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MPIDR WORKING PAPER WP 2010-001
JANUARY 2010

**Assessing old-age long-term care using
the concepts of healthy life expectancy
and care duration: the new parameter
"Long-Term Care-Free Life-Expectancy
(LTCF)"**

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Assessing old-age long-term care using the concepts of healthy life expectancy and care duration: the new parameter "Long-Term Care-Free Life-Expectancy (LTCF)"

by Rembrandt Scholz and Anne Schulz

Abstract:

Achieving old ages is also connected with prevalence of illness and long-term care. With the introduction of the statutory long-term care insurance in 1996 and the long-term care statistics in 1999 research data of about 2.3 million people receiving long-term care benefits is available. Average life expectancy can be qualitatively divided into lifetime spent in good health and lifetime spent in long-term care dependence (average care duration). In Germany women's and men's average care duration amount 3.6 years respectively 2.1 years.

Key words:

long-term care, life expectancy, ageing, Germany

Introduction

Life expectancy has been steadily rising owing to a wide variety of factors. As a result, an increasing number of people are reaching higher ages and the channels through which these gains in age are made are different. An analysis of mortality development opens up the need to make a distinction between qualitative and quantitative gains in life-expectancy growth. To understand and influence the mechanisms of life time extension, it is necessary to look at the determining factors in the context of the process of life span extension.

A concept aimed at structuring lifetime is based on the consideration that every person eventually will die from an illness and that any preceding period of ill health resulting in impairment is taken into account. Total lifetime can be divided into healthy periods and periods of health impairment (concept of healthy life-expectancy). It can be safely assumed that health impairment increases with age. The effects of impairment, however, can be compensated or arrested by favorable social conditions. Medical progress such as advances in prevention, diagnostics, curative medical care, and improvements in the availability and quality of medical aids potentially extends lifetime spent without impairment. The perception and assessment of one's own state of health is subject to age-dependent changes in that assessment. Some health impairments can be fully compensated so that they are not perceived as such. Good access to medical care, high levels of social conditions, and the availability of emergency and non-emergency medical care produce extended periods of lifetime spent without impairment. These processes are overlapped by social-class affiliation and the level of education. Thus it is important to describe the above process in the context of the life-lengthening process.

Many international studies have focused on healthy life expectancy. They provide evidence for an increase in healthy life expectancy over the last decades (Cambois, Robine and Hayward 2001, Robine and Ritchie 1991, Doblhammer and Kytir 2001). According to Cambois, Robine and Hayward (2001), and Doblhammer and Kytir (2001), the proportion of years spent in good health has also been rising, confirming the 'compression of morbidity' hypothesis espoused by Fries (1989). Certain groups differ in healthy life

expectancy as, according to Robine and Ritchie (1991), social class differentials are larger than gender differentials, for instance. Crimmins and Saito (2001) show that the development of healthy life expectancy differs for various educational groups. Compression of morbidity is seen notably among individuals who have enjoyed a high level of education. The poorly educated, by contrast, see morbidity expansion.

Several studies have focused on the development of healthy life expectancy in Germany (Brückner 1997, Klein and Unger 1999, Ziegler and Doblhammer 2005, Gärtner and Scholz 2005). In most of them, survey data were used to apply various methods to compute healthy life expectancy. It turns out that life expectancy as such as well as healthy life expectancy is higher for women than it is for men. In terms of total life expectancy, however, men enjoy a larger share of years spent in good health than their female counterparts. Bickel (2001) arrived at the same conclusion, having used German long-term care statistics in his calculations of years spent without long-term care (LTC) dependency.

The study draws on statistics on the prevalence of statutory LTC in Germany to derive a parameter that links increased survival with care duration. As ill health and accidents resulting in LTC may occur during the entire life-course, the parameter needs to be adjusted for age so that it refers to "care in old age". The parameter then corresponds to the statistical likelihood of care incidence. Up to age 60, the age-specific share of individuals receiving LTC benefits is less than 1% in Germany. When age 60+ is selected, a total of 22.6% of men and 9.2% of women are excluded in 2005. In this chapter, only LTC cases at age 60 and above are included in the calculations. The following parameters, applied to a standard population, are used: incidence of LTC; care duration, the number of LTC beneficiaries. This system has the advantage that it is standardized, comparable, and takes into account the process of longevity expansion.

An overview of the methodological implementations of Healthy Life Expectancy (HLE) was drawn when the concept was devised. Other parameters were developed in analogue (see Table 1).

Table 1:

Overview of measures used by the Sullivan method to compute health indicators to split life expectancy

Type	Measure	Author
Healthy Life Expectancy (HLE)	self-perceived health status, rated "very good" to "very poor"	Robine et al. 1992; Doblhammer/Kytir 2001
Disability-Free Life Expectancy (DFLE)	types of disability, e.g., hearing, speaking, visual disability, mental, physical or mental disability	Sullivan 1971; Saito et al. 2003
Active Life Expectancy (ALE)	ADL limitations in bathing, dressing, toileting, continence, feeding	Katz et al. 1983
Disability-Free Life Expectancy (DFLE)	degree of disability: 50%	Gesundheitsbericht- erstattung Nordrhein-Westfalen 2005
Long-Term Care-Free Life Expectancy	in receipt of LTC	Bickel 2001
Long-Term Care-Free Life Expectancy (LTCF)	in receipt of LTC aged 60+	

An advantage in using LTC statistics is that decisions reached on entitlement to LTC benefits follow an objective procedure. Further, the insurance is mandatory, resting on the principles of solidarity. Independent of age, gender, and insurance contributions the scheme grants partially comprehensive benefits on the basis of co-payment. With the enactment of statutory long-term care insurance in Germany and the introduction of corresponding statistics based on a complete survey of LTC benefits received, the corresponding parameters can be computed for the whole population, using the Sullivan

method. LTC benefits fall into three categories (home care benefits, institutional or nursing home benefits, or cash allowances) and three care-levels; these are determined by the severity of impairment. The analysis in this chapter, however, is limited to LTC benefits received, i.e. without restrictions by category and level.

The decision to introduce LTC statistics was taken with the enactment of statutory long-term care insurance in 1996 in Germany. A universal census collects data of all individuals receiving LTC benefits (with the effective date having been 15.12.1999 and from then onwards every two years). A decision on LTC provision (or: the granting of LTC benefits) is made following an objective procedure of application and screening by the medical services (Medizinischer Dienst der Krankenversicherung, MDK) in accordance to strict statutory regulations as laid down in § 18 of the German Social Code XI (SGB XI, www.mdk.de). The quality of the statistics is high.

Material and methods

The data used for the purpose of analysis are drawn from the life tables on Germany and corresponding population data by age of the Human Mortality Database (www.mortality.org). The latter data were adjusted for age group 90+, thus evening out the population overestimation in the official statistics (Scholz and Jdanov 2007). To calculate the LTC rates, the LTC statistics by age and gender were analyzed. These are accessible through the Research Data Centers of the Federal Statistical Office and the statistical offices of the Länder (www.forschungsdatenzentrum.de). By linking LTC cases with the population data, the LTC rates can be computed by age and gender. The multiplication of the LTC rates by the life table population of the given calendar year produces the number of LTC cases. These are standardized, independent of the population age-structure, and form part of the life table population. Accordingly, in the life table all lived years are divided into years spent in LTC and years without LTC (LTCF). The following applies: The sum of the total life-table population is divided into LTC beneficiaries and individuals who do not receive LTC. Thus it is possible to look at the corresponding years spent in LTC and to compute the corresponding periods in care. The corresponding parameter denotes the care duration.
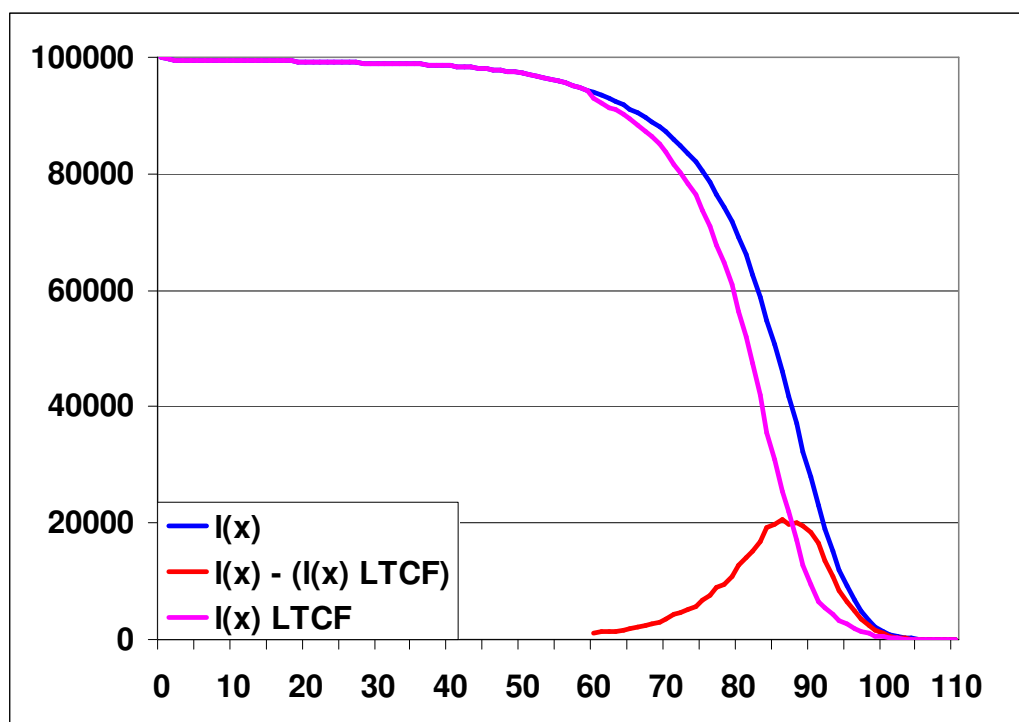
The following applies:

$$e_0 = e_{FTCF} + e_{FTC}$$

Results

A comparison of the survival curves (between the life table l(x) and the l(x) LTCF) is made in Figure 1.

Figure 1:

Survival curve of life table l(x), Long-Term Care-Free l(x) (l(x) LTCF) and prevalence of LTC cases, Germany 2005 (Source: Calculations based on care statistics and HMD).

The gap between the two survival curves shows the number of individuals drawing LTC benefits. Only LTC cases at age 60+ are considered. The computation of the parameter produces independent and adjusted variables that are independent of the age structure of the real population and that correlate to the life-table population. Of interest are the areas below the curves (Figure 2), corresponding to life expectancy and care duration. Figure 2 shows differentials by gender and age. The LTC beneficiaries form part of the population at a higher age.

Figure 2:

Standardized life-table population l(x) by age and gender based on an initial sample of 100 000 persons and persons 60+ receiving LTC benefits; Germany 2005 (Source: Calculations based on care statistics and HMD).
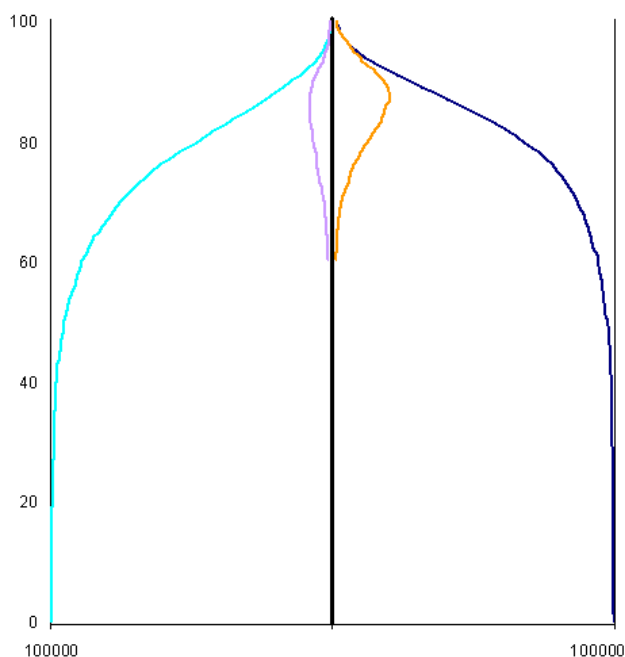

Table 2:

Division of life expectancy (LE) into Long-Term Care-Free Life Expectancy (LTCF) and lifetime spent in care (LE - LTCF) 1999 and 2005 by gender, in absolute years and relative percent; LTC at age 60+ (Source: Calculations based on care statistics and HMD).

measure	gender	1999 in years	2005 in years	changes in years	changes in %
LTCF	women	77.58	78.48	0.91	1.2
LTCF	men	73.01	74.67	1.66	2.3
LE – LTCF	women	3.26	3.61	0.35	10.7
LE - LTCF	men	1.75	2.05	0.30	16.9
LE	women	80.84	82.10	1.26	1.6
LE	men	74.76	76.72	1.95	2.6

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Table 2 shows the quantification of the areas below the curves. The result is the division of life expectancy (LE) into lifetime spent in good health (LTCF) and lifetime spent in LCT dependence (LE - LTCF)). The differences in the values between 1990 and 2005 by year and percentage reflect the changes over time. The table reveals an increase in life expectancy owing to lifetime extension with as well as without LTC-dependence. The largest increases in absolute terms arise from dependency-free years for both genders. The relative increase is especially high for care-duration. Figure 3 compares the trends in life expectancy (LE) and healthy lifetime. It turns out that the increase in lifetime spent without LTC-dependence is almost equal to the increase in total life expectancy. The relative trend in life expectancy (LE), in lifetime spent in good health (LTCF) and lifetime spent in LTC dependence for both genders and for 1999 (1999=100)) shows that the development for men is especially dynamic (see Figure 4). All of the three parameters show a reduction in the difference between men and women.

A closer look at care duration (LE - LTCF) (see Table 3) reveals a longer duration for women and a steady increase in care duration for both genders. Over time, care-duration for men increases more steeply. The age-specific trend (see Figure 5) reveals stable age-specific patterns, possibly arising from differential selection of health risk by age. The higher the age, the longer the care duration. The only exceptions are age group 85+, especially women.

Figure 3:

Trend in life expectancy (LE) and of Long-Term Care-Free Life Expectancy (LTCF) 1999 - 2005 by gender; LTC at age 60+ (Source: Calculations based on care statistics and HMD).
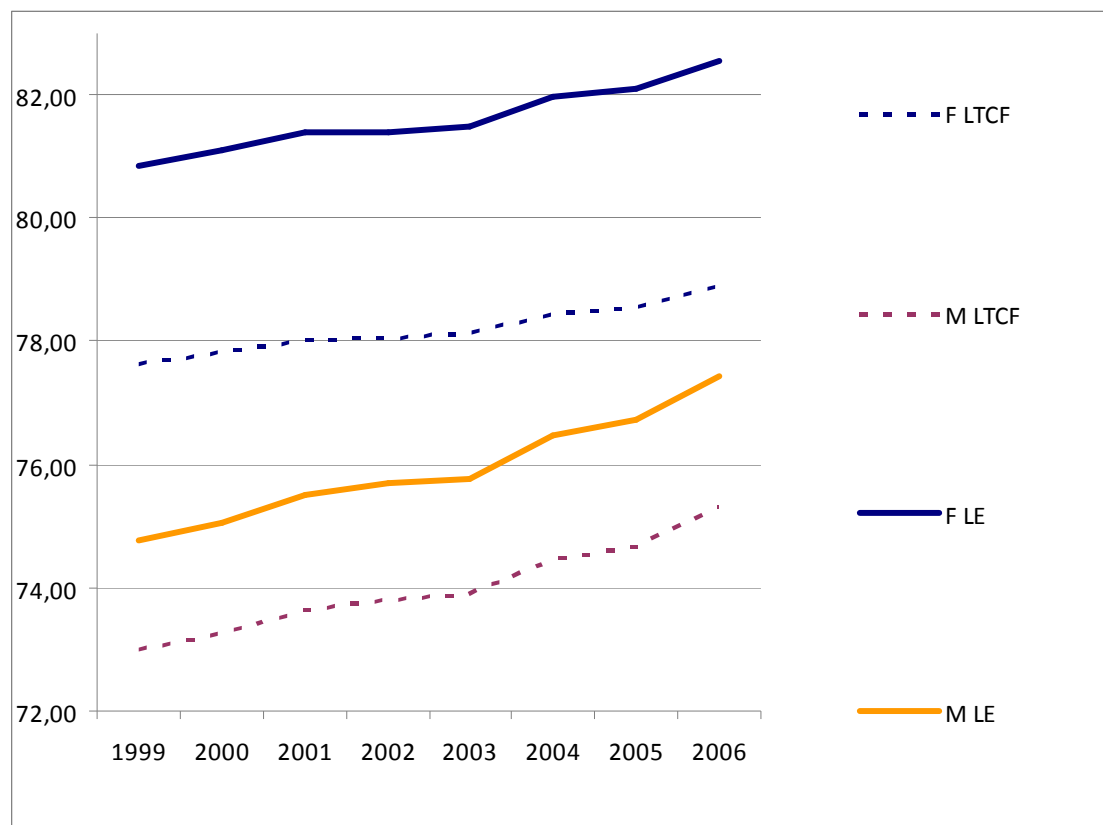

Table 3:

Care duration (LE-LTCF) in years by gender; LTC at age 60+ (Source: Calculations based on care statistics and HMD).

	1999	2001	2003	2005
women	3.26	3.43	3.38	3.61
men	1.75	1.85	1.86	2.05

Figure 4:

Trend in life expectancy (LE), of Long-Term Care-Free Life Expectancy (LTCF) and lifetime spent in care, 1999 - 2005, by gender, relative 1999=100; LTC at age 60+ (Source: Calculations based on care statistics and HMD).
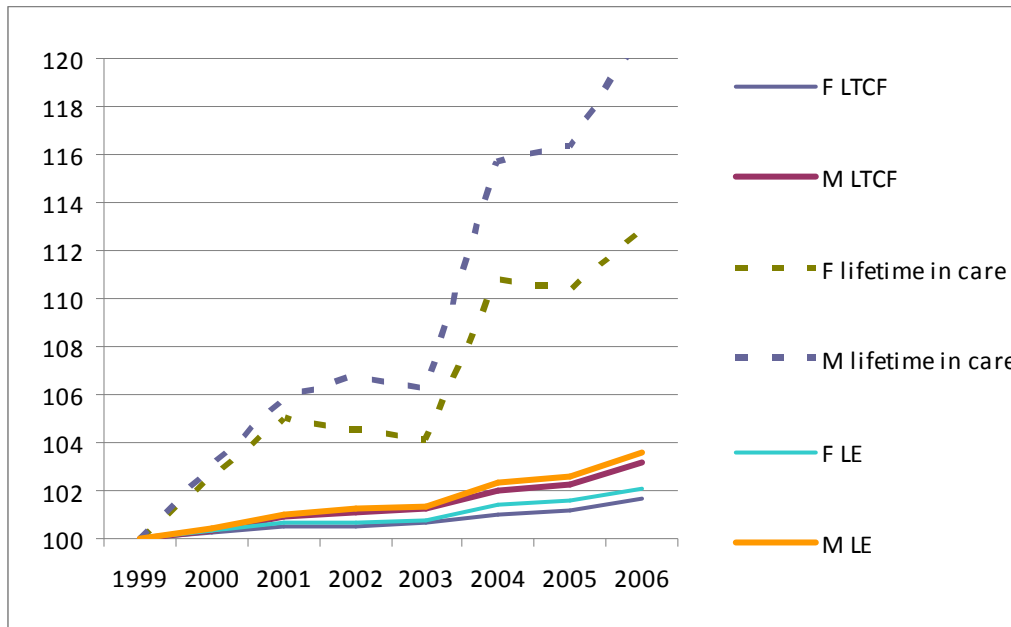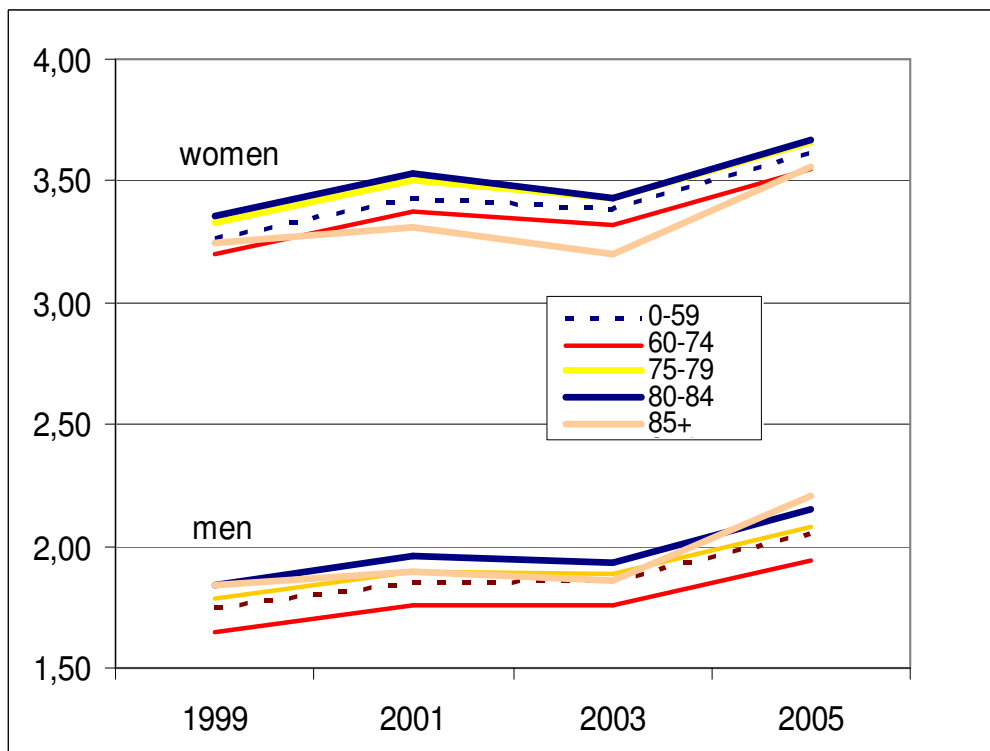

Figure 5:

Trend in care duration (LE-LTCF) by age group and gender; LTC at age 60+ (Source: Calculations based on care statistics and HMD).

Conclusion

The analog computation of the real population in Germany produces parameters that are influenced by the age structure of the population. These parameters cannot be estimated owing to historical and epochal effects on the population structure. The division of life expectancy (LE) by person-years into LTC dependency-free years (LTCF), using the Sullivan method, and years spent in LTC (LE - LTCF) produces an estimate of the number of LTC beneficiaries and of the care duration. The focus on care at age 60+ produces specific care durations at old age. The following can be said: Care duration rises over time; the increase in LTC dependency-free periods (LTCF) is larger than extensions in care duration; care duration is longer among women than it is among men. Further, the increase in care duration by age reveals that health selection in terms of care and mortality is at work. The results largely correspond with the compression hypothesis.

The calculation of life-expectancy parameters should be standardized within the framework of German Federal Health Monitoring (Gesundheitsbericht-erstattung, GBE). The age-specific references produce different long-term parameters. Large regional differentials in the parameter "Long-Term Care-Free Life Expectancy (LTCF)" point to differences in the quality of long-term care provided and to the need for further action in Germany.

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