired infections were estimated by the National Board of Health and Welfare to exceed SEK 3.7 billion per year [34]. The National Board of Health and Welfare comes to the general conclusion that the culture of patient safety in health care needs to be enhanced [35]. There is a need for increased health orientation, with health-promoting efforts and preventive efforts against ill-health and morbidity, and greater openness on the results of medical care.

## **Efficiency can be improved**

Several studies from the National Board of Health and Welfare and the Swedish Association of Local Authorities and Regions (SALAR), among others, show that there are wide differences in practice, quality, costs and efficiency, even if account is taken of structural differences as is done in the equalisation system [36, 37, 38]. Some examples of this are given below.

Several indicators developed in the work on public benchmark [39] show that some treatments are used to an insufficient extent, in general or in certain counties. SALAR and the National Board of Health and Welfare give examples of inefficient use of resources and un-

necessary care. There are wide differences between county councils in how high a proportion of operations are performed as day surgery. An example is prolapse operations, where the proportion ranges from around 5 per cent to around 50 per cent. The proportion of Caesarean sections in uncomplicated pregnancies ranges from just under 8 per cent to 17 per cent. There is general over-use – but there are also wide differences between the county councils – with regard to knee arthroscopies on patients aged 40 and over with osteoarthritis or meniscal damage. Just over 80 per cent of arthroscopies are not judged to provide any benefit for the patient. There are also differences in the incidence of replacement surgery in treatment of hip fractures. In diabetic care the proportion meeting the treatment target levels for blood glucose, cholesterol and blood pressure is in general low, and there are quite wide variations between county councils.

Prescription practises differ in a number of respects. The proportion of women at risk for osteoporosis who are given drug treatment to prevent fractures ought, for example, to be significantly higher. There is under-treatment of women with rheumatoid arthritis who ought to use biological medicines to a greater extent. The proportion of the population who are treated with antibiotics and the choice of antibiotics in certain diseases also varies, as does the choice hypertension medication.

There are quality deficiencies in the care of the elderly. Elderly patients are often large consumers of drugs. According to the National Board of Health and Welfare [35], unsuitable drug combinations, wrong dosage and mix-ups of medicines are common causes of medical injuries in this group of patients. Mix ups of patients' medicines and incorrect prescribing of insulin are common risk events in elderly care and medical care at home.

There are wide differences both within and between county councils/regions and between different municipalities in the prescribing of medications to elderly patients in special housing. The proportion of elderly people who use 10 or more drugs ranges from nearly 10 per cent in the municipality with the lowest proportion to 50 in the municipality with the highest proportion. There are wide variations: in the prescribing of psychopharmaca, in high-risk combinations of drugs, and in medications that are unsuitable for elderly people (having anticholinergic properties) and that cause memory impairments or confusion in the elderly.

Other problems identified by the National Board of Health and Welfare are that inadequate procedures may lead to substantial information being lost in the care chain and the care and treatment of elderly patients with multimorbidity becoming deficient. Inadequate resources in the municipalities for care of the most severely ill elderly people have led to elderly patients having to remain in acute medical care, resulting in overcrowding and hospital bed shortage.

### **Wide spread of cost**

There are differences in the costs of health care between different county councils. The per capita cost (excl. home medical care, dental care and restructuring costs) is nearly 20 per cent higher in the county council with the highest cost compared with the one with the lowest when account has been taken of structure in the way done in the equalisation system. The equivalent difference in cost per DRG-point<sup>26</sup> for specialised somatic care was nearly 30 per cent.

Similarly there are wide differences between municipalities in costs of care for the elderly [36], including when account is taken of structural cost differences, according to the equalisation system.

### **More measures can be taken to improve efficiency**

The National Board of Health and Welfare [35] concludes that the Swedish health care system works satisfactorily in several respects in comparison with other countries, but that the efficiency of health care delivery could be improved. Care needs to be organised on the basis of the patient's needs. There are great opportunities to work across professional boundaries and redistribute roles and tasks, use skills in a flexible way and work in multidisciplinary teams. The outpatient forms of care need to be developed. The coordination of care efforts needs to be improved, and the participation of patients and members of the public needs to increase.

The National Board of Health and Welfare also considers that much can be done at the municipal level within elderly care in order to improve the effectiveness and utilisation of resources [41]. Appropriate forms of activity, collaboration between different activities and responsible entities and knowledge-based and efficient working practices can improve results and/or reduce the costs. A long-term economic approach with sustainable management and everyday rationalisation can provide better services at lower costs.

### **Reduced service supply does not solve the fundamental problems**

At the present-day level of resources there does not appear to be any clear correlation between costs and quality. Low costs do not automatically mean low quality, nor do high costs equate to high quality. It is of key importance to bring about "good savings" which ideally result in both lower costs and better results or in any case give better value for money.

Cuts and restrictions on the public commitment may appear to be a quick way of achieving a balance between resources and needs. If the commitment is reduced it is necessary to finance private or else there will be a need to abstain from intervention. It is difficult for advanced interventions in health care and care for the elderly to be taken over by family members. Family members already provide a large proportion of the social care of elderly people. Nor does a reduced commitment solve the problems which health care faces today and it therefore does not represent a long-term sustainable solution. An inefficient care has an impact on patients, those in need of care and their families.

### **Improved efficiency instead of quick cuts**

It is possible to improve the efficiency in health and elderly care by resolute and structural efforts with a longer planning horizon. Operational units can learn from the ones that are most efficient ('best practice'). Efficiency in health and elderly care can be improved through a continued focus on results. Safe and knowledge-based health and elderly care, where efficient methods achieve a quicker breakthrough in coordinated health care and elderly care chains, improve efficiency. Lack of an overall perspective in health and elderly care can lead to attempts to get a different actor or principal to take over the responsibility for costs. It also often increases the total costs.

### **Large reorganisations are possible and have taken place**

It is also possible to change both services provided and costs in the relatively short term. An example of a large reorganisation of care of the elderly is the 'Ädel Reform'<sup>27</sup>. The Elderly Delegation [42] judged on the basis of a calculation of consumption of care in the home, somatic long-term care and living in old people's homes in 1987 that at least 530 000 people would need services and care at home and in special forms of housing in 2000. This would mean an increase of around 20 per cent on the 1987 level. Instead, the result was that less than half received elderly care, 247 600 people instead of the predicted 530 000 [43].

Another example of major change is the development in health care, with large advances in medical technology and reduced care times in hospitals.

## What if...!?

As described above, there are good opportunities to meet the needs of the ageing population for health care and care for the elderly simply by applying current knowledge. It is possible to influence health and functional capacity and consequently to prevent, defer and/or reduce morbidity and the need for care. The impeding effect of disabilities can be reduced by the use of assistive devices and increased accessibility in housing and in society in general. Health care and elderly care can be operated more efficiently by applying the knowledge that already exists, by thinking innovatively and by applying modern technology.

But there is also great potential in technological development and research. In 40 years' time there will be innovations that we cannot imagine today. Who could have imagined 40 years ago how personal computers, the Internet and mobile phones would change our lifestyles and the way we work?

Some of the opportunities enabled through technology and research up to 2050 are discussed below.

### **Information and information technology**

We live in an information society. Patients, users and family members need correct information to be involved in, search for and choose care. Efficient health care processes must be based on rational management with up-to-date and reliable information.

To make it easier for municipalities, county councils, patients, users and family members to follow up and to make informed choices, key ratios and quality and result indicators are developed (Open Comparisons, Guide for the Elderly, quality register, national IT strategy and national eHealth). These provide an important basis for the development of quality and efficiency. The work on improving various national registers with good coverage and relevant and up-to-date data continues. European cooperation is making progress on eHealth to make patient mobility in the EU possible, for instance on electronic record systems.

Public information on health, diseases and care has developed quickly thanks to modern technology. There is decision-making support for diagnostics which can be used more, for self-care and by the profession. On the website 1177 (formerly Sjukvårdsrådgivningen.se) there is information on health, self-care and common diseases, as well as a guide to care treatment. It is possible to use the Internet for certain simpler personal services, which are steadily expanded.

### Participation and co-production

Patient and user influence is an important part of evidence-based health and elderly care. Improved information, knowledge and new technology have made it possible to provide health care and care for the elderly in a new way. Scientific studies show that participation is an important element in determining the results of care.

More and more frail and ill people receive care in their homes in close contact with the health service. There is a trend towards self-care and co-production, in which users, patients and family members work alongside the profession. This is normally referred to as empowerment and co-production.

### Remote care and information

Technology makes it easier to communicate with health care remotely, i.e. the care comes to the patient. People can obtain advice at home and avoid travel and waiting rooms. Telemedicine

(interactive communication through sound, image and data) may facilitate diagnostics, consultation, transfer of medical data and treatment. Different health care levels may communicate with one another, making it possible to work and collaborate in new ways. Several activities can be performed simultaneously and in dialogue with the parties concerned.

The technology can provide reminders, warnings and follow-up. Allergy or asthma patients may be warned of high pollen levels or cold weather, by e-mails or SMS text messages. In the future it will be easier to diagnose patients, and to take medical samples at home.,

Co-production may in the future strengthen rights for patients with a long-term illness. This can save time and money for patients, users, family members and the health service.

It is important to emphasise that this shift has to take place on individual's terms and not on the terms of the profession. It is the users of new technology who have needs and strong incentives to develop it. Knowledge among patients, users and family members together with correct information are essential for successful self-care and co-production.

#### Control and follow-up

To guide health and elderly care there is a need for reliable documentation. i.e. describing what is done, for whom, with what results and at what cost. Many work processes may be facilitated and automated with the aid of advanced information technology. Development over the past few years has provided new opportunities for rationalisation of working practices (planning, manning, booking, assessment, follow-up, logistics, other processes), but above all it creates opportunities to an improved organization.

#### Large changes with new technology

It is easy to extrapolate the trends of today but forget the possibility of technical breakthroughs that fundamentally change working practices and ways of life. Technical advances combined with a new way of producing have historically led to great efficiency gains.

There are several sectors that have adapted their production systems to co-production. The furniture industry has been made more efficient by the fact that the customers themselves assemble their furniture, i.e. IKEA. The transfer of work-tasks from bank officials to customers (who conduct their financial transactions themselves on the Internet) is another example regarding service provision. Another example is the development of agriculture from labour-intensive to capital-intensive production. At the beginning of the 20th century it was not considered possible to increase production in agriculture. However, between 1900 and 2008 the number of people employed in agriculture decreased from 2.7 million (54 per cent) to 37 000 people (0.8 per cent) while production increased [44, 45]. But the opportunity for making the production of foods more efficient is not exhausted. Agriculture is moving in new directions that could not have been predicted. Cultivation takes place in a nutrient solution within an artificial atmosphere, and research is in progress on the possibility of producing meat synthetically.

An increased level of technology provides an opportunity for organising production in an entirely new way. Most likely, this also applies to health and elderly care.

#### The scientific frontiers are moving quickly

There is a great deal of research and development in the life sciences. We are on the brink of the biological society. There is research on neuroprostheses (chips that replace damaged parts

of the brain). There is for example world-leading Swedish research on dementia and there are hopes for a vaccine. Research is in progress to map the proteins and how they link to diseases, and there exist genetically manipulated mice that are regenerative, meaning that they rebuild themselves after injuries without any trace of scar tissue. Other parts of regenerative medicine include the replacement of damaged heart tissue with young tissue produced from stem cells.

There are various types of prostheses and advanced assistive devices at the prototype stage intended to make life easier for severely impaired people. In Japan and South Korea for instance, billions have been spent over several decades on developing various robots. The first exoskeletons, servomotor-assisted arms and legs, are on the market. These assist persons with disabilities in maintaining balance or lifting 70 kg per arm. Prostheses which are directly linked to the brain or nervous system are at the prototype stage .

There is a long list of advances in genetic engineering and nanobiology. Although some parts or areas of technology will prove futile, other yet unknown areas will contribute to understanding the most fundamental mechanisms of ageing and diseases.

A cure for dementia?

Age-related diseases are of great significance to the need for health and elderly care. For instance, dementia becomes more prevalent with age.

Strategic initiatives have been taken [46] on cancer, diabetes and brain and nervous system diseases and disorders for example Parkinson's disease, stroke and dementia, including Alzheimer's disease. Strategic efforts are being made in care research, i.e. research on prevention, , nursing, rehabilitation, well-being and health. Funds are reserved for research on health care organisation, production processes and management systems, among other things.

It is estimated that around 6 million Europeans suffer from dementia, at a cost of around EUR 55 billion in 2005. The number of people with dementia will almost double by 2040. European cooperation on research on neurodegenerative diseases has been initiated. This cooperation is focused in particular on Alzheimer's disease, but also on other neurodegenerative diseases such as various forms of dementia and Parkinson's disease.

If the research on disease-modifying medicines and vaccines for dementia reaches a breakthrough, this will be of great significance to the future need for health and elderly care, in much the same way that penicillin changed medical treatment methods.

Reducing impediments through accessibility and the right assistive devices

There are already assistive devices to compensate for disabilities and eliminate impediments, provide security, facilitate self-care and contacts with health and elderly care (alarms, telemedicine, virtual care) and enable social contacts through IT.

It is possible to use current assistive devices in a more systematic way, but also to continue to develop and produce assistive devices for new areas . As described above, promising development and research is in progress.

The local community fulfils an important function and has to be adapted to the needs of an ageing population - and the needs of people with disabilities. There is a need for increased accessibility in several areas. Homes must be adapted (possibility of wheelchair entry, lifts, no door sills, wider doors and more spacious bathrooms). New forms of housing has to be developed. Adapted communications are needed. There must be service provisions (shops, health-



care centres etc.) nearby and opportunities to be socially and physically active. This improves the prospects of elderly people continuing to live at home. This may affect the distribution of elderly care in ordinary and special housing, which is of great significance to the cost development.

It is important to view assistive devices and accessibility from an all-inclusive perspective. Assistive devices that work well and an adapted environment improve the prospects for participation and independence, and they contribute to a improved quality of life for people with disabilities. Assistive devices also make life easier for staff and family members, and may mean that people with extensive disabilities can continue to live in their own home. Purchasing and investment costs must therefore be weighted against the positive effects. How are the person's quality of life, everyday life and needs for support and nursing, if any, affected over the course of time?

It is obviously the technology that has to be adapted user friendly. The technology may only replace humans where it is desirable. Human nursing and contact is of course necessary, and many times preferred. But assistive devices creates time for meetings and human-to-human conversation.

### **New ideas are needed**

Processes for health and elderly care, control and organisation has to be formulated on the basis of the different patient needs and family members as well as taking account of the technical options available. There is a need to continue to develop ways of involving patients and users, strengthen their position and increase their influence. According to the National Board of Health and Welfare status report for 2010, health care is still, to a great extent, characterised by a professional and organisational perspective rather than a patient perspective.

As the simulations have shown, a small group of people with extensive morbidity ("multi-morbidity") accounts for a large share of the costs. Adapting care to patient needs together with coordinating and combining skills brings both improvements and efficiencies. Care and working practices also need to be adapted, both to those who wish to take great responsibility themselves and to those who do not.

New ideas and innovations are required, as well as targeted development to exploit the potential offered by modern information technology. The technology exists, but not the organisation and the processes needed to benefit from it.

The box on the next page shows the productivity improvements which will be needed to meet the increased needs of the ageing population. Examples are also given of cost reductions from reduced morbidity and improved efficiency.

## Every little helps...

Cost reductions that are required for the share of health and elderly care in GDP to be unchanged (incl. level of ambition/technology):

0.5–0.6 per cent per year for health care,

0.7–0.9 per cent per year for care of the elderly.

### Examples of measures that can reduce costs

- 1. Improve public health:** the difference between the most healthy scenario, compression of morbidity, and the least healthy scenario, expansion of morbidity, implies around SEK 16.3 billion.
- 2. Reduce accidental falls:** every year a third of all people over the age of 60 and one in two people over the age of 80 suffer from falls. Accidental falls increase by 65 per cent as a consequence of an ageing population. The direct annual costs are estimated at SEK 4.8 billion at 2006 prices and increase due to the demographic trend to SEK 8 billion in 2050 [30]. If half of all the accidental falls could be avoided, this would lower costs by around SEK 4 billion.
- 3. Avoid medical injuries:** the extra days of care due to avoidable medical injuries in somatic inpatient care are estimated to cost around SEK 5 billion annually.
- 4. Reduce health care-related infections:** the total and direct costs of care for all hospital infections are estimated by the National Board of Health and Welfare to exceed SEK 3.7 billion per year.
- 5. Prevent dementia:** if the development of Alzheimer's disease can be delayed by 5 years, the incidence of the disease in population is halved in 50 years [16]. The direct costs for all dementia care totalled around SEK 38 billion in 2005. Patients with Alzheimer's make up 60 per cent of all dementia patients. The annual direct costs of Alzheimer's can be estimated at just under SEK 23 billion. Half these costs, the potential for savings, amounts to around SEK 12 billion per year.
- 6. Reduce the incidence of hypertension:** this would mean that around 6 000 people avoid strokes every year [11], which means an annual saving in direct care costs of around SEK 3 billion [2].
- 7. Increase health care productivity:** if all county councils were as productive as the most efficient county council with regard to providing equivalent DRG-points in specialised somatic care and weighted patient contacts in primary care, taking account of structural differences in geographical circumstances and patient-mix needs, this would equate to a saving of SEK 7.2 billion per year [38].
- 8. Reduce elderly care costs:** if all the municipalities were to lower their elderly care costs to the standard cost according to the equalisation system, costs would decrease by SEK 2.8 billion.

These examples result in efficiency improvements totalling around SEK 54 billion (some overlap may, however, occur), i.e. nearly half the 2050 efficiency gap according to the expansion of morbidity scenario.

(1 000 SEK=108 EUR, 28 September 2010, European Central Bank)

# Conclusions and discussion

- More efficient health care and care for the elderly provide better results and/or reduced costs.
- Better health and functional capacity reduces the need for health and elderly care .
- Improved accessibility and effective assistive devices reduce the impediments represented by disabilities.
- More hours worked contribute to growth.
- New ideas, development and research.

## Efficiencies, better health and more hours worked

The simulations in the LEV-project show that an ageing population pose a challenge for health and elderly care in 2050, but that there is time to change. There are possible ways of increasing the number of hours worked through more people working and people staying in the labour market longer. It is possible to influence morbidity and disability and reduce their obstructive impact. There is great potential in efficiency improvements, doing the right things and doing them the right way.

### Applying current knowledge

Large efficiency gains can be reached simply by applying the knowledge that already exists (see example on p. 42). There is knowledge on:

- how public health is to be improved and how severe morbidity could be prevented and treated.
- effective methods of treatment, working practices and processes in health and elderly care.

## AREAS FOR IMPROVEMENT

### Efficient health and elderly care

- New ideas, think for the long term
- Apply best knowledge, right skills and modern technology
- Focus on results, with open comparisons and regular follow-ups (see p. 38)
- Make patients, service users and family members participants and adapt activity to their needs and wishes
- Collaborate with patients, service users and family members and with other sectors and responsible entities, in each activity

These measures increase the possibility of sustainable funding of welfare services and at the same time bring positive effects for service users and patients. A new way of funding services, on the other hand, does not alter the amount of services needed, the result or the costs.

Even small efficiency improvements have a great impact in the long term. An increase in productivity of less than one per cent per year is required in all the health scenarios to cope with the funding of health and elderly care by 2050. However, this will not happen by itself.

Benefiting from knowledge we possess into practice represents a challenge. It also takes time to obtain benefit from the technical advances that have been made. There is a need to come up with new ideas and do new things in a new way. The organisation of the activity and work processes, skills and decision-making paths need to be adapted to the new opportunities.

To achieve this there is a need for resolute and sustained work on efficiency improvements and continued investments on a better basis for follow-up research and development.

### **Reduced need for health care and elderly care**

It is possible to influence the future need for health and elderly care. Preventive and health-promoting efforts can influence lifestyle and habits and reduce the risk of developing diseases. Risk groups can be identified and morbidity detected earlier. The health and mobility of the elderly can continue to improve.

### **Reduced impediments through assistive devices and accessibility**

Elderly people can carry on living at home and cope on their own longer if the future society is accessible, if there are local services, adapted housing and communications and if modern assistive devices are used.

### **New ideas, research breakthroughs and innovations**

It is unrealistic to think that new ideas will cease in 2010, that people's lifestyle habits and health can no longer be influenced, that the way in which health care and elderly care work cannot improve, that care processes and working practices cannot be developed, or that no further technical and medical progress will be achieved in practice or in research.

With present-day knowledge and technology, there are already great opportunities for efficiency improvements. The scientific frontiers are moving forward quickly, and there is great potential for future breakthroughs for the treatment of the age-related diseases and for measures that reduce the impediments posed by disabilities.

### **Effective forecasts have to prove wrong**

Policy forecasts and simulations are intended to initiate discussion of how we should meet the challenges of the future, what needs to be done, when and how. Although all the forecasts are based on assumptions, there is value in illustrating how development of cost, health, or other units of interest, is affected by different policy measures. Undesirable outcomes create pressure for policy change and may eventually lead to an alternative development than what was forecasted. This implies that effective forecasts change the future, which means that they prove – and have to prove – wrong.

### **More analyses are needed**

Simulations with SESIM can shed light on several questions. What can we, for example, do to reduce severe morbidity in dementia, and what impact would this have on costs? What would happen if the spread of multiresistant bacteria increased? What happens if average life expectancy increases even more, while the health of the population deteriorates? What impact would an increased birth rate have on the dependency ratio? Some of these issues will be addressed in future reports.

### **The future need for care**

The fact that health is improving and life expectancy is rising is a positive trend to which society must adapt. Health and elderly care provide health and quality of life for those who need interventions. How well health care and elderly care work is of great significance for both service users and patients, but also for family members and for the population at large.

It is possible to meet the needs of the ageing population for health and elderly care. However, strategic and resolute efforts are required in several areas. If this is accomplished we will succeed in meeting the needs.

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## Footnotes

- <sup>1</sup> Statistics Sweden population forecast from 15.04.2010. The model projections are based on the 2006 forecast.
- <sup>2</sup> The total dependency ratio is calculated as the sum of the number of persons aged 0-19 and the number of persons aged 65 and over in relation to 100 persons aged 20-64.
- <sup>3</sup> The first part of SESIM (Swedish Simulation Model) was produced in the mid-1990s at the Ministry of Health and Social Affairs. The model has been developed over the years by the Ministry of Finance, among others, and has been used to study changes particularly regarding the pensions system. In the early 2000s SESIM was furthered by the addition of explanatory modules for health status, consumption of inpatient care and care of the elderly, see *Simulating an Ageing Population* [2]. For further information, see also [www.sesim.org](http://www.sesim.org). [1].
- <sup>4</sup> Health status in SESIM is based on the Statistics Sweden health index from questions in the ULF survey, where the individual has assessed his or her health, mobility, presence of diagnosed chronic disease and ability to work or perform daily activities. The combinations are then translated to health status: full health, slight ill-health, moderate ill-health and severe ill-health.
- <sup>5</sup> Correlations concerning the consumption of health care are estimated on data material from the Statistics Sweden ULF survey, the National Board of Health and Welfare's various registers of inpatient care, outpatient care and prescribed drugs and SHARE.
- <sup>6</sup> The correlations are estimated on data material from SNAC-K (the Kungsholm study).
- <sup>7</sup> For the expansion of morbidity scenario only the mortality risk has been changed, for example an 80-year-old is given the mortality risk of a 75-year-old. For the compression of morbidity and the dynamic equilibrium scenarios, the health status of the individuals has also been modified, so that an 80-year-old, for example, is given the health of a 75-year-old.
- <sup>8</sup> In the expansion of morbidity scenario the age-standardised health of people over the age 65 deteriorates by 0.7 per cent up to 2050, with dynamic equilibrium health improves by 3.7 per cent and in the compression of morbidity scenario health improves by 5.3 per cent.
- <sup>9</sup> In the projection the consumption of visits to doctors in primary care and specialised outpatient care, days of inpatient care and medicines has been combined to provide a cost measure at 2010 fixed prices. Consumption is used synonymously with this cost measure in this chapter.
- <sup>10</sup> This scenario agrees with the "medical paradox", whereby increased survival due to health-care interventions means that the individuals age with health problems.
- <sup>11</sup> As the number of health years increases in these scenarios, age-standardised consumption decreases in both scenarios. In the dynamic equilibrium scenario, however, the total consumption per individual is constant over life, while this decreases in the compression of morbidity scenario.
- <sup>12</sup> In future reports further analyses will be performed on these cost trends as a consequence of changes in level of ambition and development of technology and incomes.
- <sup>13</sup> The projection is based on the total expenditure on health care according to the health accounts, i.e. including investments and both privately and publicly funded health care.



- 14 No aggregate trend in GDP is generated in the model, and we assume instead that GDP follows growth in total payrolls, i.e. total gross pay including employer's contributions. According to the simulation, GDP will increase by 2.16 per cent per year at fixed prices up to 2050. This is somewhat lower than the Ministry of Finance's projection in the 2010 Budget Bill of 2.29 per cent per year. If it is assumed instead that the average trend in GDP per person over the last 30 years will continue to apply in the future, growth in GDP would be 1.8 per cent per year.
- 15 It is assumed that real wages and the consumer price index will both rise by two per cent per year. The trend in pay in the care sector is assumed here to follow the general trend. Tax rates are additionally assumed to be constant, so that tax revenue follows the trend in the tax base.
- 16 There are many examples where productivity can increase in the health care and elderly care sector, but for illustrative purposes it is assumed that productivity is zero in the projection.
- 17 The costs of care of the elderly are based on the municipalities' accounts summaries and include costs in ordinary special housing including outpatient activity. In modelling, costs of day centres, home nursing services, home adaptation and outpatient activity follow the use of home help services. Income from charges is deducted.
- 18 Around 5 per cent of the population with particularly care-demanding diagnoses account for around 60 per cent of total health-care costs (see [7]).
- 19 Future reports will also study various health trends for specific disease groups, known as focal diseases.
- 20 The number of full-time equivalent employees in care of the elderly is based on the same ratio between the number employed in municipal activity, and the number of full-time equivalents also applies in care of the elderly. The number of employees in LSS (Act concerning Support and Service for Persons with Certain Functional Impairments) activity has been excluded. url: [www.skl.se/web/Kommunal\\_personal\\_2008.aspx](http://www.skl.se/web/Kommunal_personal_2008.aspx)
- 21 Access to staff in care for the elderly is based on the National Board of Health and Welfare forecast (NPS 2009) on the trend in the number of nurses up to 2023. There is no forecast for nurse assistants or nursing auxiliaries, and the same trend has therefore been assumed as for nurses. It is assumed in the forecast that the annual average change in 2010-2023 also continues over the period 2023-2030. The need for care of the elderly per county is based on a population forecast from 2002 with information on the proportion of the population over the age of 65 (Einar Holm, Umeå University). The proportion of the working population who work in care of the elderly has been assumed to increase to the same degree in 2010-2030 in all the county councils. The projection is additionally based only on public employees, the shortage of which would be even greater if private employees had been included.
- 22 The calculation is based on the assumption that other public consumption, government grants and charges for health and elderly care increase at the same rate as incomes. It is also assumed that the increase in cost due to raised level of ambition/technology is funded by tax.
- 23 The outcome of the Statistics Sweden health index in the ULF survey has been converted to life quality weights in the calculation via EQ5D.

- 24 The total willingness to pay is an indicator of the value of health (the benefit) generated in the population. In the transport sector calculations of the benefit of road safety are used in decisions on investments. This means that the Riksdag and the Government have approved SEK 16.3 million (at 2001 prices) as the value of a statistical human life. On the basis of the value, Persson and Hjelmgren have estimated a willingness to pay of SEK 655 000 per QALY [10].
- 25 It is assumed that willingness to pay for health follows the general trend in prices and incomes in the economy.
- 26 DRG stands for diagnosis-related groups and is a system for grouping individual care contacts into larger groups, based on their medical contents and consumption of resources.
- 27 The Ädel Reform of 1992 among other things signifies that most of the responsibility for long-term care and day care for the elderly and disabled was transferred from the county councils to the municipalities.
- 28 The calculation is based on data on cost per patient for different diagnoses in Region Skåne in 2004.



In 2050 the proportion of elderly people in the population is expected to have increased from the present level of 17 per cent to 25 per cent. The population is ageing, health is improving and life expectancy is rising. This is a positive trend to which society must adapt.

A working group in the Ministry of Health and Social Affairs has therefore used a unique model to simulate how 3 000 individuals age up to 2050 and the impact this is expected to have on health, morbidity and mortality and the future need for health and elderly care. The simulations show that it is possible to combine measures to meet the increasing needs of the ageing population for health and elderly care in 10–15 years. However, resolute efforts are required to

- improve health and functional capacity,
- increase accessibility,
- bring about effective health care and elderly care that apply current knowledge and introduce new ideas
- research and develop.



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