Lifetime risk of entering residential or nursing home care in England

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LIFETIME RISK OF ENTERING RESIDENTIAL OR NURSING HOME CARE IN ENGLAND

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Abstract

Study objectives - **To estimate the risk of entry to long-stay residential and nursing care for elderly people, from current admission rates.**
Design - **Double-decremented life-table analysis of national statistics which are refined using evidence from PSSRU surveys of residential and nursing care.**
Setting - **England, 1995/6.**
Main results - **The life time risk of long-stay entry into a care home, based on 1995/6 admission rates, for men is 16 per cent at birth, rising to 20 per cent at 65. For women, the risk is much higher, rising from 32 per cent at birth to 36 per cent at 65. The expectation of long-stay care for elderly people, of someone who has not already been admitted, for a man is 3½ months at birth rising to 4 months at 65. For a woman it is 11 months at birth rising to 12 months at 65. These are the average insurance risks for a person not already in a care home.**
Conclusions - **The risk is now greater than is widely appreciated. This has significant implications for personal planning as well as to insurers and fundors**.

KEY POINTS

- The risk of admission to long-stay entry in a residential or nursing home has been rising.
- Based on current admission rates, the future risk of long-stay entry into a care home of a person aged 65 is 20 per cent for a man and 36 per cent for a woman.

Introduction

At a time when the options for funding long term care are much under discussion, and the role of private insurance is being examined, surprisingly little is known about the risks involved. For residential and nursing care for elderly people, a life-time risk of admission is often cited as about 1 in 4: though this figure appears to have no firmer basis than that in the last Census, 24 per cent of all people aged 85+ were in medical and care establishments [1, table 4]. However, the rate of transition into institutions has been rising over a long period particularly in the oldest age-groups [2].

The estimates presented here are period based measures based on the admission rates to long-stay residential and nursing home care for people aged 65+ in 1995/6. A double-decremented life table approach is used.

The term 'care home' is used throughout to refer collectively to residential, nursing and dual-registered homes primarily for elderly people, and 'residents' to refer to the long-stay residents and patients of these establishments. This paper is not concerned with other forms of institutional care such as homes for younger disabled people, or long-stay hospital care (though since the Community Care reforms, the latter has been fast disappearing). It is also not concerned with planned short-term stays in care homes. A long-stay resident is one for whom a date of discharge was not set prior to admission

Methods

At 31 March 1996, Department of Health returns for England report there were 236,848 residents of residential homes for the elderly and EMI, and 133,387 patients of nursing homes for the elderly [3,4]. There is an overlap in these figures caused by dual registratration of some homes, and not all recorded

residents are long-stay. We estimate that at this date there were in total about 325,511 long-stay residents aged 65 and over in care homes (Appendix A).

The number of long-stay admissions to residential homes of people aged 65 and over, during FY1995-6, is reported as 86,076 [3, table L17]. No equivalent figure is published for nursing homes, and not all of these are first-time admissions. We estimate that the number of first-time long-stay admissions to care homes in the year ending 31 March 1996 (FY1995/6) was about 123,284 (Appendix B).

Two recent large-scale surveys undertaken by the PSSRU at the University of Kent have been used to extend the published figures, and to estimate an age-sex breakdown for the purpose of estimating life-time risk.

The Admissions survey was undertaken in the last quarter of 1995, and obtained information on 2,558 people from 18 nationally representative local authorities, who were admitted to a care home at that time following a social worker assessment [5]. People identified in this survey are being tracked, but as yet only limited prospective data is available. The design of this study means that it does not include people who are 'private', that is do not seek state funding for their residential care, apart from those who applied for help but were assessed as capable of self-funding.

The Cross-sectional survey provides information on all types of home in 21 representative local authorities in late 1996. Information is available from 617 homes and 11,882 residents. It was conducted in November 1996 [6].

The analytic method uses a double-decremented period life table, in which a hypothetical population is subjected to two alternative causes of loss, either death or first-time entry to a care home as a long-stay residents (even if individuals subsequently leave). The basic form of the model is:

$$l_{x+1}(NI) = l_x(NI) - d_x(NI) - h_x(NI)$$

$$h_x(NI) = l_x(NI) \times q_x(h, NI)$$
$$d_x(NI) = l_x(NI) \times q_x(d, NI)$$

where:

$\quad$ $l_x(NI)$ is the number of people who are non-institutionalised when they reach the age of 'x'; $d_x(NI)$ deaths among the non-institutionalised population while aged 'x';

$\quad$ $h_x(NI)$ the number of first admissions to institutions while aged x;

$\quad$ $q_x(h,NI)$ is the probability of first admission while aged x;

$\quad$ $q_x(d,NI)$ is the probability of death while aged x among the non-institutionalised.

in addition:

$$dh_x(NI) = l_x(NI) \times q_x(dh, NI)$$
$$q_x(dh, NI) = q_x(d, NI) + q_x(h, NI)$$

where:

$\quad$ $dh_x(NI)$ are deaths or first admissions from the non-institutionalised population aged 'x'.

$\quad$ $q_x(dh,NI)$ is the combined probability of death or first admission among the non-institutionalised aged 'x'.

We also refer to $q_x(T)$ and $l_x(T)$ which are the death-only decremented figures from the conventional life table.

All the above assumes analysis by single year of life, but the method is readily adapted to longer intervals.

A period method is used for estimating the q's: that is to say, they are estimated on the latest available data about the rates of death and admission [7]. The results provide expectations for a hypothetical group of $l_0(NI)$ = 10,000 individuals of each sex who through their lives experienced the rates which existed in 1995/6. This is a standard demographic approach, which contrasts with the cohort approach of following real individuals through their lifetime. The latter can only provide estimates which relate to the experience of people born 100 years ago or more.

The estimates of q's follow the common form for period life tables, though the numbers relate to the non-institutionalised population only. Thus:

$$q_x(dh, NI) \;=\; \frac{D_x(T) - D_x(I) + H_x(NI)}{\{P_x(T) - P_x(I)\} \;+\; 0.5 \times \{D_x(T) - D_x(I) + H_x(NI)\}}$$

except that $q_x(dh,NI) = 1$ for the highest age-group because then everyone must either die or be institutionalised. Similarly:

$$q_x(h, NI) \;=\; \frac{H_x(NI)}{\{P_x(T) - P_x(I)\} \;+\; 0.5 \times \{D_x(T) - D_x(I) + H_x(NI)\}}$$

except that in this case the top age group:

$$q_x(h, NI) \;=\; \frac{H_x(NI)}{D_x(T) - D_x(I) + H_x(NI)}$$

where:

        $P_x(T)$ and $P_x(I)$ denote the total and institutionalised populations aged 'x';
        $D_x(T)$ and $D_x(I)$ denote the deaths aged 'x' in total and institutionalised populations;
        $H_x(NI)$ denotes the number of first time admissions aged 'x';

all in the year for which data is available.

The number of people who will have a first admission to residential/nursing care when aged `x` or above is estimated from the period life table by:

$$N_x(h) \;=\; \sum_{i=x}^{\infty} l_i(NI) \times q_i(NI)$$

The future risk of admission for someone aged 'x' who has not been previously admitted is therefore:

$$Risk_x \;=\; \frac{N_x(h)}{l_x(NI)}$$

Results

Tables 1 and 2 show the calculation of estimated life-time risk, together with other statistics previously mentioned.

Column 2: Population estimates from ONS publication PP1 97/1 table 2.

Column 3: Numbers of deaths are from ONS publication DH2 97/1, table 1, (with some additional age breakdown based on DH2 96/2 table 1).

Columns 4,5,6: These are the conventional abridged life table calculations based on columns 1 and 2. $q_0(d,T)$ uses a separation factor of 0.7. Column 6 shows period based estimates of life expectancy.

Column 7: The population in long-term care homes for elderly people by age and sex is estimated in Appendix A.

Column 8: Numbers of first-time long-stay admissions by age and sex are estimated in Appendix B. This uses Department of Health published totals for residential and dual registered homes [3], while numbers of admissions to nursing homes, adjustments to allow for the proportion of residents who are first-time admissions, and the breakdown by age and sex are estimated from the PSSRU surveys [5,6].

Column 9: There is limited data available on the death rate of people admitted to residential and nursing care. The estimates given here are based on a stationary population model (see Appendix C).

Columns 10,11,12: These show the calculation of the double decremented life table. The life expectancy shown in column 12 is up until either death or first admission to residential care.

Columns 13,14: The probability of first admission during each age band (for people not already admitted), and the life time risk for a person of given age, are calculated using the formulae above.

Discussion

Key observations from tables 1 and 2 are as follows.

The life time risk of long-stay entry into a care home, based on 1995/6 admission rates, is:
- For a man 16.0 per cent at birth, rising to 19.6 per cent at 65.
- For a women, 32.2 per cent at birth, rising to to 36.4 per cent at 65.

The expectation of long-stay care in a care home, of someone who has not already been admitted is given by the difference between columns 4 and 12 of table 1 and 2.
- For a man this is 3½ months at birth rising to 4 months at 65.
- For a woman this is 11 months at birth rising to 12 months at 65

These latter figures are referred to as the insurance risk. Strictly speaking they are not the expectation of long-stay care, but the expected length of life after first admission. However the probability of returning to a private household is small (see Appendix B).

Note that the insurance risk is not the same thing as the expected length of stay once admitted, since it includes allowance for the probability of admission. The expected length of stay once admitted, based on these figures, is about 2 years for a man and 3 years for a woman.

The robustness of these estimates should be considered. The sample sizes involved mean that the sampling errors of estimates (where they are based on the PSSRU surveys) are trivial in relation to the likely fixed errors in the method, and we concentrate on the latter. Three in particular are worth discussing further: sensitivity analysis is used to check their possible effect.

The overall admissions rate.

The estimate of life-time risk is above all determined by the overall rate of admissions to care homes. Long-stay admission rates of people aged 65+ to residential and dual-registered homes have risen over the last three years [3, table E13]. Between 1994/5 and 1995/6 admissions rose by 14 per cent (the increase in number of residents was 1 per cent: Appendix C). Whether this is a long-term trend, a settling down following the Community Care reforms, or whether FY1995/6 was an unusual year, remains to be seen.

For nursing homes, no evidence is available on changes in admission. Numbers of beds occupied by people aged 65+ actually fell 1 per cent between 1994/5 and 1995/6, so it seems unlikely that admission rates will have increased so much.

To test sensitivity, we have repeated all calculations using 1994/5 numbers of residents and admission rates. For residential and dual-registered homes, the actual admission rates in that year were used. For nursing homes, as no figures are published we have assumed that the rate of increase was half that of residential homes, in other words the number of admissions was then 7 percent less than we estimated from rates found in the PSSRU cross-sectional survey. The net result is that while the total number of residents is little changed between the two years, the number of admissions is 10 per cent less than in tables 1 and 2.

The effect of using the 1994/5 admission rates on the estimated life-time risk of admission is as follows:
- For men, it is 14.4 per cent at birth rising to 17.6 per cent at 65.
- For women, it is 29.0 per cent at birth rising to 32.8 per cent at 65.

However, although the risk of admissions is a little lower, the implication is that the turnover rate must have been lower, so the expectation of stay in long-term care of someone not already admitted, the insurance risk, is virtually unchanged.

The proportion of first-time admissions.

Certain assumptions are made in Appendix B about the proportions of residents admitted from private households, other care homes, and from long-stay in hospital who were first time long-stay admissions. In addition, rather limited evidence was available for estimating the proportion of privately funded residents who are first time long-stay admissions. At worst, we might suppose that both the total number of admissions in 1995/6 was abnormally high and in addition the proportion of admissions that are first-time admissions, in each age/sex group is less than we estimated in appendix B (equally they might be higher, but we are chiefly concerned to derive a lower bound on risk).

Using the estimated 1994/5 admission rates, but further deducting 5 per cent from the number of first-time admissions in each age/sex group, the risk of admission becomes:

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- For men, it is 13.6 per cent at birth rising to 16.6 per cent at 65.
- For women, it is 27.4 per cent at birth rising to 30.9 per cent at 65.

Survivorship rates following first entry.

Appendix C uses a model that assumes stationary populations in order to estimate numbers of deaths among people who had been admitted to care homes. In fact there has been a long-term steady growth in numbers of residents. Judging from the number of registered beds available, provision increased by an average 2 per cent per annum between 1991 and 1996.

To test the possible effect of the failure of the stationarity assumption, the number of deaths among people in care homes given in column 9, is reduced by 6 per cent in each age/sex group. It can be shown that this would result in a 2 per cent annual growth in numbers of residents. The effect is to slightly reduce the expected risk of admission, compared with tables 1 and 2:

- For men, it is 15.7 per cent at birth rising to 19.2 per cent at 65.
- For women, it is 31.3 per cent at birth rising to 35.3 per cent at 65.

Despite this, longer survival means that the expectation of stay, the insurance risk, actually increases:

- For a man this is 4 months at birth rising to 5 months at 65.
- For a woman this is 12 months at birth rising to 13½ months at 65

The conclusion from these checks is that the estimates of risk appear reasonably robust to the assumptions that have been necessary. However rates of admission have been changing quite fast in recent years and only circumstancial evidence is available of death rates following admission. Caution must always be observed with period based estimates in these circumstances.

Funding

Acknowledgements

6. References

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Table 1: Life time risk of admission to long-stay residential/nursing care for elderly people

Males, England, 1996.

1. Age	2. Population $P_x(T)$	3. Deaths $D_x(T)$	4. $q_x(d,T)$	5. $l_x(d,T)$	6. Life Exp $e_x(T)$	7. Inst pop $P_x(I)$	8. First Admis $H_x(NI)$	9. Inst Deaths $D_x(I)$	10. $q_x(dh,NI)$	11. $l_x(dh,NI)$	12. Expt NI Life $e_x(NI)$	13. Prob Admis $q_x(h,NI)$ %	14. Lifetime Risk %
0	309.3	2.10	0.0068	10000	74.6	0.00	0.00	0.00	0.0068	10000	74.3	0.0	16.0
1-4	1304.4	0.37	0.0011	9932	74.1	0.00	0.00	0.00	0.0011	9932	73.8	0.0	16.1
5-9	1666.7	0.26	0.0008	9921	70.2	0.00	0.00	0.00	0.0008	9921	69.9	0.0	16.1
10-14	1565.8	0.31	0.0010	9913	65.3	0.00	0.00	0.00	0.0010	9913	65.0	0.0	16.2
15-19	1493.2	0.82	0.0027	9903	60.3	0.00	0.00	0.00	0.0027	9903	60.0	0.0	16.2
20-24	1613.3	1.36	0.0042	9876	55.5	0.00	0.00	0.00	0.0042	9876	55.2	0.0	16.2
25-34	4050.6	3.76	0.0092	9835	50.7	0.00	0.00	0.00	0.0092	9835	50.4	0.0	16.3
35-44	3410.1	5.41	0.0157	9744	41.1	0.00	0.00	0.00	0.0157	9744	40.8	0.0	16.4
45-54	3185.9	12.51	0.0385	9590	31.7	0.00	0.00	0.00	0.0385	9590	31.4	0.0	16.7
55-64	2362.5	28.12	0.1123	9221	22.8	0.00	0.00	0.00	0.1123	9221	22.5	0.0	17.4
65-69	1037.1	27.51	0.1244	8185	15.0	4.29	2.01	0.94	0.1294	8185	14.7	0.9	19.6
70-74	893.9	39.07	0.1970	7167	11.8	9.66	5.93	4.58	0.2051	7126	11.5	3.0	21.4
75-79	616.8	42.64	0.2947	5755	9.1	13.92	6.58	5.51	0.3068	5665	8.8	4.6	23.2
80-84	385.0	42.66	0.4338	4059	6.8	17.35	9.84	8.98	0.4567	3927	6.6	10.3	26.8
85+	234.7	45.34	1.0000	2298	5.2	29.83	12.40	16.73	1.0000	2133	5.0	30.2	30.2

Populations, Deaths and Numbers of Admissions (cols 2,3,7,8,9) are expressed as '000.
For l_x, e_x and the risk of admission (cols 5,6,11,12,14) figures refer to the start of the corresponding age group.

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Table 2: Life time risk of admission to long-stay residential/nursing care for elderly people

Females, England, 1996.

1. Age	2. Population $P_x(T)$	3. Deaths $D_x(NI)$	4. $q_x(d,T)$	5. $l_x(d,T)$	6. Life Exp $e_x(T)$	7. Inst pop $P_x(I)$	8. First Admis $H_x(NI)$	9. Inst Deaths $D_x(I)$	10. $q_x(dh,NI)$	11. $l_x(dh,NI)$	12. Expt NI Life $e_x(NI)$	13. Prob Admis $q_x(h,NI)$ %	14. Lifetime Risk %
0	293.4	1.52	0.0052	10000	79.8	0.00	0.00	0.00	0.0052	10000	78.9	0.0	32.2
1-4	1238.7	0.31	0.0010	9948	79.2	0.00	0.00	0.00	0.0010	9948	78.3	0.0	32.4
5-9	1584.4	0.19	0.0006	9938	75.3	0.00	0.00	0.00	0.0006	9938	74.4	0.0	32.4
10-14	1481.1	0.21	0.0007	9933	70.3	0.00	0.00	0.00	0.0007	9933	69.4	0.0	32.4
15-19	1411.8	0.40	0.0014	9925	65.4	0.00	0.00	0.00	0.0014	9925	64.5	0.0	32.5
20-24	1536.1	0.51	0.0017	9911	60.4	0.00	0.00	0.00	0.0017	9911	59.6	0.0	32.5
25-34	3871.6	0.93	0.0024	9895	55.5	0.00	0.00	0.00	0.0024	9895	54.6	0.0	32.6
35-44	3351.0	4.22	0.0125	9871	45.7	0.00	0.00	0.00	0.0125	9871	44.8	0.0	32.6
45-54	3187.1	8.50	0.0263	9747	36.2	0.00	0.00	0.00	0.0263	9747	35.3	0.0	33.0
55-64	2420.0	16.79	0.0671	9491	27.0	0.00	0.00	0.00	0.0671	9491	26.1	0.0	33.9
65-69	1162.1	17.95	0.0744	8855	18.6	5.04	2.34	1.08	0.0797	8855	17.6	1.0	36.4
70-74	1117.1	29.03	0.1220	8196	14.9	13.81	5.44	3.24	0.1321	8149	13.9	2.3	38.5
75-79	911.9	38.52	0.1910	7196	11.6	26.75	13.81	10.58	0.2110	7072	10.6	7.0	41.7
80-84	715.3	52.46	0.3099	5821	8.8	54.16	22.62	15.77	0.3664	5580	7.8	14.0	44.0
85+	678.3	102.88	1.0000	4018	6.6	150.69	42.32	55.86	1.0000	3536	5.9	47.4	47.4

Populations, Deaths and Numbers of Admissions (cols 2,3,7,8,9) are expressed as '000.
For l_x, e_x and the risk of admission (cols 5,6,11,12,14) figures refer to the start of the corresponding age group.

Appendix A: **Estimating the total number of long-stay residents of residential and nursing homes aged 65+**.

This estimate of residents in care homes of people aged 65+ is based on national statistics for England, 1995-6, allowing for double counting of people in nursing home beds in dual-registered homes.

Care homes included:
- Residential home for elderly people and elderly mentally infirm registered with local authorities (including dual registered homes) but not homes for younger people with physical/sensory disablement, mental illness, or learning difficulties. These homes do not predominantly serve elderly people (though there were 7,515 people over 65 in such homes, mostly the last).
- Nursing homes for elderly people, those with mental illness and physically disabled, Unlike residential care homes, these nursing homes predominantly serve people 65 and over.

From [3, table E5] Residents aged 65+ in residential and dual-registered homes for elderly, March 1996 = 226,580

 From [3, table E7]: Residents in residential and dual-registered homes for EMI = 10,519.

From [3, table E7]: Proportion of long-stay residents in homes for elderly and EMI = 96% and 97% respectively.

From [4, table 6a]: All nursing home beds occupied by people aged 65 and over= 133,387, of which, from table 6b, number in dual-registered homes = 33,600.

From PSSRU cross-sectional survey, the proportion of residents of nursing homes who are long-stay = 98%

Therefore, total number of people over 65 who are long-stay in homes/beds predominantly for the elderly = 226,580 x 96% + 10,519 x 97% + (133,387-33,600) x 98% = 325,511.

The figures shown in tables 1 and 2, column 7, are based on this total. The age and sex breakdown is according to the proportions in PSSRU cross-sectional survey:

Appendix B: **Estimating the number of first-time long-stay admissions to residential and nursing homes by people aged 65+** .

This estimate of first time admissions to residential and nursing homes for elderly people is based on national statistics for England, 1995-6, allowing for double counting of people in nursing beds in dual registered homes, adjusted where necessary using two PSSRU surveys.

Residential and dual-registered homes

From [3, table E13]: Long stay admissions aged 65+, all homes, FY1995-6
= 102,370 x 84% = 85,991

Nursing homes

From the PSSRU cross-sectional survey, annual rates of long-stay admission per resident (long and short stay) in nursing homes is 62.8%. Nationally there were 99,789 residents aged 65+ in nursing homes (excluding dual-registered homes) in 1996.

Therefore, estimated long-stay admissions to nursing homes = 99,789 x 62.8% = 62,697.

By similar argument there were 21,101 admissions to nursing beds in dual registered homes. Therefore overall there were an estimated 64,890 long-stay admissions to residential homes and residential beds in dual registered homes; and 83,789 admissions to nursing homes and nursing beds in dual registered homes.
.
Allowing for first time admissions.

Information is obtained from the PSSRU survey of admissions. This shows the previous residence (for residential and nursing beds separately) as follows:

	Residential homes/beds	Nursing homes/beds
From private household	83.1%	68.5%
From another care home	10.6%	15.4%
Long-stay hospital/other	6.3%	16.1%
(n)	1400	1193

The third group arises because the survey did not seek information on previous place of residence for people who had been in hospital more than 8 weeks. (This group includes a few other cases that could not be classified).

People admitted from a private household are likely to be first time admissions. Very few people admitted long-term to a care home ever return to a private household, let alone go back to a care home. After 6 months, only 3 percent of those traced in the admissions survey had left the original care home to return to a private household. People admitted from another care home are unlikely to be first time admissions. A few might be previously short-term residents, unable to return home for some reason. Those admitted from a long-stay hospital place are probably mostly first time admissions - but some may have moved from a care home to hospital and then been admitted to a different care home.

If we assume:

- All people admitted from private households and none of those from another care home were first time long-stay admissions;
- The proportion of first time admissions among those from long stay hospital is the same as the proportion of first time admissions among others;

then 88.7% of admissions to residential beds and 81.6% of admissions to nursing care beds are first time admissions.

These figures apply to state-funded residents only. We have more limited information on privately funded residents who represent about 23 per cent of recent admissions to residential homes and 26 per cent of recent admissions to nursing homes, from the PSSRU cross-sectional survey. Based on the 492 private residents admitted in the previous 12 months, whose former place of residence was known, we conclude that approximately 85% of those admitted to residential care, and 72% of those admitted to nursing beds, are first time admissions.

On this basis there were an estimated 123,284 first long-stay admissions to a care home by people aged 65+ in England in 1995-6.

The age/sex structure of these admissions shown in tables 1 and 2 column 8 is based on proportions from the PSSRU admissions survey. This has been crosschecked against partial figures reported nationally for long-stay resident care admissions [3, table L17]. (The PSSRU cross-sectional survey found that recently admitted privately funded residents are in fact slightly older than state funded residents, but this would have little affect on the estimated proportions).

Appendix C: Survivorship rates of elderly people admitted to care homes.

There is little recent evidence on length of survival after first admission. Netten & Bebbington (1995) estimated survivorship rates based on 73 long-stay residents to one home over a four year period from 1990. However, preliminary evidence suggests that death rates in the admissions survey is considerably higher.

A stationary population model is invoked to predict deaths for the present analysis. There is some justification for this in that though the total number of people over 65 in residential homes increased by 1 per cent [3, table E13], this is offset by an equal fall in the number in nursing homes [4, table 4; 9, table 1]. The age distribution was similarly little altered. With this model it is assumed that the total number of deaths in any year among people who have been admitted to care homes will be equal to the number of first admissions.

The number of residents in each age/sex group is determined by the number in the previous year, plus those moving up from the previous age group and the number of first admissions of that age, less the number moving out of that age group and the deaths of that age. Assuming these numbers are constant from year to year, it can be shown that:

$$D_{65-69}(I) \quad \approx \quad H_{65-69}(NI) - P_{69}(I)$$
$$D_{70-74}(I) \quad \approx \quad H_{70-74}(NI) - P_{74}(I) + P_{69}(I)$$
$$etc \; until$$
$$D_{85+}(I) \quad \approx \quad H_{85+}(NI) + P_{84}(I)$$

where:

$D_x(I)$ denotes deaths among the institutional population in age group x;

$H_x(NI)$ first admissions to institutions among people in age group x;

$P_x(I)$ the number of residents in institutions aged x (note these are end-of-year counts).

(These formulae are shown as approximate because some small end-of-age-group adjustment terms have been ignored).

Table 1 column 7 gives estimates of the residential population in five-year bands. The numbers for the required individual years have been estimated with help from the PSSRU cross-sectional survey. After smoothing (to allow for any tendency for reported ages to be rounded), we found that the highest age in each 5-year age group accounts for roughly 25 per cent of the total in that age group. This is true for both sexes and all age groups. These proportions are applied to the corresponding age group in column 7 of table 1. Together with the estimates of first admissions in table 8, this yields the numbers in column 9.