PROJECTIONS OF ELDERLY HEALTH DEVELOPMENT AND COSTS FOR LONG-TERM CARE IN SWEDEN

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The increasing number of older persons to be expected in the coming decades raises serious questions concerning the resources that will be demanded for provision of long-term care of the frail elderly. Clearly there is a need for increased resources. However, simplistic calculations based upon the assumption that future needs of care will be proportional to the number of old persons per age group can lead to misleading results by failing to take into account the health development of the older persons. Here currently available Swedish data indicate a possible shift in trends – the previous very positive development seems to have changed into more moderate improvements or maybe even into a negative one.

*In an effort to include factors such as health and access to informal care a calculation model has been developed. Data for the model are derived from different sources – longitudinal studies, local surveys of recipients of care etc. Four different scenarios are explored. The model calculations show that the results are highly sensitive to the assumptions you make concerning the health development of older persons. In the most pessimistic scenario **D** the projected cost increase in fixed prices during the period 2005-30 amounts to 69 per cent – in the most optimistic scenario **0** the cost increase stays at 25 per cent. This shows the great importance of policy measures directed at improving the health of the elderly – involving among others conditions that stimulate to increased physical and mental activity and also different medical interventions.*

1 Introduction

A common feature among the industrialized countries in the 21st century is a rapid increase in the number of older persons. Sweden is no exception. The expected increase raises serious questions concerning the resources that will be demanded for provision of long-term care of frail older persons. Clearly there is a need for increased resources. However, simplistic calculations based upon the assumption that future needs of care will be proportional to the number of old persons per age group may lead to misleading results by failing to take into account the health development of the older persons [1]. In fact a simple model codeveloped by the author indicated that the expected increase in the period 2000-30 was reduced from 60 to around 20 per cent, assuming that prevailing health trends according to national surveys should continue [2-3]. Since then, however, new data has thrown this very positive development into doubt. It seems that the previous very positive development has changed into more moderate improvements or maybe even into a negative one.

In order to include factors such as health and access to informal care in the projections of future costs for long-term aged care a calculation model – the ASIM III-model – has been developed. The model makes it possible to calculate forecasts for the development during the period 2000-30 under different assumptions. Using the model it is thus possible to analyse the impact of different factors that influence future resource needs, such as the distribution of

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population of older persons according to age, gender, marital status, the health development in different sub-groups and the provision of different long-term care services in relation to care needs.

The applied approach is to describe the provision of care for different subgroups in the population and then calculate the impact – in terms of costs – of different assumptions concerning the development of these subgroups. The calculations are based upon different trends that are estimated from earlier developments and prolonged into the future.

Calculations concerning the future development of care services needs among the frail older persons have been made in several countries in the last decade [4-8], by the European Union [9] and also by international organisations such as the OECD [10]. Those predictions that take health development into account have generally speaking arrived at much lower estimates of the future needs than those that have omitted this factor. The calculations have above all shown, that the assumptions you make concerning the development of ill-health and disability among the older persons are extremely crucial for the obtained results. At the same time this development is still controversial with very different opinions among researchers concerning which of three main hypotheses – compression, expansion or postponement of morbidity – that should apply [11-14]. The advantage of using a model, which makes it possible to easily calculate the result under different assumptions, is that the effect of this controversy can be explored. It is also easy to introduce new data when these are available.

The extent to which public care services[1] are needed depends of course a lot on the reliance on informal care systems – spouse, children, kin, friends, etc. – or privately paid care services. In Sweden this is reflected by large gender differences and large differences between married and non-married persons in the provision of public care services [15]. Older frail men tend to have a – often younger – wife capable of providing care, whereas older frail women much more often are single, being left alone after their husband has died [16]. Patterns of mortality development and co-habitation will in the future change the proportion of single-living persons of both genders. A tendency towards decreasing gender differences in mortality may to a large extent be counterbalancing increased divorce rates. It should also be noted that the prevalence of ill-health differs between married and non-married persons. It is thus very important to be able to catch these factors in predictions, which is the reason for including them in the model.

2 Material and methods – the ASIM III-model[2]

Without a clear view on the question how older age care services are provided according to needs it is difficult to make forecasts of future developments, since these must be based upon clear assumptions concerning the needs development. The ASIM III-model aims at solving this problem by providing estimations on the amount of public long-term care services provided per age group prospectively according to these terms for the period 2000-30.

The calculations are made by combining different data sources. Projections of the health development are based upon the national surveys on living conditions (ULF). Lacking national data concerning the provision of services given needs this data is calculated using different local studies, namely the SNAC study at Kungsholmen, Stockholm in 2001 [5] and the so-called "Field municipalities surveys" in eight Swedish municipalities in 2002 [22].

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1 In Sweden, care services for the elderly are sometimes organised by the municipality, sometimes by private entrepreneurs. Regardless of mode of organisation most of the formal care is paid for by the municipality and these services will in the sequel be referred to as *public care services* [17].

2 This model is the third in a series of elderly care services models developed by the author starting in 1985 [18-19].

The basic structure of the ASIM III-model consists of a subdivision of the Swedish population 65 years and above into subgroups according to age (age groups 65-74, 75-84, 85+), gender, civil status (with or without spouse) and degree of ill-health (four levels, cf. below). For each subgroup is denoted the number of persons, that receive public long-term care services for older persons according to four different levels:

- Community care: home help < 1 hour per day,
  1-2 hours per day,
  > 2 hours per day
- Institutional, round-the-clock, care in residential home or nursing home.

The prevalence of ill-health for each subgroup (age, gender, marital status) in the population is estimated using the Swedish National Survey of Living Conditions (ULF). These interview surveys have been performed yearly nation-wide in Sweden since the end of the 1970s with a sample size around 8000 persons [23]. Among others, participants are asked questions concerning health conditions – self-rated health, mobility restrictions and restrictions in functional capacity due to chronic disease. From the answers to these questions a health index with four degrees is constructed – full health, slight ill-health, moderate ill-health and severe ill-health.

Using this data the proportion of persons, per age group, gender, civil status and degree of ill-health, receiving services on the respective levels is calculated. It is then assumed that these provision levels per sub-group remain unchanged in the studied time period.[3] Then in order to forecast the future volume (or costs in fixed prices) of the aged care services you only need a population forecast (according to gender, age group and civil status) and assumptions concerning the development of ill-health in each sub-group. Forecasts are made for the years 2005, 2010, …, 2030 simply by multiplying the estimated number of persons in the population per sub-group (gender, age group, marital status, class of disability) each year with the initial proportion of persons receiving services on the respective levels in the respective sub-group.

The population prognosis is obtained from Statistics Sweden [24]. In Figure 1 below is shown the official Swedish population forecast per age group and gender for the period 2000-30. As seen from the diagram the number of older persons is expected to increase during the whole period, but in the first two decades the increase is concentrated among the younger old. It is not until after the year 2020 that a major increase is expected among the age group 85+, which is the most relevant when it comes to estimating future needs of aged care services.

There is no official subdivision of the population forecast according to marital status. The development of the proportion of married person in the period 2000-30 has been extrapolated (linear regression) per five-year age group and gender from the period 1985-2000. Reduced mortality results in the proportion of married increasing for all age groups except the youngest (65-69). This effect is especially noticeable for the very old. As an example the proportion of married women in the age group 85-89 years is expected to increase from 13 in 2000 to 21 per cent by the year 2030. The reason is decreasing mortality among older and very old men.

As mentioned above the present (*i.e.* year 2000) provision of services per sub-group is calculated using local studies ”blown up” to agree with the official national figures.

Table 1 below shows the proportion of persons receiving services on the four above service levels according to degree of ill-health calculated using the local data.

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[3] This is the default assumption in the model, which can be adjusted at will.

The figures in Table 1 represent an aggregate over all age groups, gender and marital status. There are of course in reality wide variations between these different groups. Given level of ill-health older persons receive more public services than younger and non-married persons more than married. There are also gender differences – mainly reflecting differences when it comes to access to informal care by spouse or kin.

The model assumptions concerning the development of ill-health or disability are based upon trend extrapolations using (adjusted) data from the ULF studies. As will be shown later in this paper these trend extrapolations can be modified in different ways creating different scenarios. In Figure 2 is shown – by way of example – the development of the probability of severe ill-health in the period 2000-30 according to the 1980-2000 trend for non-married men and women, aged 75-79 years and 85-89 years respectively.

The number of persons receiving different levels of services can be

Figure 1

Population Development in Sweden, 2000-30

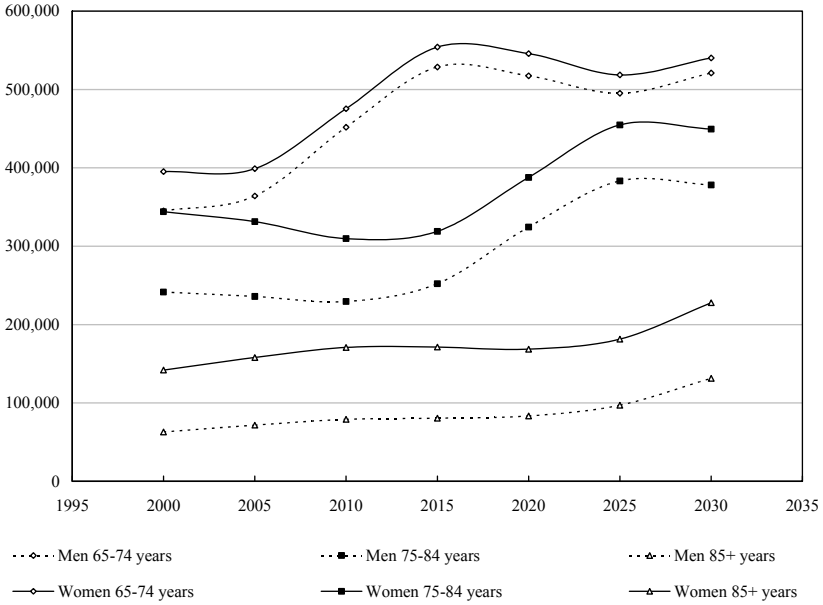


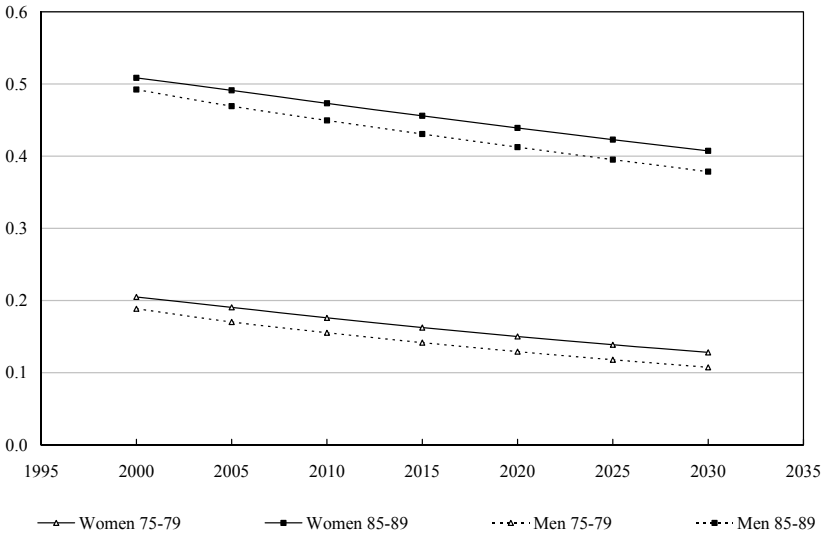
Table 1

Proportion of Persons Receiving Public Aged Care Services per degree of Ill-health, 2000
(according to ASIM III-model)

	Full health	Slight ill-health	Moderate ill-health	Severe ill-health	All Groups
Community living without public help	**98.2%**	**96.5%**	**85.5%**	**46.9%**	**83.6%**
Public help <1 hr/day	1.7%	2.9%	10.5%	13.3%	6.6%
Public help 1-2 hr/day	0.1%	0.3%	1.9%	6.4%	2.0%
Public help >2 hr/day	0.0%	0.2%	0.7%	9.6%	2.3%
Total percentage of community-living persons with public help	**1.8%**	**3.3%**	**13.2%**	**29.3%**	**10.9%**
Institutionalized	**0.1%**	**0.1%**	**1.3%**	**23.8%**	**5.6%**
Percentage of persons with public help	**1.8%**	**3.5%**	**14.5%**	**53.1%**	**16.4%**
Percentage of total number of persons	**18.2%**	**38.1%**	**21.9%**	**21.9%**	**100.0%**

Figure 2

Development of the Probability of Severe Ill-health in the Period 2000-30 according to the 1980-2000 Trend
(non-married men and women aged 75-79 years and 85-89 years respectively)



converted to costs. In community care an average cost per level of services has been calculated using SNAC-surveys for estimating the average number of hours of help per week (per level of services, see above) and the yearly cost for one hour of help per week in the year 2000 price level according to official estimates. The costs for institutional care are assumed to be dependent on the disability level of the residents. The costs have been calculated by adjusting previously estimated figures to present (2000) price level. The result of the cost calculations is shown in Table 2 a) and b) on the left.

Using a fixed price level amounts essentially to measuring the volume of services. No regard is made towards relative price development depending on staff wage increases.

The ASIM III-model is implemented in EXCEL. The above results are aggregated to totals per gender, age group, marital status and degree of ill-health in order to facilitate comparison and analyses of results. Diagrams showing different aspects of the developments are automatically derived

Table 2

Calculated Costs for Care Services
(year 2000 price level)

a) Community Care

Level of Services	Average Number of Hours Help per Week	Yearly Costs *(thousands SEK)*
< 1 hour per day	3.2	36
1-2 hours per day	9.0	101
> 2 hours per day	20.2	226

b) Institutional Care

Degree of Ill-health	Yearly Costs *(thousands SEK)*
Full health, slight or moderate ill-health	269
Relative severe ill-health	299
Severe ill-health	384
Very severe ill-health	476

from the calculated data. Different parameters can be used to control priorities with regard to gender, age group, marital status and disability. In this way it is possible to adjust the result to budget constraints and calculate the implications for different sub-group of the applied priorities.

3 Results

The ASIM III model can be used for many different types of calculations forecasting developments in the period 2000-30. As shown above the Swedish population of older persons is expected to grow considerably in the coming decades. This will of course have effects on the projected costs for the public old age care services. The population growth in the period 2000-15 concerns mainly the younger old and thus does not have a large effect on the care service costs. The main thrust comes after the year 2020, when the big 1940s generation, the "baby-boomers", reaches the above 80 year olds group. The projected cost development by age groups given unchanged prevalence of ill-health per age and gender is shown in Figure 3.

Figure 3

Projected LTC-cost Development per Age Group Assuming *Unchanged Health* after the Year 2000
(millions SEK)

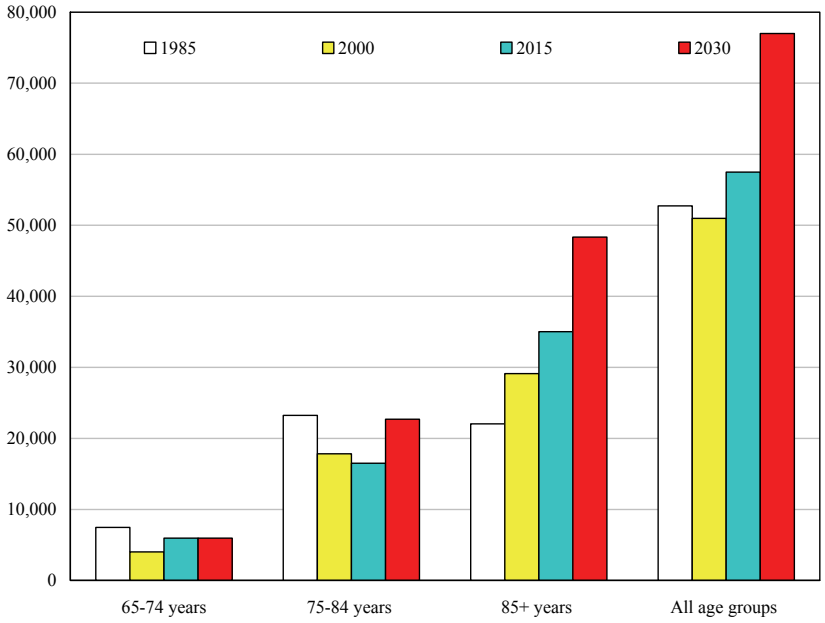
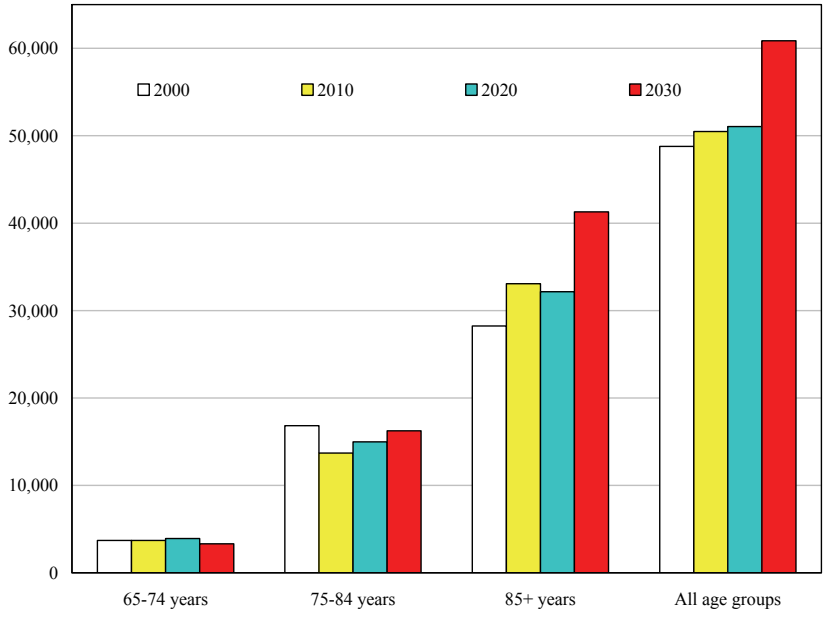


Figure 4

Projected LTC-cost Development per Age Group Assuming *Unchanged Health Trends* after the Year 2000
(millions SEK)



As seen from Figure 3, the projected cost increase is moderate until the year 2015. After that a sharp increase of costs is projected. The cost increase stems mainly from the increase of 85+ group. Should the health trends observed during the period 1980-2000 prevail also in the future the development – as shown in Figure 4 – will be much more moderate.

In this case the LTC-costs for the younger age groups of old persons are actually projected to diminish and costs will not start to increase until the year 2020. However, these assumptions may be too optimistic. There are now indications that the positive health trend already may have stopped and possibly even reversed. In order to explore the contingencies the cost development has been calculated in five alternative scenarios:

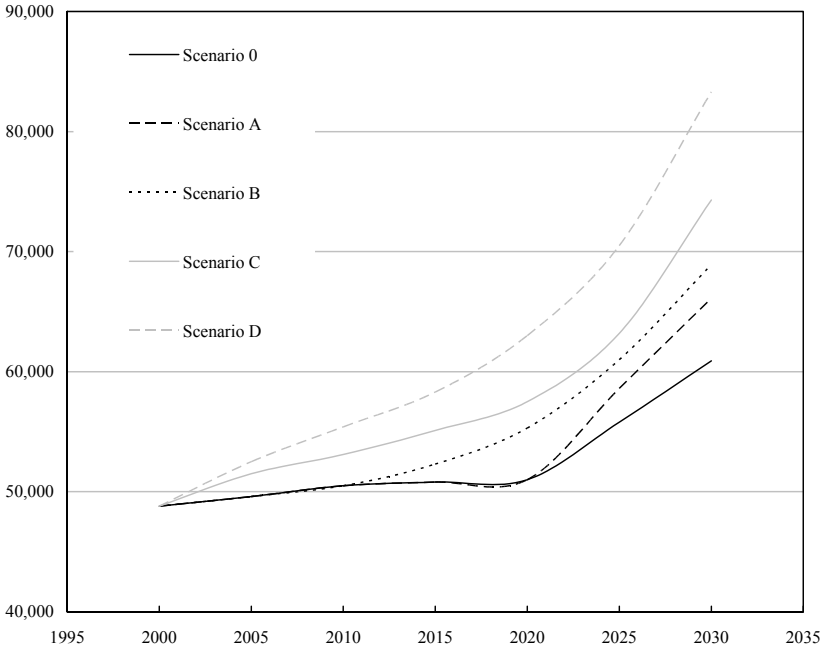
0 – continued positive ill-health trend
A – continued positive ill-health trend until 2020, after that constant prevalence of ill-health,
B – continued positive ill-health trend until 2010, after that constant prevalence of ill-health,
C – constant prevalence of ill-health
D – reversed trend, returning to the 1985 level in 2030.

In Figure 5 below is shown the projected cost development according to the five different scenarios defined above.

The effects of the health development on the future costs are as seen from Figure 5 quite drastic. In the most pessimistic scenario **D** the projected cost increase in fixed prices during the period amounts to 71 per cent – in the most optimistic scenario **0** the cost increase stays at 25 per cent. However, even in scenario **D** the increase does not amount to more than 1.6 per cent of present GDP, which does not look insurmountable for such a long period assuming that economic development will remain reasonably favourable. It must be noted of course that the costs refer to fixed price level. Economic growth ensuing from increased productivity will increase the price of care services, because wages in the care sector tend to follow wages in the total economy. Assuming this development and disregarding the price development of other costs than staff, what the calculations actually show is that the share of GPD going to care services for the frail older persons – at present 2.6 per cent – will increase by 25-69 per cent, *i.e.* to 3.3-4.4 per cent, depending on scenario.

Figure 5

Projected LTC-cost Development during the Period 2000-30 according to Different Scenarios
(fixed prices)



The assumptions concerning the future development of ill-health among the older persons seem to have a larger impact on the demand for institutional care than community care given present service levels. The model calculations show that in the worst scenario **D** the projected increase in the number of institutional places amounts to 74 per cent, whereas the corresponding increase of the number of persons with community care services stays at 52 per cent. In the continued health trend scenario **0** these projected increases are only 27 per cent in both cases.

4 Discussion

The projections presented above concerning the future volume of old age care services – given present service levels – can be compared with previous results reported by Batljan and Lagergren [2]. As mentioned above the former projections resulted in an expected volume increase by the year 2030 at around 22 per cent. This projection was – in the same way as scenario **0** presented above – based upon the assumption of a continued health trend for the whole period and the trend was estimated using the same data source – the ULF surveys.

The ASIM III-model represents a step towards greater sophistication compared to the previous calculations produced by Batljan and Lagergren [2]. More specifically, the model presents a more detailed description of service levels and health states. The set-up of the model makes it easy to calculate results for different sub-groups in the population. The model shares one weakness with the previous calculations – it departs from the present situation without taking into account whether this situation is satisfactory or not. The purpose of the model is to show the effects of different sets of assumptions. The flexibility of the model makes it possible to vary these assumptions and in this way achieve a better understanding of the total future demand and resource problems.

The wide range of results produced by alternative assumptions concerning the future ill-health trends in the different scenarios show again how important the health and disability factors are when it comes to estimating future care needs. One conclusion to make is of course the need for better data. But perhaps more important is that this shows so clearly the enormous significance of an effective preventive health policy aimed at the older persons. The care needs of the older persons in the future are to a great extent determined by today's choices of living conditions and lifestyles.

Health policy for the older persons involves among others creating conditions that stimulate the older persons to increased physical, social and mental activity, having access to a social network and a meaningful role in society. The value of different medical interventions should also not be dismissed. Further there are good possibilities to decrease the need for services by making it easier for older persons to cope by themselves given the level of ill-health and disability. Here the possibilities mainly lie in technological applications and in adjustments of housing and environment. Meeting the future care needs of the baby-boom generation is definitely a challenge, but in no way insurmountable, if action is taken today.

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