Ilija Batljan · Mårten Lagergren

Future demand for formal long-term care in Sweden

Published online: 16 August 2005
© Springer-Verlag 2005

Abstract Ageing population will have a significant effect on demand for human resources in health care and social care for the older people. Here we are presenting, using different scenarios, how projected demographic development may influence the demand for formal long-term care (LTC) for the people older than 65 years in Sweden 2000–2030. Our method uses information on utilisation of current services per gender and age group, demographic projections of number of older people per gender and age group and assumptions on health status changes per gender and age group. Our assumptions on health status changes were based on estimates from Swedish National Survey of Living Conditions, covering 32,502 observations during the period 1975–1999. The assumption that trends in severe ill-health in Sweden between 1975 and 1999 will continue (meaning expected improvements in age/gender-specific health and functional ability among the older people) results in the projected increase in the demand by year 2030 being almost halved, compared with an estimate that is based on unchanged age/gender-specific health and functional ability. The assessment of future demand for LTC for the people older than 65 years should involve extrapolations based on expected changes in health status, as well as the question how decreasing mortality incorporated into population forecasts is to be associated with future trends on severe morbidity/disability.

Keywords Demand for LTC · Human resources · Health status · Mortality · Ageing · Sweden

I. Batljan (✉)
Department of Social Work, Stockholm University; and Ministry
of Health and Social Affairs, 103 33 Stockholm, Sweden
E-mail: ilijab2000@yahoo.se
Tel.: +46-70-5183967
Fax: +46-8-217876

M. Lagergren
Stockholm Gerontology Centre, Box 6401, 113 82 Stockholm,
Sweden

Addressing issues related to demand for human resources in health care and social care for the people older than 65 years is viewed as one of the most important objectives for many OECD-countries within the context of ageing populations (Birch 2002; OECD 2003; Batljan and Lagergren 2004). Given the fact that particularly long-term care (LTC) for older people is a labour-intensive sector, human resources planning is crucial for the development of the formal care for the elderly in the future. In order to ensure the availability of sufficient, well-qualified manpower at right place in right time, there is need to analyse how changes in demographics may affect future demand for human resources for LTC for older people.

It is well known that the utilisation of LTC for the older people rises with age. This fact has been used as a starting point for the assessment of future demand for LTC for older people in Sweden in different studies (SOU 1996, p. 163; Fölster 1998). The approach used in these studies is a simple demographic extrapolation. This means that current utilisation of LTC for older people is multiplied by projected increase in the number of people aged 65 years and over, or sometimes 80 years and over. However, current utilisation of LTC for older people varies greatly, not only by age but, also by sex (Larsson and Thorslund 2002). The increase in the number of older persons is also projected to vary greatly by age and sex (Statistics Sweden 2002). That is why it is important to use detailed information by age and sex when analysing how demographic changes will affect future demand for LTC for older people.

The projected number of older people in the future is essentially a direct function of the number of people living in the country today combined with age-specific average mortality rates. An improvement in survival after age 65 was the main force behind rising life expectancy in the past few decades (Oeppen and Vaupel 2002). Official demographic projections in Sweden are also based on further decreases in the mortality rates (Statistics Sweden 2002; Lagergren and Batljan 2000). It is partly this assumption of further decrease in mortality

rates that results in higher numbers of older people and rapidly increasing demand for LTC for older people in the future given unchanged (i.e. today's) utilisation per age group and sex.

Future demand for LTC for older people depends ultimately on old people's health and their functional ability. Thus, the crucial issues for projections of future demand for LTC are mortality development, morbidity and the relation between those two. The question then becomes how is the observed decrease in mortality associated with older people's state of health and functional ability, in age-group terms. This has been a highly controversial question for several years. Three hypotheses (Fig. 1) concerning relation between mortality and older people's state of health and functional ability have figured in the international literature: dynamic equilibrium, expansion of morbidity and compression of morbidity (Robine and Michel 2004). One central issue involved in all these hypotheses is the trend in the number of years of healthy life expectancy in relation to total life expectancy (Robine et al. 2003).

The first hypothesis, dynamic equilibrium (also referred to as a postponement of morbidity), was launched by Manton (1982). This hypothesis states the time spent with severe morbidity and disability remains approximately constant. This is due to the fact that medical treatments and improvement in lifestyles reduce the rate of progression of chronic diseases. It assumes that the postponement of death to higher ages due to falling mortality is accompanied by a parallel postponement of severe morbidity and/or disability. However, the increased survival may also lead to an increase in the number of years spent in slight or moderate ill-health. Nevertheless, active life expectancy grows at the same rate as total life expectancy and the number of years with disability remains the same. The hypothesis was built on evidence that the prevalence of several chronic illnesses declined in the USA in the 1980s. These trends are explained by improvements in underlying factors, such as higher educational level, better nutrition, increased physical activity, etc. Since these factors are continuing to develop favourably, Manton et al. (1995) found it reasonable to assume that the elderly population's state of health will continue to improve and active-life expectancy would rise. Survey results reported by Manton et al. (1997) and Manton and Gu (2001), based

on the National Long-Term Care Survey (NLTCs) showed a clear, significant decrease in the age-standardised proportion of functionally disabled older people in the USA in 1982–1999. Similar results have been reported in the work of Freedman and Martin (1998). Empirical evidence for dynamic equilibrium hypothesis has also been provided by Graham et al. (2004) using data from New Zealand.

The second hypothesis, expansion of morbidity, has been proposed by Olshansky et al. (1991). Their argument is that medical inputs for the older people result in a higher proportion of people with health problems surviving to an advanced age. Age-related morbidity thus increases: severely ill old people no longer disappeared. Broadly, the same argument had previously been put forward by Gruenberg (1977). Thus, in its pure form, the hypothesis postulates that active-life expectancy stays unchanged, despite the increased total life expectancy. What actually increases is only the number of years of ill-health. Support for the expansion hypothesis has been provided by various researchers, including Guralnik (1991)—on the basis of data from American studies, and Kaplan (1991), using data from the Alameda study. In their review of a literature on compression and expansion of morbidity, Hum and Simpson (2002) conclude that additional years of life will probably occur in a moderately impaired health state.

Finally, a directly opposed hypothesis, the compression of morbidity hypothesis, proposed by Fries (1980), posits that improved living conditions and healthier life style, together with the fact that more and more chronic diseases may be curable, cause the onset of disability to be postponed to an increasingly higher age. According to the hypothesis, humankind has a genetically determined—albeit individually variable—maximum age. The hypothesis therefore entails the assumption that morbidity/disability will be gradually compressed at very old ages (into the last years of life) and the number of years spent with diseases or disabilities will decrease over time. However, in a modern definition of the compression of morbidity (Fries 2003), there is no assumption on life expectancy approaching the natural limit. In this definition, the hypotheses are presented as a positive concept where healthy life expectancy grows faster than total life expectancy and the number of years spent in bad health decreases. Healthy life style leads to

Fig. 1 Morbidity–mortality: three hypotheses

both increasing survival and compression of the disability into few years at the end of life (Vita et al. 1998; Ferrucci et al. 1999; Nusselder et al. 2000; Hubert et al. 2002). Doblhammer and Kytir (2001) provided empirical evidence for compression of morbidity hypothesis in their study on trends in healthy-life expectancy in Austria. Using data on disability-free life expectancy, and comparing them with data on life expectancy for men and women in France between 1981 and 1991, Robine, Mormiche and Sermet (1998) provided additional empirical evidence for the compression hypothesis.

In their overview of international trends of older people's functional ability, Waidman and Manton (1998) conclude that the proportion of functionally disabled old people is decreasing in most industrialised countries. In a systematic review of disability trends among the older adults during the late 1980s and 1990s in the USA, Freedman et al. (2002) show consistent evidence of decline in IADL disability and conflicting evidence of decline in basic ADL disability. Crimmins (2004) emphasises that the effect of increased survival may be balanced by the reduction in the incidence of disease, and by the fact that having a disease appears to be less disabling than in the past. Less-disabling diseases may be the result of environmental improvements and particularly access to assistive devices (Spillman 2004; Freedman et al. 2004).

Purpose

The purpose of this paper is to present how projected demographic development may influence future demand for human resources for LTC for older people in Sweden 2000–2030, given different assumptions regarding future development in older person's health and functional ability. We are also presenting trends (1975–1999) related to the proportion of persons with severe ill-health in the 65–84 age group, divided by gender and by 5-year subgroups (65–69, 70–74, 75–79, 80–84). Those trends are compared with the development of mortality, during the same period. The paper is not aimed to resolve the

controversies in the literature concerning relation between mortality and morbidity/disability, but to contribute to it based on long-term Swedish data.

Data and method

Data used for estimates on future demand for LTC for older people were taken from annual surveys carried out in the period 1975–1999 by the Swedish National Survey of Living Conditions (SNSLC)—in total 32,502 observations (Table 1). They relate to the proportion of people with severe ill-health in the 65–84 age group, divided by gender and by 5-year subgroups (65–69, 70–74, ..., 80–84). To provide a more stable selection, the surveys have been collated in 5-year intervals. The sample frame for the SNSLC covers the whole population living in Sweden, including people in long-term care institutions. Non-response rate varied between 18.5% in 1975–1979, 20.0% in 1985–1989 and 22.0% in 1995–1999. The main reason for increasing non-response rate was increased number of people not available for interviews. Proportions of those that were sick or institutionalised have been relatively stable.

The SNSLC included questions concerning health conditions—individuals' self-assessments of their own general state of health, the prevalence of chronic illness, ailments and other forms of infirmity, and impaired mobility and need for assistance. From the answers to these questions, a health index with four degrees was constructed—full health, slight ill-health, moderate ill-health and severe ill-health. A detailed description of the health index, that was originally suggested by Statistics Sweden, can be found elsewhere (Statistics Sweden 1989; Swedish National Board of Health and Welfare 1997; Boström and Persson 2001). According to the Swedish Government Commission on cost and revenue equalisation in Swedish municipalities and county councils (SOU 1994, p. 144) the degree of ill-health has a very great impact on the demand for LTC for older people. This means that overall demand for LTC for older people in Sweden is determined, to a large extent, by the

Table 1 Number of observations from SNSLC, period, gender and age group

Period							
Sex	Age group	1975–1979	1980–1984	1985–1989	1990–1994	1995–1999	1975–1999
Men	65–69	1,858	1,116	1,029	869	774	5,646
	70–74	1,372	935	899	777	754	4,737
	75–79 ^a		1,049	714	638	632	3,033
	80–84 ^a		592	423	384	384	1,783
	65–84	3,230	3,692	3,065	2,668	2,544	15,199
Women	65–69	1,808	1,196	1,106	890	846	5,846
	70–74	1,263	1,073	1,000	901	863	5,100
	75–79 ^a		1,324	906	765	737	3,732
	80–84 ^a		833	666	553	573	2,625
	65–84	3,071	4,426	3,678	3,109	3,019	17,303
Both sexes	65–84	6,301	8,118	6,743	5,777	5,563	32,502

^aFigures on members of the 75–79 and 80–84 age groups for the period 1975–1979 are lacking because before 1979 the upper age limit in SCB's Swedish National Survey of Living Conditions was 75

number of people suffering from severe ill-health. Accordingly, we use prevalence of severe ill-health as an indicator of health status for estimates on future demand for LTC for older people.

Unfortunately, the SNSLC has an upper age limit (85 years). There are some studies with an open upper age limit that have been reporting health improvements even in the highest age group (Manton et al. 1997; Manton and Gu 2001). Nonetheless, there are strong indications that the rate at which health is improving decreases with advancing age. In order to not overestimate the impact of health trends, we have assumed that the improvement in terms of prevalence of severe ill-health in the 85–89 age group is half of that in the 80–84 group. We also assumed that morbidity—expressed in the same terms—in the 90+ age group is constant. These assumptions are related to changes in mortality during the last 25 years and chosen for reason of simplicity in order to not overestimate health improvements. The decrease in mortality in the 85–89 age group is 60–70% of that in the 80–84 group. Mortality rate decreased in the open-ended interval age group 90+ has been about 0.3% per year during the period 1975/1979–2000/2004. Statistics Sweden has provided mortality data.

In Sweden, 290 municipalities are comprehensively responsible for LTC for the elderly and people with disabilities. LTC for older people in Sweden is primarily (around 85%) financed by municipal taxes. A smaller part of the elderly care is financed by the state grants directed to the municipalities. Publicly financed LTC for older people in Sweden is extensive (2.6% of GDP), compared to most countries. It can be divided into special housing accommodation (institutional care) and home care. There is also a still small, but important part of social services which are support programmes for family caregivers (respite and relief services, support and educational groups for carers and economic support for caring). Swedish municipalities also have statutory responsibility to provide assistive devices according to the needs in the elderly population. Municipalities are financially responsible for all types of LTC for older people, including long-term patients in somatic acute hospital care and geriatric hospital care (Lagergren 2002). Moreover, in the case when the elderly stay at acute care or geriatric hospitals after the medical treatment is completed, the municipalities have to pay to the county councils for that care.

In 2003, 7.2% of 65 years and older and 18.4% among those 80 years and older were living permanently in special forms of housing accommodation (Swedish National Board of Health and Welfare 2004).

Home help services provided by the municipality under the Social Services Act constitute the most important services for making it possible for the elderly to continue living in their own homes as long as possible. Service tasks include help with daily activities, e.g. shopping, cooking, cleaning and laundry. Personal care (e.g. assistance with eating and drinking, getting

dressed, personal hygiene and moving about) is also included. In 2003, 8.3% of the population (65 years and older) and 19.1% among those 80 years and older, received home help services. Out of these, about one-third also received home nursing care (Swedish National Board of Health and Welfare 2004). Home nursing is, today, in many cases highly specialised and includes qualified medical care, as well as terminal care (Lagergren 2002).

Current utilisation of LTC for older people can be presented by gender and age group utilisation profiles. These can be expressed in different ways, e.g. by average costs or average number of service hours or average number of nurses currently giving services per capita for each gender and age group. Gender and age group utilisation profiles are approximations of how resources in form of working hours or number of nurses are allocated between gender and age groups. Profiles can be used practically as weights, when making demographic extrapolations of future requirements on human resources. The method used is indifferent of measurement unit. In this paper, we are using cost data per capita for each gender and age group as weights when expressing current utilisation of services (Table 2).

Table 2 shows that an appreciable increase emerges with rising age and that cost per capita for women are higher than for men. The latter feature has, of course, much to do with gender disparities in access to informal care, i.e. support from relatives and others (Larsson and Thorslund 2002).

Data on demographic projections that we use are taken from Statistics Sweden. The proportion of older people aged 65 years or more in Sweden is expected to increase substantially in the decades ahead. However, as seen from Fig. 2, there is a quite different development for men and women.

Given unchanged gender and age group utilisation profiles and using demographic projections, we can make a first estimate of the demographic influence on future care demand (gender and age sensitive simple demographic extrapolation). That will present our first scenario.

In the second scenario of future LTC demand, we introduced health trends by sex and 5-year age groups. In this scenario, we are estimating the development of the future LTC demand using current gender and age

Table 2 Estimated per capita costs of LTC and services (LTCaS) for the people older than 65 years care by 5-year age groups and gender, SEK, 2001 (Swedish Association of Local Authorities 2002)

Age group	Women	Men
65–74	10,300	9,500
75–79	32,900	25,800
80–84	74,500	52,300
85–89	153,600	110,700
90+	272,700	212,900

Source: Swedish Association of Local Authorities (2002)

Fig. 2 Sweden's older people population, trends up to 2030 according to Statistics Sweden's latest projection, men and women in Sweden, 65–79 years and 80+ years, 2000–2030

group utilisation profiles, demographic projections of the number of older people per gender and age group and assumptions concerning the changes in health status per gender and age group.

For the two scenarios (scenario 1: without taking into account changes in health status, scenario 2:

Fig. 3 Trend of the proportion of older people 65–84 years age* with severe ill-health according to SCB's Swedish National Survey of Living Conditions (1975–1999)

taking into account changes in health status) we estimate the expected change in demographically determined demand in terms of volume of required number of service hours. The assumption is that the current gender and age group utilisation profiles—as expressed in cost terms—are a good approximation of the average number (by gender and age group) of hours worked required by the public LTC for older people. The volume of hours worked can then easily be used to assess future demand for human resources for LTC given provider mix and average number of working hours per provider.

The model assumptions concerning the development of severe ill-health are based upon trend extrapolations (logarithmic) using the observed proportions with severe ill-health from SNSLC during two periods 1975/1979–1995/1999 and 1985/1989–1995/1999.

Results

First we present how, according to SCB's Swedish National Survey of Living Conditions, the proportion of people with severe ill-health has changed over the past 20 years (Fig. 3).

As seen from Fig. 3, the proportion of older people with severe ill-health has decreased steadily in the period 1975/1979–1995/1999 in all the age groups investigated, and for both genders—male and female. The prevalence of severe ill-health among the elderly in age group 65–84 years declined from 22% in 1975/1979 to 17% in 1995/1999. Although the population aged 65–84 years increased from about 670,000 (average per year) in 1975/1979 to 750,000 in 1995/1999, the number of people suffering severe ill-health decreased from about 150,000 to 130,000 persons. The improvement in health status was most pronounced in the 65–74 age group among women and in the 65–79 age group among men. The improvement has been clearer for men than for women. Those results are in line with evidence from the OECD countries indicating same patterns within the trend towards improved health status among the older people (Jacobzone et al. 2000).

Proportions of people aged 65–84 suffering severe ill-health decreased for women by 1.4% per year (no matter if the analysed period was 1975/1979–1995/1999 or 1985/89–1995/1999. For men, these proportions decreased by 2.8% per year if the analysed period was 1975/79–1995/1999 or by 2.5% per year if the analysed period was 1985/89–1995/1999. During the period 1975/79–1995/1999, mortality among Swedish women aged 65–84, decreased by 1.4% per year (the same decrease was observed during the period 1985/89–1995/1999). Among Swedish men in age group 65–84, mortality rate decreased by 1.2% per year if the analysed period was 1975/1979–1995/1999 or by 1.6% per year if the analysed period was 1985/89–1995/1999.

Given observed health improvements and the logarithmic extrapolation of present trends on health improvement, the proportion of old people with severe ill-health will continue to decrease. It means that our scenario 2 represents scenario with expected health improvements.

The result of our estimates of the growth in volume of working hours, obtained from scenario 1 (simple extrapolation assuming constant demand per age group and gender) and the corresponding growth given

expected health improvements (from scenario 2, using two time periods for the trend estimates) is shown in Fig. 4 below in terms of a volume-index.

The impact of expected health improvements on the required future volume of hours worked in the public LTC for older people is, as we can see, very heavy. If the present trends continue, there will be a clear reduction in the proportion per age group of old people with severe health problems. As a result, the projected increase in the volume of demand for LTC for older people in Sweden by year 2030 is almost halved, compared with the increase as calculated assuming unchanged age/gender-specific health and functional ability.

Discussion

Estimates of future demand for LTC are crucial precondition for pro-active, and not simply responsive, planning for LTC needs for tomorrow's older population (Jagger 2000). Simple demographic extrapolation (our scenario 1) with implicit assumptions on decreasing mortality and unchanged health status (assumed in demographic projections) are often used in different policy reports as a base assumption when discussing future impact of population ageing on future demand on LTC (Economic Policy Committee 2001). The assumption of unchanged health status (which is the same as ignoring to take health status into account) among older people is probably inconsistent with assumption on continuing decrease in mortality. The calculations of future demand for LTC for older people presented in our scenario 2 above are based on the assumption that trends on decreasing mortality, incorporated into population forecasts, need to be associated with trends on improved health. We are extrapolating trends on improved health using trend extrapolations in the observed proportions with severe ill-health by age and gender group. However, an estimate based instead on trends per age group, gender and “cohabitation/living alone”, and divided among all four degrees of the health index (with full health and slight ill-health combined), proves to

Fig. 4 Volume-index trend for demand for human resources for long-term care for older people in Sweden, with simple and revised extrapolation according to data from Swedish National Survey of Living Conditions (trends based on two time periods 1975/1979–1995/1995 and 1985/1989–1995/1995), 2000–2030

yield virtually the same results. One limitation with our analyses is that we do not have information on changes in the prevalence of severe ill-health among people 85 years and older. However, our assumptions concerning this development are rather conservative and in line with the mortality development.

The trends we use are covering period 1975/1979–1995/1999. Using the trend 1985/1989–1995/1999 gave the similar results. However, the most important question is whether the improvement in older people's health will continue in the future.

There are many factors of significant importance for old people's health. Life circumstances in early life, both the foetal environment and the first years of our lives, have a long-term influence on our health chances, both as adults and also as old people (Swedish National Board of Health and Welfare 1997). An individual's health status and socio-economic position run parallel and influence each other in many ways. Various genetic and environmental factors, access to medical services, individual differences in aging, health-related behaviours (e.g. alcohol, tobacco, inactivity, and nutrition) and attitudes in general are other important conditions that influence health development among older people.

Fogel and Costa (1997) have presented evidence showing that old people's health particularly reflects the conditions they have lived under, and the lifestyle they have made for themselves over the years. Thus, one important precondition for continued improvement in health and survival among older people is the trend of lifestyle and living conditions in the whole population. There are strong indications that the favourable trend observed in these respects will continue. However, health disparities between different social groups are tending to grow (Swedish National Board of Health and Welfare 2005). Such disparities also persist in old age. Reducing health gaps in the population is thus an important task of old age policy, as well as health policy in general.

Finally, according to our results, decreasing mortality during the period 1975/1979–1995/1999 was accompanied by improving status of health for the older people in Sweden. The substantial correspondence between the trend of mortality and the prevalence of ill-health among the older people (according to the data from SNSLC presented above) can hardly be a coincidence. This provides strong support for the conclusion that, as long as we are projecting continued fall in mortality and rise in life expectancy in the future, we should also expect an improved state of health at any given age and take it into account when assessing future demands for human resources. In terms of relationship morbidity/disability–mortality our results support general equilibrium hypothesis. However, when analysing women and men separately, we observed some signs of compression of morbidity hypothesis as regards Swedish men.

Considerable changes in the composition of Swedish elderly population will occur in the future. First, the level of education among the older people in Sweden will increase dramatically as age groups with a much higher

average educational level enter the elderly ranks. Since high education among older people is connected to better health, this should boost the health improvement considerably. On the other hand, a higher proportion of older people will have immigrated as adults to Sweden. There is evidence that morbidity—no matter whether morbidity is defined as the number of days' paid sick leave, the number of visits to a medical centre, the numbers on disability or self-reported assessments of health state—is higher among the immigrants living in Sweden than among people born in Sweden (Swedish National Board of Health and Welfare 1997; The National Institute of Public Health in Sweden 2002). Immigrants, however, tend to demand less LTC for older people than people born in Sweden, given the level of dependency. The effects of these changes in population composition, and immigrants care demand are important issues for further research.

Demand for formal care is one way of trying to satisfy needs that are related to health problems and functional impairment. An alternative way is “informal care”, i.e. nursing, social care and assistance provided by relatives, neighbours, friends, etc. It is well known that, in volume terms, informal care is heavily predominant (Daatland 1990; Johansson et al. 1993; Szebehely 1998; OECD 1998; Svedberg 2001). However, methods of systematically assessing the actual and potential inputs of relatives and of taking these into account in assessments of demand need to be further developed (Szebehely 1998; Larsson and Thorslund 2002). There is concern due to trends toward delayed childbearing, increased female labour-force participation and the competing demands for potential family caregivers time. These trends, combined with changing preferences and rising incomes among the elderly could pressure towards more formal LTC in the future, “if public programs are called upon to replace what previously has been informal, or unpaid, family care” (Spillman and Pezzin 2000). To some extent, Sweden has gone through some of these situations already. Since the late 1980s, Sweden is one of the countries with highest labour force participation among women in the OECD-countries (OECD 2000). Furthermore, the great majority of older persons in Sweden live by themselves or with their spouses. Only about 2% live with their children. Finally, Sweden has already gone through a rapid demographic transition. For the last 10 years it has had a very high proportion of people older than 80 years. Sweden is also among the countries with highest life expectancy (life expectancy at birth by year 2004: men 78.4 years; women 82.7 years) in the world.

In our analysis we use current utilisation of services as a starting point. This can mask the fact that there may be unmet needs for services at present due to lack of capacity or appropriate services for example. Also, the overuse of services can be masked; however, given available information, it is always possible to adjust the starting point in order to fit “right” level and apply the trends from that starting point.

Conclusion

Estimates on future demand on human resources for LTC for older people are highly dependent on a number of assumptions. Examples of those assumptions include population ageing and population structure, trends in health status, availability of informal caregivers, changes in options for prevention and treatments etc. However, a key indicator in assessing these future demands for LTC for older people is the prevalence of severe ill-health (and functional disabilities) in the population. Given the importance of demographic ageing for human resources planning for LTC for older people it is crucial for today's policy makers, planners and researchers to have good quality information on public health trends and health status among the older people. Policy makers, planners and researchers should use this information when assessing future demand for care. The assessment of future demand for LTC for the people older than 65 years should involve extrapolations based on expected changes in health status as well as the question how decreasing mortality incorporated into population forecasts is to be associated with future trends on severe morbidity/disability. Analyses of morbidity trends should be combined with analyses of mortality information. It is also important to develop comparable international studies that allow assessment of the development of older people's disability (Minicuci et al. 2004). Furthermore, there is also a need to further develop methods that take into account and quantify informal care that is provided to older people.

Acknowledgements We thank two anonymous referees and Editor-in-Chief. This paper was completed during Ilija Batljan's PhD's studies at the Department of Social Work at Stockholm University. He is especially grateful to professor Mats Thorslund for valuable comments and careful reading of different versions of this manuscript.

References

- Batljan I, Lagergren M (2004) Inpatient/outpatient health care costs and remaining years of life-effect of decreasing mortality on future acute health care demand. *Soc Sci Med* 59:2459–2466
- Birch S (2002) Health human resources planning for the new millennium: inputs in the production of health, illness and recovery in populations. *Can J Nurs Res* 33:109–114
- Boström G, Persson G (2001) The development and distribution of public health. *Scand J Public Health Suppl* 58:17–36
- Crimmins EM (2004) Trends in the health of the elderly. *Annu Rev Public Health* 25:79–98
- Daatland SO (1990) What are families for? On family solidarity and preference for help. *Ageing Soc* 10:1–15
- Doblhammer G, Kytir J (2001) Compression or expansion of morbidity? Trends in healthy-life expectancy in the elderly Austrian population between 1978 and 1998. *Soc Sci Med* 52:385–391
- Economic Policy Committee (2001) Budgetary challenges posed by ageing populations: the impact on public spending on pensions, health and long-term care for the elderly and possible indicators of the long-term sustainability of public finances. Brussels: EPC/ECFIN/630-EN final
- Ferrucci L, Izmirlian G, Leveille S, Phillips CL, Corti MC, Brock DB, Guralnik JM (1999) Smoking, physical activity, and active life expectancy. *Am J Epidemiol* 149:645–653
- Fogel RW, Costa DL (1997) A theory of technophysio evolution, with some implications for forecasting population, health care costs, and pension costs. *Demography* 34(1):49–66. Erratum in: *Demography* 34(2):170
- Freedman VA, Crimmins EM, Schoeni RF, Spillman BC, Aykan H, Kramarow EA, Land K, Lubitz J (2004) Resolving inconsistencies in trends in old-age disability: report from a technical working group. *Demography* 41(3):417–441
- Freedman VA, Martin LG, Schoeni RF (2002) Recent trends in disability and functioning among older adults in the United States. a systematic review. *JAMA* 288:3137–3146
- Freedman VA, Martin LG (1998) Understanding trends in functional limitations among older Americans. *Am J Public Health* 88:1457–1462
- Fries JF (1980) Aging, natural death and the compression of morbidity. *N Engl J Med* 303:130–135
- Fries JF (2003) Measuring and monitoring success in compressing morbidity. *Ann Intern Med* 139:455–459
- Fölster S (1998) Kommunerna kan kanske? ("Can Swedish Municipalities Do Better?") (in Swedish). Ministry of Finance, Expert Group on Public Finance (ESO), Stockholm, Ds 1998:15
- Graham P, Blakely T, Davis P, Sporle A, Pearce N (2004) Compression, expansion, or dynamic equilibrium? The evolution of health expectancy in New Zealand. *J Epidemiol Community Health* 58:659–666
- Gruenberg EM (1977) The failure of success. *Milbank Mem Fund Q Health Soc* 55:3–24
- Guralnik JM (1991) Prospects for the compression of morbidity: evidence from the Alameda County study. *J Aging Health* 3:138–153
- Hubert HB, Bloch DA, Oehlert JW, Fries JF (2002) Lifestyle habits and compression of morbidity. *J Gerontol Med Sci* 57(A):M347–M351
- Hum D, Simpson W (2002) Disability onset among aging Canadians. *Can J Aging* 21:117–136
- Jacobzone S, Cambois E, Robine JM (2000) Is the health of older persons in OECD countries improving fast enough to compensate for population ageing? *OECD Economic Studies* No. 30, 2000/1
- Jagger C (2000) Compression or expansion of morbidity—what does the future hold? Editorial. *Age Ageing* 29:93–94
- Johansson L, Thorslund M, Smedby B (1993) Formal and informal support in a rural setting in Sweden. *J Gerontol Soc Work* 20:79–95
- Kaplan GA (1991) Epidemiological observations on the compression of morbidity. Evidence from the Alameda county study. *J Aging Health* 3:155–171
- Lagergren M, Batljan I (2000) Will there be a helping hand. Annex 8 to The Long-Term Survey 1999/2000. Fritzes, Stockholm
- Lagergren M (2002) The systems of care of care for frail elderly persons: the case of Sweden. *Aging Clin Exp Res* 14:252–257
- Larsson K, Thorslund M (2002) Does gender matter? Differences in patterns of informal support and formal services in a Swedish urban elderly population. *Res Aging* 24(3):308–337
- Manton KG, Gu XL (2001) Changes in the prevalence of chronic disability in the United States black and nonblack population above age 65 from 1982 to 1999. *Proc Natl Acad Sci USA* 98:6354–6359
- Manton KG, Stallard E, Corder E (1997) Chronic disability trends in elderly United States populations: 1982–1994. *Proc Natl Acad Sci USA* 94:2593–2598
- Manton KG, Stallard E, Corder L (1995) Changes in morbidity and chronic disability in the U.S. elderly population: evidence from the 1982, 1984 and 1989 National long term care surveys. *J Gerontol Soc Sci* 50B:S194–S204
- Manton KG (1982) Changing concepts of morbidity and mortality in the elderly population. *Milbank Q Health Soc* 60:183–244

- Minicuci N, Noale M, Pluij SMF, Zunzunegui MV, Blumstein T, Deeg DJH et al (2004) Disability-free life expectancy: A cross-national comparison of six longitudinal studies on aging. The CLESA Project. *Eur J Ageing*. DOI 10.1007/s10433-004-0002-5
- Nusselder WJ, Looman CWN, Marang-van de Mheen PJ, van de Mheen H, Mackenbach JP (2000) Smoking elimination produces compression of morbidity. *J Epidemiol Community Health* 54:566–574
- Oeppen J, Vaupel JW (2002) Broken limits to life expectancy. *Science* 296:1029–1031
- Organisation for Economic Co-operation and Development (OECD) (2003) Human resources for health care. SG/ADHOC/HEA(2003)6. Paper presented at the OECD Ad hoc group meeting on the OECD Health Project, April 23–25, 2003
- Organisation for Economic Co-operation and Development (OECD) (2000) Labour force statistics. OECD, Paris
- Organisation for Economic Co-operation and Development (OECD) (1998) The caring world: an analysis. DEELSA/ELSA/PG (98)12. OECD, Paris
- Olshansky SJ, Rudberg MA, Carnes BA, Cassel CK, Brody JA (1991) Trading off longer life for worsening health: the expansion of morbidity hypothesis. *J Aging Health* 3:194–216
- Robine JM, Michel JP (2004) Looking forward for a general theory on population aging. *J Gerontol Med Sci* 59(A6):590–597
- Robine JM, Mormiche P, Sermet C (1998) Examination of the causes and mechanisms of the increase in disability-free life expectancy. *J Aging Health* 10(2):171–191
- Robine JM, Jagger C, Mathers CD, Crimmins EM, Suzman RM (2003) Determining health expectancies. Wiley, Chichester
- SOU (1994:144) Utjämning av kostnader och intäkter i kommuner och landsting. Betänkande från beredningen för statsbidrag och utjämning i kommunsektorn ("Government Commission report on cost and revenue equalisation in Swedish municipalities and county councils"). Reports of the Government Commissions SOU 1994:144 (in Swedish). Fritzes, Stockholm
- SOU (1996:163) Behov och resurser i vården - en analys ("Needs and Resources in the Care Sector—An Analysis"). Report from HSU 2000 (Funding and Organisation of Health Services and Medical Care), Reports of the Government Commissions SOU 1996:163 (in Swedish). Fritzes, Stockholm
- Spillman BC (2004) Changes in elderly disability rates and the implications for health care utilisation cost. *Milbank Q* 82(1):157–194
- Spillman BC, Pezzin LE (2000) Potential and active family caregivers: changing networks and the "sandwich generation". *Milbank Q* 78(3):347–374
- Statistics Sweden—SCB (1975–99) The Swedish National Survey of Living Conditions, 1975–99. Statistiska centralbyrån (SCB), Stockholm
- Statistics Sweden—SCB (2002) Population forecasts, 2002–2050. Statistiska centralbyrån (SCB), Stockholm
- Statistics Sweden—SCB (1989) Hälsan i Sverige. Hälsostatistisk årsbok 1989 ("Health in Sweden. Health statistical yearbook 1989") (in Swedish). Statistiska centralbyrån (SCB), Stockholm
- Svedberg L (2001) Spelar ideella och informella insatser någon roll för svensk välfärd? ("Do voluntary /non-profit and informal efforts have any impact on Swedish welfare?"). In: Szebehely M (ed) Välfärdstjänster i omvandling SOU 2001:52 ("Welfare Service in Transition" Reports of the Government Commissions SOU 2001:52) (in Swedish). Fritzes, Stockholm
- Swedish Association of Local Authorities (2002) Kommunala framtider—en långtidsutredning om behov och resurser till år 2050. ("Municipalities in the future—a long-term survey of needs and resources until the year 2050") (in Swedish). Kommunförbundets förlag, Stockholm
- Swedish National Board of Health and Welfare (2005) Sweden's 2005 public health report. National Board of Health and Welfare, Stockholm
- Swedish National Board of Health and Welfare (2004) Äldre—vård och omsorg år 2003 Statistik—Socialtjänst 2004:3. ("Service and Care to Elderly Persons, 2003. Statistics—Social Welfare 2004:3") (in Swedish). National Board of Health and Welfare, Stockholm
- Swedish National Board of Health and Welfare (1997) Sweden's 1997 public health report. National Board of Health and Welfare, Stockholm
- Szebehely M (1998) Hjälp i hemmet i nedskärningstider—hemtjänstens och anhörigas insatser för gamla kvinnor och män ("Home Help in Times of Cutbacks—Inputs from the Home-Help Service and Relatives for Elderly Men and Women"). In: Sandquist A-M (ed) Å t var och en efter behov ("To Each According to His Needs") (in Swedish). Kommentus förlag, Stockholm
- The National Institute of Public Health in Sweden (2002) Födelselandets betydelse—om hälsan hos olika invandrargrupper i Sverige. ("Does country of origin matters—health status among immigrants in Sweden") (in Swedish). The National Institute of Public Health in Sweden, Stockholm 2002:29
- Vita AJ, Terry RB, Hubert HB, Fries JF (1998) Aging, health risks, and cumulative disability. *N Engl J Med* 338:1035–1041
- Waidman TA, Manton KG (1998) International evidence on disability trends among the elderly. Urban Institute, Duke University, Mimeo