Life Expectancy in Long-Term Institutional Care by Marital Status: Multistate Life Table Estimates for Older Finnish Men and Women

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Objectives. We estimate (a) probabilities of moving to and from long-term institutional care and probabilities of death and (b) life expectancy in the community and in care by gender and marital status.

Method. A 40% random sample of Finns aged 65+ at the end of 1997 \( n = 301,263 \) drawn from the population register was linked with register-based information on sociodemographic characteristics, entry and exit dates for long-term institutional care, and dates of death in 1998–2003. Probabilities and life expectancies were estimated using multistate life tables.

Results. At age 65, women are expected to spend more of their remaining lifetime in institutions than men (1.6 and 0.7 years, respectively). These care expectancies remain similar even for survivors to very advanced ages. Gender differences are driven by women’s higher chances of entering institutions at ages above 80 years and lower chances of exit. At age 65, 59% of women and 36% of men will ever enter long-term institutions. The married spend less of their longer life expectancy in institutions than the non-married. The large gender difference in care use exists within each marital status group.

Discussion. The resources that are needed to provide long-term care services will increase as age of death increases. We demonstrate significantly longer care expectancy among women and among the unmarried.

Key Words: Finland—Life expectancy—Long-term care—Marital status.

One of the major concerns relating to population aging is the provision and financing of long-term institutional care services for the growing number of older people (Christensen, Dobhammer, Rau, & Vaupel, 2009). Time spent in such care is an important component of total burden of care and is also strongly associated with quality of life at the end of life (in this article, “care” refers to long-term institutional care and “care expectancy” refers to expected number of years likely to be spent in care at a given age). For a fuller understanding of the extent and determinants of long-term care expectancy, population-based analyses of care entry and care exit are sorely needed.

In addition to age-related increase in poor physical and mental function, long-term institutional care entry is also determined by more distal individual characteristics such as marital status (Branch & Jette, 1982; Breeze, Sloggett, & Fletcher, 1999; Gaugler, Duval, Anderson, & Kane, 2007; Grundy & Jitlal, 2007; Niítilä & Martikainen, 2008; Wolinsky, Callahan, Fitzgerald, & Johnson, 1992). The unmarried as well as those living alone are more likely to enter into long-term care due to poorer socioeconomic circumstances (Niítilä & Martikainen, 2008), but more importantly because of their lower availability of informal care within the household (Freedman, 1996). There is, however, less systematic evidence showing how marital status relates to lifetime use of long-term care (Kemper & Murtaugh, 1991; Murtaugh, Kemper, Spillman, & Carlson, 1997; Spillman & Lubitz, 2002), and studies estimating the fraction of remaining years of life that will be spent in long-term care are seldom available.

Marital status also influences exit from care—either through death or return back to the community (Martikainen et al., 2009)—but the findings are less clear cut, which may reflect lower statistical power to detect effects, as well as the greater homogeneity of the population in long-term institutional care than the population living in the community. The unmarried may also enter institutional care in better physical health than the married and are thus likely to live longer in care. Furthermore, unmarried people may remain longer in institutions than those who have a spouse if they do not have access to emotional support and task help in the household of potential return.

As far as we are aware, comprehensive population-based estimates of moves to and from long-term care are not readily available for any country, and especially for major population subgroups. We use a large population-based data set of Finns aged 65 or older from longitudinal linkages of national registers with virtually no loss to follow-up.
We have three specific aims: (a) to estimate probabilities of moves to and from long-term institutional care and of death, (b) to estimate life expectancy in the community and in long-term institutional care and expected lifetime proportions of ever entering care, and (c) present estimates separately for factors known to be associated with care needs and care use, gender, age, and marital status.

**Method**

**Data**

The data consisted of a 40% random sample of Finns aged 65 or older on December 31, 1997 (n = 301,263, mean age: 74.3, 62.5% women) drawn from the population register. These data were linked with register-based information on marital status and dates of death provided by Statistics Finland, as well as with entry and exit dates for all episodes of long-term institutional care provided by the National Institute for Health and Welfare. Follow-up was from January 1, 1998 to December 31, 2003, and we observed 1,589,000 person-years. Statistics Finland performed the data linkage using personal identification codes (permission TK 53-576-04). Validation studies show these data to be of good quality (Mathers, Fat, Inoue, Rao, & Lopez, 2005; Official Statistics of Finland, 2012; Sund, 2012).

**Definition of Long-Term Institutional Care**

Finnish elderly care policy supports living independently and minimizes long-term institutional placement. Institutional care is mostly organized by the municipalities in health center wards and nursing homes. Service provision is based on a principle of universal access and financed mainly through general taxation. Client fees, with a maximum set at 80% of disposable income, constitute less than 20% of total expenditure. Access to public care is determined by expert evaluation of care needs rather than ability to pay (STAKES, 2007).

We included care episodes in institutions providing long-term care and 24-hr assistance, including nursing homes, service homes with 24-hr assistance, hospitals, health centers, and rehabilitation care. Long-term psychiatric care was also included. Long-term care was defined as care that lasted for 90 days or more or was confirmed by a long-term care decision made by the municipal service providers. The 90-day criterion was met if the patient was at the same institution for the time required or successively at several institutions without returning back to the community for more than one night. Chaining of care in different institutions to form continuous long-term care episodes provides a more accurate estimate of the care burden and enables comparisons of population subgroups with different care use patterns.

With these definitions, few individuals (n = 264) had more than five episodes. Thus, in order to simplify the statistical analyses, we only included information on the first five episodes. Our final data included 65,611 long-term care episodes, with about 75% starting in health centers or hospitals (Nihtilä and Martikainen, 2008). The majority of those institutionalized had only one continuous episode, although about 14% had two or more.

Episodes starting less than 90 days before the end of follow-up on December 31, 2003 were excluded as we did not know their final status. Thus, the effective censoring date was September 30, 2003. The exact exit date was not available for 7.8% of all long-term care episodes. In these cases, we set the exit date to the last end-of-year patient census date when the person was known to be present. Alternatively setting the exit date to the end of the next year or to the date of death (if died during the next year) had negligible impact on our life expectancy estimates.

**Transition Probability and Life Expectancy Estimation**

Multistate life tables provide a general framework that can be used to study various phenomena such as cardiovascular life history (Peeters, Mamun, Willekens, & Bonneux, 2002) or marriage, divorce and widowhood patterns (Schoen & Standish, 2001). We use multistate life tables to estimate the expected time spent in long-term care based on patterns of entry and exit observed in the period 1998–2003 (Putter, Fiocco, & Geskus, 2007). We estimate transition probabilities by sex, age, and marital status between the three states of interest: living in the community, in long-term institutional care, and dead. Multiple moves between home and long-term care are allowed for. Overall, the estimates are based on 55,989 deaths directly from home to death, 48,615 moves from home to long-term care, 19,209 moves from long-term care to home, and 31,366 deaths from long-term care. The single year data are smoothed to provide continuous estimates of instantaneous transition probabilities above age 65 for all possible transitions.

We start with initial synthetic populations of 100,000 men and women aged 65 with the proportions in long-term care as in the data set. At each age, we use the transition probabilities to estimate the numbers of people who move into and out of a given state; in the case of long-term care, the number of entrants from the community and exits as return to the community or death. In order to control for changing population distributions with age, we undertake these steps in 1/100 year intervals. For a given age and marital status, the resulting multistate life table gives the transition probabilities between states, number of people in each state, and the average total number of years that such individuals can expect to live in the alternative states. We further estimate the probability of ever entering care and expectation of time in care if entering. In the calculation of life expectancy and other life table summary statistics by marital status, we make the standard assumption that men and women will remain in a given marital status until death (Schoen & Standish, 2001)—for example, life expectations...
for married men reflect the experience of a synthetic cohort that experiences the transition probabilities of married men until death. Life expectancy comparisons are not distorted by age differences of the compared groups.

The multistate life table method provides more information and is based on a clearer time window than the simpler Sullivan’s method (Peeters et al., 2002; Schoen & Standish, 2001), but the two approaches provided very similar results for the overall estimates suggesting that our results are robust.

**Results**

The probability of death both in the community and in long-term institutional care, and entry to long-term care increases rapidly with age, whereas the probability of returning back to the community declines with age (Figure 1). The probability of entering care is somewhat higher among women than men, particularly at older ages. In contrast, the probability of death is higher among men at all ages, and the differences are particularly pronounced among those in care. The probability of returning back to the community is higher among men.

At exact age 65, total life expectancy for women was 19.7 years, of which 18.1 were spent living in the community and 1.6 in institutions (Table 1). For men, total life expectancy was shorter, 15.6 years, with an average 0.7 years spent in institutions. For both men and women, total life expectancy declines with increasing age, but life expectancy spent in institutions remains relatively high even for survivors to very advanced ages. Women have higher overall chances of ever entering long-term care than men with almost 60% of women ever entering as opposed to about 35% among men. Furthermore, care expectancy among those who have ever entered is 2.7 years among women and 2.1 years among men.

For both men and women, transition probabilities into and out of care institutions vary substantially by marital status (Figure 2). The married have a lower probability of entry and a higher probability of return to the community than the never married, divorced, and widowed. Probability of death in institutions is, however, generally higher among the married than the non-married, whereas in the community, it is lower among the married.

At exact age 65, married men—that is, men who experience the transition probabilities of married men until death—have life expectancy of 16.4 years. Life expectancy among married men is 3.4 years longer than among never-married men, but they will spend 0.6 years less in institutions than never-married men (Table 2). Married women can expect to live 1.8 years longer than never-married women but spend 0.5 years less in care institutions. Other marital groups have intermediate values. Thirty-three percent of married men, 38% of widowed men, 39% of divorced men, and 43% of never-married men will use institutional care at some point in their lives. The corresponding figures for Finnish women are 56%, 59%, 61%, and 64%. Among those who ever enter long-term institutional care, care expectancy is 2.8 years among never-married men and 1.9 years among married men. For women, these figures are 3.0 and 2.5 years, respectively. The longer care expectancy among the non-married rises mainly from much heavier long-term care use at ages below about 85 years (results not shown).

**Discussion**

**Gender**

At age 65, women have a longer total life expectancy and spend more of their remaining years in institutions than men. In particular, the latter difference is driven not only by women’s higher chances of entering institutions...
at all ages above 80 years but also by their lower chances of returning back to the community and by men’s substantially higher probability of death in institutions. The gender difference in probability of death in institutions is much larger than in the community. This could indicate that men are in much poorer health than women—with regard to conditions leading to death—when they enter and reside in care institutions. More research on health status immediately prior to entry is sorely needed to assess this possibility.

The gender difference in care expectancy is not well explained by large gender differences in marital status distributions at older ages, although they do partly explain the female excess in entry (Einiö, Guilbault, Martikainen, & Poulain, 2012; Martikainen et al., 2009). Hypothetical calculations for women, based on the assumption that the marital status distribution is the same as for men, indicated that such distributional differences have only a very modest effect on the gender difference in care expectancy (results not shown here).

Our results cannot be directly compared with those of previous studies, because corresponding multistate life expectancies are not available, but are consistent with healthy life expectancy studies, showing that women live longer but spend proportionately more time as disabled than men (e.g., Robine, Jagger, Mathers, Crimmins, & Suzman, 2003). However, as the use of care institutions is not only a function of health status, but also of numerous sociodemographic characteristics (Einiö, 2010; Martikainen et al., 2009) and service supply factors, direct comparisons with these studies should be made with caution.

Among women, long-term care expectancy is relatively constant at most ages; for example, 65-year-old women and 85-year-old women will already have spent some time in care, these findings suggest that more long-term care will be needed as age of death increases—an interpretation that is consistent with more exhaustive analyses from Finland (Murphy & Martikainen, 2013).

Around 60% of women and 35% of men will reside in long-term care institutions at some point after age 65. Our results are consistent with findings from the United States in the 1990s, showing that lifetime use of nursing homes is higher among women than men (Kemper & Murtaugh, 1991; Spillman & Lubitz, 2002), with almost half of American women and a third of men deceased at ages 65+ using nursing homes at some point in their lives (Spillman & Lubitz, 2002). Women’s higher lifetime use in Finland than the United States could be attributable to numerous methodological and contextual differences between the studies; for example, Finnish care data include both nursing homes and hospitals. We further estimate that among ever entering men, long-term care expectancy is about 2.1 years, and among women, it is 2.7 years. However, the higher institutional care use by Finnish women than men is not unique or simply due to how care is defined. A comparative study (Einiö et al., 2012) shows that even larger gender differences in care are observed in Belgium than Finland when looking at nursing home care only. This study also showed that age, gender, and marital status differentials in care are very similar to those observed for this study that uses a more inclusive definition of long-term care.

### Marital Status

Marital status differentials in long-term care use are well established (Branch & Jette, 1982; Breeze et al., 1999; Gaugler et al., 2007; Grundy & Jitlal, 2007; Wolinsky et al., 1992), but most studies focus on first entry to care only. For care entry, we show clear differentials among men with lower probability of entry among married men at all ages. Our observation of smaller marital status differentials among women than men is also consistent with previous literature (Einiö et al., 2012; Grundy & Jitlal, 2007).
We further show that the married—particularly among men—who enter care are more likely to exit both through return to the community and death (at ages below 85 or so)—a finding consistent with a previous Finnish study (Martikainen et al., 2009). This may reflect two separate processes. First, the married are more likely to return to the community if a spouse is available to provide both emotional support and task help, which is not a possibility for unmarried people. Second, a subsection of the married may enter long-term care in extremely poor health or their health...
may decline particularly rapidly while in care. This may be because the informal care provided by spouses may enable the married to live in the community longer after the onset of severe health problems (Martikainen et al., 2009).

Married people have a longer total life expectancy at age 65 but spend fewer of their remaining years in institutions than the non-married. The never married have the shortest total life expectancy but live the longest in institutions in Finland, but lack of comparable studies precludes direct comparison to other settings. However, a Canadian study on health-adjusted life expectancies suggested that married people had a longer total life expectancy at age 30 and lived longer in good health than did non-married people. This was true regardless of whether marital status was measured as a constant or a time-varying variable (Nault, Roberge, & Berthelot, 1996).

The proportion ever entering long-term institutional care is about 8% points higher among never-married men and women than the married. Although, in our study, marital status was measured as a time-invariant baseline characteristic, our results are in the same direction to those reported in an American study, showing that approximately 27% of those married at the time of their death and 42%–48% of others used nursing homes at some point in their lives (Kemper & Murtaugh, 1991; see also Spillman & Lubitz, 2002).

**Methodological Considerations**

Large population-based longitudinal data linking different administrative registers carry several major advantages. They facilitate the continuous follow-up of entry into and exit from long-term care, thus allowing unbiased estimation of care transitions and care expectancy. We also take account of multiple long-term care episodes within the observed time period, and thus our care expectancy estimates better capture lifetime use rather than the duration of single episodes. Furthermore, the data suffer little from loss to follow-up, missing values or misreporting, which may be serious problems with survey data. Information on long-term institutional care is also highly representative of general Finnish elderly population, and our total life expectancy estimates are fully consistent with figures provided by the Statistics Finland.

Information on changes in marital status was not available in the 6-year follow-up period. In particular, the married population at risk includes those widowed or divorced during the follow-up. Sensitivity analyses using a 1-year follow-up period—a period that allows for less change in marital status—indicates that the effect of this bias is modest, at most 5%–10% in the case of long-term care expectancy at age 65 for the married.

Marital status is a proxy for the various advantages that marriage may provide. It is known to be associated with informal care from both spouses and children (Blomgren, Breeze, Koskinen, & Martikainen, 2012), but these data contain no direct information on willingness and ability of close kin to provide such care. Both the need and the ability for the spouse to provide care depend on the health status of the partners. Studies with direct information on health and care giving may be better placed at understanding the mechanisms of the findings we observe.

**Conclusions**

We demonstrate significantly higher use of long-term institutional care among women and among the non-married. These differentials are produced by higher chances of entering and remaining in long-term care. Our results may be useful when designing old-age care services, for better allocating scarce resources, and eventually when devising interventions that aim to delay or completely avoid long-term care. Our results further imply that survivors to even the most advanced ages cannot avoid a significant spell in long-term care. Higher age at death thus appears not to be associated with a significantly shorter expectation of long-term institutional care use at the end of life (see Murphy & Martikainen, 2013 for more thorough analyses).

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**Table 2. Life Expectancy in Years in the Community and in Long-Term Institutional Care (LTC), Percent Ever Entering and Life Expectancy in LTC Among Those Entering by Gender and Marital Status**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Marital status</th>
<th>Community</th>
<th>LTC</th>
<th>Total</th>
<th>Percent ever entering</th>
<th>Life expectancy in LTC if ever entered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>Married</td>
<td>15.79</td>
<td>0.61</td>
<td>16.40</td>
<td>32.8</td>
<td>1.88</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>13.65</td>
<td>0.82</td>
<td>14.46</td>
<td>37.6</td>
<td>2.17</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>12.11</td>
<td>0.92</td>
<td>13.03</td>
<td>38.7</td>
<td>2.39</td>
</tr>
<tr>
<td></td>
<td>Never married</td>
<td>11.77</td>
<td>1.19</td>
<td>12.96</td>
<td>42.6</td>
<td>2.80</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>14.82</td>
<td>0.73</td>
<td>15.55</td>
<td>35.5</td>
<td>2.67</td>
</tr>
<tr>
<td>Women</td>
<td>Married</td>
<td>19.04</td>
<td>1.42</td>
<td>20.46</td>
<td>56.3</td>
<td>2.52</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>17.90</td>
<td>1.59</td>
<td>19.49</td>
<td>58.8</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>17.01</td>
<td>1.72</td>
<td>18.73</td>
<td>61.4</td>
<td>2.82</td>
</tr>
<tr>
<td></td>
<td>Never married</td>
<td>16.68</td>
<td>1.94</td>
<td>18.62</td>
<td>64.4</td>
<td>3.01</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>18.12</td>
<td>1.59</td>
<td>19.70</td>
<td>58.7</td>
<td>2.70</td>
</tr>
</tbody>
</table>
The life expectancies with and without long-term care that we have presented refer to the late 1990 and early 2000s. Although there is little evidence of change in these life expectancies within our 6-year study period, it remains uncertain whether they will remain constant in the future. Changes may be driven by changes in the potential number of long-term care residents and alternative ways of providing long-term care. The delay of the incidence of severe disability to ever older ages—a process observed in some countries (Robine et al., 2003)—does not necessarily imply that the experience of long-term institutional care at the end of life is becoming any shorter, only that with increasing life expectancy years of life without severe disability are becoming longer. In fact, with ever increasing age at death, health conditions—such as dementia—that require extended periods of end-of-life care may even increase, and thus the balance of care may shift strongly from acute hospital care toward nursing home care (Martikainen et al., 2012; Murphy & Martikainen, 2013). A better understanding of the future impact of these changes requires further analyses of longitudinal data on changes in disability status and long-term care transitions.

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