# Expected length of stay in nursing homes and hostels over a lifetime in Australia

**WELFARE DIVISION**
**WORKING PAPER NO. 23**

# Expected length of stay in nursing homes and hostels over a lifetime in Australia

Zhibin Liu

December 1999

Australian Institute of Health and Welfare
Canberra

A complete list of the Institute's publications is available from the Publications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's web site at http://www.aihw.gov.au.

**Suggested citation**

Liu Z 1999. Expected length of stay in nursing homes and hostels over a lifetime in Australia. Canberra. Australian Institute of Health and Welfare (Welfare Division Working Paper No. 23)



Any enquiries about or comments on this publication should be directed to:

Dr Diane Gibson
Australian Institute of Health and Welfare
GPO Box 570
Canberra ACT 2601

Phone: (02) 6244 1190

# Expected length of stay in nursing homes and hostels over a lifetime in Australia[1]


## Abstract

A life-table model is developed to estimate the lengths of stay in nursing homes and hostels over a lifetime. These estimates can be used to calculate the lifetime costs of residential aged care to the Commonwealth government and individuals.

The expected lengths of stay in nursing homes and hostels are estimated at various ages by sex. The results are compared with the life expectancy of the general population and the life expectancy of the population with severe or profound disability.

The paper fills a gap in the knowledge of residential aged care services in Australia. Apart from a number of methodological limitations, previous work in this area has provided only episodic measurements and can not represent the total use of nursing home care over a lifetime.


## Introduction

How much does an average person use nursing home and hostel care over his or her lifetime? This question is of a considerable interest to members of society in many ways. An individual may be interested in this information for his or her own retirement planning, or in considering the likely care needs of a family member. Government policy makers find this information useful for long-term planning purposes, insurance companies in formulating and appraising long term care insurance products, and superannuation funds in considering the inclusion of provision for long-term care in future funding arrangements. Service providers, too, may be interested in knowing the answer to this question in order to develop long-term service delivery strategies.

There are two important aspects to this question. One is the likelihood of using a nursing home and hostel, and the other is length of stay in nursing homes and hostels over a lifetime. Liu (1998) employed a life-table model and estimated that over one-third of the members of a female birth cohort would eventually enter a nursing home for long-term care at least once. Their male counterparts were less likely to use nursing home care (one in five). These probabilities increased to 39% for women and 25% for men at age 65. For hostels, the corresponding probabilities were 22% for women and 9% for men at birth, and 26% for women and 12% for men at age 65 (AIHW 1997: 251).


[1] The author is grateful to Dr Diane Gibson, Dr Colin Mathers, Dr Ching Choi and Dr Peter Braun at the Australian Institute of Health and Welfare for their helpful comments and suggestions on earlier versions of this paper.

This paper measures the likely length of stay in nursing homes and hostels which individuals will experience over a lifetime.

Three types of length of stay have been reported in Australia. One is the retrospective measurement at the time of separation from residential care. Another is the duration of stay from admission to the current date for the current residents. The third one is the completed length of stay of an admission cohort (Liu 1996; AIHW 1997: 265–6). While the three measurements differ from each other, they have two common features. Firstly, they are episodic measurements. In other words, they all measure a single stay. They do not reflect the total use of the services by the residents because many people use nursing homes and hostels for a number of episodes over a lifetime. Secondly, they are limited to a sub-population (residents) and cannot be generalised to total population because the majority of the population never uses residential aged care services in Australia (Liu 1996,1998; AIHW 1997: 250–2).

These measures represent either a partial or complete length of stay relating to a single episode but do not represent the overall use of nursing homes and hostels over a lifetime. A full measure of length of stay is not available in Australia, although considerable effort has been devoted to the issue by researchers in the U.S.A (Liang & Tu 1986; Liang, Tu & Whitelaw 1996). The Steering Committee for the Review of Commonwealth / State Service Provision (1997: 350,1999: 742) identified lifetime use as an important performance indicator for aged care services in its first report on aged care services in 1997, but the indicator remains an unsolved problem in its latest report in 1999.

# Methodology and data

A number of methods have been used by the U.S.A. researchers to estimate length of stay in nursing homes over a lifetime; however, life-table techniques seem to possess the highest level of accuracy so far (Liang & Tu 1986; Liang, Tu & Whitelaw 1996). Liang and Tu (1986) applied a double-decrement life-table model, which was similar to the Sullivan method (Mathers 1988: 55–62), to derive the lifetime length of stay in nursing homes in the U.S.A. Liang and associates (1996) used a four-state increment-decrement life-table model to estimate the risk and duration of nursing home and short-term hospital stays. In order to calculate the expected length of stay, both studies were required to derive the probabilities of entering a nursing home and dying based on empirical prevalence data. The first study also assumed that all incidences occurred at the middle of the age interval. Therefore, for example, the length of stay in a nursing home for a new entrant is half of the interval. The second one used an estimated average length of stay in a nursing home from the other states between ages $x$ and $x+1$.

In essence, the mathematical model used in this paper is a double-decrement life table. The event of a member leaving the birth cohort is defined as either death or entering a nursing home or hostel for permanent care. The superiority of the data available to this study enables the author to simplify the procedure of the calculation of the model and therefore improve its accuracy. The main data source is the System for Payment of Aged Residential Care centrally located at the Commonwealth Department of Health and Aged Care. It contains individual records of all care episodes for all residents in nursing homes and hostels. Each episode has a date of admission and date of separation. Person-days spent in nursing homes and hostels for permanent care during the 1996–97 financial year can be computed by subtracting the date of admission from the date of discharge for each episode.

The computed person-days are then aggregated by single age group and by sex.[2] Such information on person-days has two important implications for modelling. Firstly, it enables the direct estimate of person-days in the life table without first estimating the probabilities of entering the services. Secondly, it makes the assumption for the timing of the event (admission) redundant because the exact number of person-days is available. As a result, the modelling procedure is simplified and the accuracy of the results is improved.

Based on population data produced by Australian Bureau of Statistic (ABS), the total number of person-days lived by the general population can also be calculated for each single-age and by sex over the 1996–97 financial year. The proportion of person-days spent in nursing homes and hostels is then obtained by dividing the person-days spent in nursing homes and hostels with the total person-days lived by the general population.

There is, however, an important assumption here. The cross-sectional use pattern by age and sex is assumed as the lifetime experience of a synthetic birth cohort. Under this assumption, the above-calculated proportions are applied to the stationary population (person-years) in the general population life table to derive the number of person-years spent in nursing homes or hostels by the synthetic cohort. The expected length of stay is obtained by dividing the sum of person-years at and above an age with the number of survivors at the exact age. The modelling process is illustrated further by the following formula.

$$np_x^1 = \frac{nPD_x^1}{PD_x^1} \quad \text{or} \quad hp_x^1 = \frac{hPD_x^1}{PD_x^1} \tag{1}$$

$$nL_x^1 = L_x^1 \times np_x^1 \quad \text{or} \quad hL_x^1 = L_x^1 \times hp_x^1 \tag{2}$$

$$nT_x = \sum_{i=x}^{\infty} nL_i^1 \quad \text{or} \quad hT_x = \sum_{i=x}^{\infty} hL_i^1 \tag{3}$$

$$ne_x = \frac{nT_x}{l_x} \quad \text{or} \quad he_x = \frac{hT_x}{l_x} \tag{4}$$

where $np_x^1$ and $hp_x^1$ represent the proportions of person-days spent in nursing homes and hostels respectively by the general population between ages *x* and *x+1* in 1996–97. The $nPD_x^1$ and $hPD_x^1$ are the numbers of person-days spent in nursing homes and hostels respectively by the people between ages *x* and *x+1* in 1996–97. They are directly derived from nursing home and hostel data. The $PD_x^1$ refers to the number of person-days lived by the total population between ages *x* and *x+1* in 1996–97 (derived from ABS 1997). It was estimated as the product of the average population in 1996–97 financial year and the number of days during the year (365). The $nL_x^1$ and $hL_x^1$ are the person-years lived in nursing homes and hostels respectively by the birth cohort between ages *x* and *x+1*. $nT_x$ and $hT_x$ are the cumulative person-years lived in nursing homes and hostels respectively by the cohort at age *x* and above. The $ne_x$ and $he_x$ are the expected lengths of stay in nursing homes and hostels respectively for the survivors of the cohort at exact age *x*. The $L_x^1$ and $l_x$ are person-years between ages *x* and *x+1* and the number of survivors at exact age *x*. They are taken from life tables for the general population (ABS 1998).

[2] Person-days for respite care accounted about 2% of total person-days and are excluded from the analysis.

The model is applied to males and females separately to reflect the different use patterns of the two sub-populations. People aged under 65 have very low rates of use for both nursing homes and hostels, and therefore they were excluded from the study (AIHW 1998a, 1998b).

# Modelling results

**Table 1: Expected length of stay (years) for permanent care in nursing homes and hostels at the older ages by sex, Australia 1996-97**

| Exact | Nursing homes | | Hostels | | Nursing homes and hostels combined | |
|---|---|---|---|---|---|---|
| age | Females | Males | Females | Males | Females | Males |
| 65 | 1.02 | 0.41 | 0.85 | 0.30 | 1.87 | 0.71 |
| 66 | 1.03 | 0.42 | 0.85 | 0.31 | 1.88 | 0.72 |
| 67 | 1.03 | 0.42 | 0.86 | 0.31 | 1.89 | 0.73 |
| 68 | 1.04 | 0.42 | 0.87 | 0.32 | 1.91 | 0.74 |
| 69 | 1.05 | 0.43 | 0.88 | 0.32 | 1.92 | 0.75 |
| 70 | 1.06 | 0.44 | 0.88 | 0.33 | 1.94 | 0.76 |
| 71 | 1.07 | 0.44 | 0.89 | 0.33 | 1.96 | 0.77 |
| 72 | 1.08 | 0.45 | 0.90 | 0.34 | 1.98 | 0.78 |
| 73 | 1.09 | 0.45 | 0.91 | 0.34 | 2.00 | 0.80 |
| 74 | 1.10 | 0.46 | 0.92 | 0.35 | 2.02 | 0.81 |
| 75 | 1.11 | 0.47 | 0.94 | 0.36 | 2.05 | 0.83 |
| 76 | 1.12 | 0.48 | 0.95 | 0.37 | 2.07 | 0.84 |
| 77 | 1.14 | 0.48 | 0.96 | 0.38 | 2.09 | 0.86 |
| 78 | 1.15 | 0.49 | 0.97 | 0.39 | 2.12 | 0.88 |
| 79 | 1.16 | 0.50 | 0.98 | 0.40 | 2.14 | 0.90 |
| 80 | 1.18 | 0.51 | 0.99 | 0.41 | 2.16 | 0.92 |
| 81 | 1.19 | 0.52 | 0.99 | 0.43 | 2.18 | 0.94 |
| 82 | 1.20 | 0.53 | 1.00 | 0.44 | 2.20 | 0.97 |
| 83 | 1.21 | 0.53 | 0.99 | 0.45 | 2.20 | 0.99 |
| 84 | 1.22 | 0.54 | 0.99 | 0.47 | 2.21 | 1.01 |
| 85 | 1.22 | 0.55 | 0.98 | 0.48 | 2.20 | 1.03 |
| 86 | 1.24 | 0.56 | 0.97 | 0.49 | 2.20 | 1.05 |
| 87 | 1.24 | 0.56 | 0.95 | 0.51 | 2.19 | 1.07 |
| 88 | 1.25 | 0.57 | 0.92 | 0.51 | 2.17 | 1.08 |
| 89 | 1.23 | 0.57 | 0.88 | 0.51 | 2.11 | 1.09 |
| 90 | 1.22 | 0.58 | 0.83 | 0.51 | 2.05 | 1.09 |
| 91 | 1.20 | 0.56 | 0.78 | 0.49 | 1.98 | 1.06 |
| 92 | 1.17 | 0.55 | 0.71 | 0.48 | 1.88 | 1.03 |
| 93 | 1.13 | 0.52 | 0.64 | 0.45 | 1.77 | 0.97 |
| 94 | 1.09 | 0.49 | 0.59 | 0.41 | 1.68 | 0.89 |
| 95 | 1.03 | 0.46 | 0.51 | 0.35 | 1.53 | 0.81 |

*Note:* This table is derived from AIHW 1997 unpublished nursing home and hostel data, ABS 1997:16–7 & 42–7 and ABS 1998: 54–5 using the life-table model.

Table 1 summarises the results of the modelling analysis. It presents the expected lengths of stay in nursing homes, hostels, and nursing homes and hostels combined for both males and

females at each single age from 65 to 95. For example, at age 65, an average woman can expect to spend about 1.02 years in a nursing home and 0.85 years in a hostel. Unlike the probabilities of using a nursing home and a hostel, the expected lengths of stay in nursing homes and hostels can be added together to represent the length of stay in the two systems combined. This is because no one can be in both systems at the same time. As a result, a woman at age 65 can expect to spend 1.87 years in nursing homes and hostels combined before her death. These two systems were merged into a single system called residential aged care facilities from 1 October 1997. The combined measure is, therefore, more pertinent to the current system.

The modelling results show a substantial difference between men and women. Men have a much shorter expected length of stay in both nursing homes and hostels across all ages. On average, a woman at age 65 will spend 2.5 times longer than her male counterpart in a nursing home. The sex difference is even greater in relation to hostel use. These patterns are consistent with earlier findings in relation to the length of stay of an admission cohort. On average, a woman was estimated to stay for about 737 days for each admission for permanent care in a nursing home, while the corresponding figure for a man was about 475 days (Liu 1996:20). Similar patterns has also been found in hostels (AIHW 1998b).

The expected length of stay gradually increases with age and reaches its peak at around the mid to late eighties. The decline in the expected length of stay after age 90 are expected because at these advanced ages the length of stay in nursing homes and hostels is increasingly limited by shorter life expectancies. This pattern is consistent with those of the probabilities of entering a nursing home or hostel (Liu 1998; AIHW 1997). Studies in the U.S.A. showed a similar increasing trend up to age 90 but they did not do any analyses beyond that age (Liang & Tu 1986; Liang, Tu & Whitelaw 1996).

# Applications and further analyses

## Length of stay over a lifetime of users

The expected length of stay over a lifetime has important implications for further analyses. If those cohort members who will never use a nursing home or a hostel care are excluded from the calculation, this measurement for the cohort can be transformed into the length of stay over a lifetime for those who will use the services. This can be achieved by using the lifetime probability of nursing home or hostel use (AIHW 1997; Liu 1998).

The average expected length of stay in nursing homes per woman (including those who do not enter a nursing home) is estimated as 1.02 years and the chance of this woman entering a nursing home is estimated as 39%. Therefore, among those women who are aged 65 and will enter a nursing home some time before death, the average length of stay in nursing homes is about 2.62 years (1.02 / 0.39). This figure is larger than an earlier estimate of the average length of stay of 2.02 years per episode for females in a nursing home (Liu 1996: 20). The difference is consistent with the fact that many people use more than one episode of care in nursing homes. Similarly, for a man who is 65 years old and will use nursing home care some time during the remaining lifetime, the expected lifetime stay in nursing homes is about 1.64 years (0.41 / 0.25) compared with the average duration of 1.30 years for each single stay. In terms of hostels, the expected length of stay over lifetime for a woman who is 65 years old and will use a hostel sometime in the future is 3.27 years (0.85 / 0.26) and the corresponding figure for a man is 2.50 years (0.30 / 0.12). Compared with nursing home use,

people are less likely to use hostel care than nursing home care over a lifetime; however, the average length of stay for hostel residents is longer than that for nursing home residents.

## The proportion of life expectancy spent in nursing homes and hostels

The expected length of stay in nursing homes and hostels can be compared with life expectancy to show the time spent in residential aged care in relative terms (table 2). At age 65, women will spend 5 per cent of their remaining life in nursing homes, 4 percent in hostels and 9 per cent in nursing homes and hostels combined. These proportions increase significantly with age. At age 85, women will spend one-third of their remaining life in residential aged care facilities (19 per cent in nursing homes and 15 per cent in hostels).

The sex differences are also significant in relative terms. Men spend much smaller proportions of their remaining life in nursing homes and hostels compared with women. The proportions increase with age for men but to a weaker degree than do those for women.

Nursing homes and hostels are designed to accommodate and care for people with profound or severe handicap; therefore, it is pertinent to compare the expected length of stay in nursing homes and hostels with the number of years that residents can expect to live with a profound or severe handicap (table 2).

**Table 2: Per cent of expected life spent in nursing homes and hostels**

| | % of total expected life spent in | | | % of expected life with sever handicap spent in | | | Life expectancy (years) | |
|---|---|---|---|---|---|---|---|---|
| Sex/Age | Nursing homes | Hostels | Nursing homes and hostels | Nursing homes | Hostels | Nursing homes and hostels | Total | with severe handicap |
| Females | | | | | | | | |
| 65 | 5 | 4 | 9 | 22 | 18 | 40 | 19.81 | 4.65 |
| 70 | 7 | 6 | 12 | 23 | 19 | 43 | 15.84 | 4.53 |
| 75 | 9 | 8 | 17 | 26 | 22 | 48 | 12.2 | 4.28 |
| 80 | 13 | 11 | 24 | 29 | 24 | 53 | 9.02 | 4.12 |
| 85 | 19 | 15 | 34 | 33 | 27 | 60 | 6.44 | 3.67 |
| Males | | | | | | | | |
| 65 | 3 | 2 | 4 | 17 | 13 | 30 | 16.1 | 2.36 |
| 70 | 3 | 3 | 6 | 19 | 14 | 33 | 12.69 | 2.34 |
| 75 | 5 | 4 | 9 | 20 | 15 | 36 | 9.71 | 2.33 |
| 80 | 7 | 6 | 13 | 20 | 16 | 37 | 7.2 | 2.49 |
| 85 | 10 | 9 | 19 | 22 | 19 | 40 | 5.29 | 2.55 |

*Note:* This table is derived from the table 1, ABS 1998: 44–5 and Colin Mathers AIHW 1998 unpublished data. The life expectancy of people with profound or severe handicap is based on the information available in 1993 and the figure may under-report the current level of profound or severe handicap in Australia.

Colin Mathers (AIHW unpublished data) estimates that at age 65 women can expect to live an average of 4.65 years with a profound or severe handicap. Using this estimate, it can be calculated that, of those 4.65 years, 40 per cent will be spent in residential aged care facilities

(22 per cent in nursing homes and 18 per cent in hostels). This proportion increases to 60 per cent at age 85. Older men can also expect to spend a substantial proportion of their expected years of life with a profound or severe handicap in residential aged care facilities, although the proportion is smaller than that for their female counterparts.

## Lifetime costs of residential aged care

The expected length of stay in nursing homes and hostels has important applications to cost estimates. Residents in nursing homes and hostels are charged and funded on a daily basis. The average costs per person over a lifetime can be estimated by multiplying the expected length of stay by daily costs. The daily costs in nursing home and hostel are estimated as the average costs per bed-day for high-care (Resident Classification Scales 1 to 4) and low-care (Resident Classification Scales 5 to 8) residents in the 1998–99 financial year. Such a cost estimate can be made for all ages although only those for people aged 65 are presented here (table 3).

**Table 3: Estimated lifetime costs on residential aged care per person at age 65 ($)**

| | Commonwealth subsidies | | | Resident contributions | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Nursing home | Hostel | Total | Nursing home | Hostel | Total | Nursing home | Hostel | Total |
| Female | 35,686 | 12,864 | 48,550 | 10,340 | 8,615 | 18,954 | 46,025 | 21,479 | 67,504 |
| Male | 14,344 | 4,540 | 18,884 | 4,156 | 3,041 | 7,197 | 18,500 | 7,581 | 26,081 |

*Note:* This table is derived from the table 1 and the Department of Health and Aged Care 1999 unpublished data.

On average, residential aged care services for a woman at age 65 is estimated to cost $67,504 over the remaining years of her life. About two-thirds of the costs will be for nursing home care and the other one-third for hostel care. The costs are broken down into two components here. On average, the Commonwealth government will bear the majority of the cost (72%) and the resident will contribute about 28%. The Commonwealth subsidy is relatively higher in nursing homes (78%) than in hostels (60%). A means-tested system of fees was adopted by the Government in 1998; therefore, the government / private individual cost ratio is heavily affected by the income and asset levels of the residents. Changes in the composition of the residents in terms of their income levels may alter the above cost patterns. For example, as Martin (1999) argued recently, a shift towards an increased number of concessional residents (those who pay only the basic level of individual contribution) would increase the costs of the residential care system to the Government even if the total number of residents was stable.

The expected lifetime cost of residential aged care for a man at age 65 is less than 40% of that for a woman. However, the cost distribution pattens for men are similar to those for women in terms of the nursing home and hostel split and the Commonwealth and resident contributions.

# Discussion

This paper represents an important methodological and information advancement in the research of residential aged care in Australia. A life table model was developed to estimate the expected length of stay in nursing homes and hostels for a synthetic birth cohort of the population. The estimates are done separately for males and females at each single age of 65 and over. This model is simpler and has a higher level of accuracy than those currently used in the U.S.A, and presents an advance on international literature on the topic. The availability of unit records for each episode of each resident enables the paper to employ such model.

This paper also fills a gap in Australian knowledge of nursing home and hostel use patterns from a lifetime perspective. For the first time in Australia, length of stay in nursing homes and hostels can be measured over a lifetime.

It is important to reiterate that there are important assumptions underlying the calculations, and that any interpretation of findings must keep these assumptions in mind. Most importantly, the life tables are based on the nursing home and hostel use patterns prevailing in 1996–97; a forward projection based on these estimates is valid only if the patterns of nursing home and hostel supply and use are statistically comparable to that of 1996–97. In particular, nursing home and hostel use patterns in Australia appear to be basically supply driven. The estimated length of stay do not represent 'need' or 'demand' but the patterns of utilisation only, a pattern which is constrained by levels of nursing home and hostel provision. A relatively small change in the supply of nursing home and hostel care could significantly change the length of stay; thus, for example a reduced level of provision would necessarily reduce the length of stay over a lifetime.

Nursing home and hostel systems have merged into a single system, referred to as residential aged care facilities, since 1 October 1997. This development makes separate modelling for nursing homes and hostels redundant. However, the modelling results for nursing homes and hostels combined are still relevant. The new system may affect the use patterns for the residents because they can move between different levels of care without leaving the system or even leaving the same facility; however, this will have little impact on the total use by the population at large unless the provision level is also altered.

With the above caution in mind, the paper reveals that, on average, a woman at age 65 can expect to spend over 12 months in nursing homes and about 10 months in hostels, or over 22 months in residential aged care facilities before her death. Men can expect to spend much less time in residential aged care facilities compared with women. The expected lifetime length of stay in residential aged care facilities is less than 9 months (about 5 months in nursing homes and 4 months in hostels) for a man at age 65.

This paper, from a lifetime perspective, further confirms a well-known belief that women are the predominant users of residential aged care services. They use more services, cost more, and contribute more in individual expenditure.

The findings in this paper show a high level of consistency with two earlier studies by the same author (Liu, 1996, 1998), providing some evidence of the reliability of the findings. The findings differ from those published in the United States, but the two systems of aged care are quite different, and the methodology adopted in the various studies also differs significantly. Liang and Tu's (1986) life-table model showed that the expected length of stay in nursing homes was about 44 months for people aged 65 in the U.S.A in 1976. They admitted that their method tended to over-estimate. Liang and another group of associates (1996) used a refined but more complex life table model to estimate the expected length of stay in nursing homes in the U.S.A. in 1985. The result was about 23 months for people aged

65, which is close to the estimate for women at the same age in this paper. The sheer complexity of their model reduced the level of accuracy of the result.

The combination of the present study and the lifetime probability study (Liu 1998) also generates new information on nursing home use. The average lifetime length of stay in nursing homes by a nursing home resident is 2.62 years for a woman and 1.30 years for a man at age 65. These expected lengths of stay in residential care facilities account for about 9% of life expectancy at age 65 for women and 4% for men. The proportions increased rapidly with age. By age 85, they arise to 34% for women and 19% for men. When life expectancy with severe and profound handicap is used as denominator, the proportions of the time in nursing homes and hostels rise to 40% and 30% for women and men at age 65 respectively. These figures must be interpreted, however, in the context that the majority of the population does not have profound or severe handicap and do not use residential aged care.

The expected lengths of stay can also be used to estimate the costs for the residential aged care services. Expenditure on the average woman is considerably higher than that for the average man. The majority of the costs are paid by the Commonwealth Government, particularly for nursing home care. Assuming the current means-tested system of fees continues, a shift towards concessional residents in the resident mix could lead to an increase in the costs to the Government without increasing the resident population.

These findings of the paper are of considerable significance in terms of planning for the financing residential cared care both at micro and macro levels. They are useful to individuals, to service providers, to government, to insurance companies and to superannuation fund managers in addressing the important issues concerning the future cost of long term care.

# References

Australian Bureau of Statistics (ABS) 1997. Population by age and sex, Australian States and Territories June 1992 to June 1997, Cat No. 3201.0. Canberra: ABS.

Australian Bureau of Statistics (ABS) 1998. Deaths, Australia. Cat No. 3302.0. Canberra: ABS.

Australian Institute of Health and Welfare (AIHW) 1997. Australia's welfare 1997: services and assistance. Canberra: AIHW.

Australian Institute of Health and Welfare (AIHW) 1998a. Hostels in Australia 1996–97: a statistical overview, AIHW cat. no. AGE 9. Canberra: AIHW & DHFS (Aged Care Statistics Series no. 3).

Australian Institute of Health and Welfare (AIHW) 1998b. Nursing homes in Australia 1996–97: a statistical overview, AIHW cat. no. AGE 10. Canberra: AIHW & DHFS (Aged Care Statistics Series no. 4).

Liang J & Tu E & Whitelaw N 1986. Estimating lifetime risk of nursing home residency: a further note. The Gerontologist 26(5): 560–3.

Liang J, Tu E & Whitelaw N 1996. Probabilities and lifetime durations of short-stay hospital and nursing home use in the United States, 1985. Medical Care 34(10): 1018–36.

Liu Z 1996. Length of stay in Australian Nursing homes. Canberra: AIHW (Aged Care Series no. 1)

Liu Z 1998. The probability of nursing home use over a lifetime. Canberra: AIHW (Welfare Division Working paper no. 16)

Martin C 1999. Nursing home costs blow out. The Australian Financial Review, Friday, August 13: 3.

Mathers C 1991. Health expectancies in Australia 1981 and 1988. Canberra: AGPS.

Steering Committee for the Review of Commonwealth / State Service Provision 1997. Report on Government Services, Volume 2: Emergency Management, Community Services, Housing. Canberra: AusInfo: 341–80.

Steering Committee for the Review of Commonwealth / State Service Provision 1999. Report on Government Services, Volume 2: Emergency Management, Community Services, Housing. Canberra: AusInfo: 729–88.