Healthy Life Expectancy: Trends to 1998, and the implications for long term care costs

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Summary

This report examines the trend in healthy life expectancy in England & Wales over the last two decades, and considers the future implications for costs of long-term care for older people.

The evidence is based on the General Household Survey between 1976 and 1998, together with data from comparable institutional populations. Trends are measured in limiting longstanding illness for the population as a whole; also in disability in the activities of daily living, and mobility for people over 65.

The impact on long-term care costs of a continuation of the current trends in disability is assessed using the forecasting model of Wittenberg et al (1998a). This is based on the trend to 1996 only with 1996 GAD population projections.

The report concludes:

1. Healthy life expectancy has continued to improve steadily over the last 20 years, in line with improvements in life expectancy, but not as fast. The improvement is most noticeable for severer forms of disability, but with regard to limiting long-standing illness there is little or no improvement.

2. However trends in age-specific disability rates are far from clear, and may actually have declined, particularly for limiting long-standing illness. The improvement in healthy life expectancy is being driven by improvements in life expectancy.

3. There is surprising year-on-year volatility in reported disability rates.

4. As a result, the forecast of future costs which make allowance for current trends in healthy life expectancy is very similar to Wittenberg et al's (1998a) baseline assumption of no change in age-specific disability rates.

5. Forecasting costs based on a range of assumptions about trends in disability from one standard deviation above, to one standard deviation below the central estimate, reveals the sensitivity of these forecasts to assumptions about trends. Projecting to 2031, this implies a range in the likely cost (at present prices) of between £20.5bn and £28.0bn per annum, with a central projection of £23.7bn, approximately 2½ times the amount spent in 1995.

1. Introduction.

This report describes the results of an investigation of trends in healthy life expectancy in England and Wales. First, it extends the series of estimates of healthy life expectancy in England & Wales based on the General Household Survey, to incorporate evidence from the 1996/7 and 1998/9 surveys. These contained a section on the health of people over 65 comparable with that asked in 1980, 1985, and 1994/5. Second, it considers the likely impact on the demand for long-term care if present trends in disability are projected into the future, using for this purpose the model developed by Wittenberg et al (1998) – the PSSRU/LSE model.

A second, subsequent report will undertake analysis of the 1996 follow-up of people over 65 interviewed as part of the 1994/5 General Household Survey (Goddard, 1998). This calculates health transition probabilities and comments on the potential design implications for a longitudinal health survey of older people. This is not included here.

1.1 Background and Previous Work.

Health expectancy is a way of describing the healthfulness of populations that is independent of their age structure, in a way that has an immediate interpretation for individuals. A key question is whether the lowering of mortality rates, which have been leading to an ageing of the population in most countries, are being accompanied by a corresponding improvement in morbidity rates, particularly among older people. In consequence, what is the likely demand for long-term care as the population ages? Wittenberg (2000b) demonstrates that trends in health status are one of most critical factors affecting projections of future costs.

Previous work by the PSSRU has undertaken to measure and establish trends in healthy life expectancy both for the population as a whole and for people over 65, using evidence from the General Household Survey. This work has been associated with an international effort to establish trends in healthy life expectancy and to draw common conclusions from health surveys and health series in a number of developed countries.

The UK work was originally summarised in Bone et al (1995) which included analyses and review designed to cover the main potential policy applications of the method, including:

- Monitoring Health Trends. Are improvements in health care postponing the onset of chronic ill-health; or preserving the lives of the unfit? What is the life-time risk and expected duration of particular states of health?
- Equity. Are all sections of the population benefiting from improvements in health care? How should health resources be distributed among areas and field agencies?
- Health Care Planning. What is the likely demand for long term care resulting from increasing numbers of old people?

- Health Outcomes. What diseases cause most ill-health? What national health strategy is likely to bring about the greatest improvement in morbidity?

Bone et al (1995) also illustrated new methods for calculating healthy life expectancy based on longitudinal data from two local surveys, and argued the case for a national longitudinal health survey, at least for older people. The *National Long-Term Care Survey* in the US (Manton, 1988) has been providing results for the US some years. The MRC *Cognitive Functioning and Ageing Study* (Brayne et al, 1999) based on six sites has provided some longitudinal estimates and the recently announced *English Longitudinal Survey of Ageing* (NCSR, 2000) should be able to do similar in due course. National healthy life expectancy estimates for people over 65 in institutions has also been prepared recently (Bebbington et al, 2000).

Following Bone (1995), Bebbington & Darton (1996) examined more systematically trends in healthy life expectancy for people over 65 based on data from the General Household Surveys in 1980, 1985, and 1994/5[1]. One of the conclusions of this work was that there appeared to be some evidence of an improving trend in healthy life expectancy for the most severe disability, but little sign of improvement at more moderate levels of disability. The results are in line with similar findings from other countries such as the US (Robine et al, 1995). If this represents a genuine trend, the implication is that numbers at the severest end of disability are not rising as fast as the population over 65, but the increase in life expectancy gained over the last 15 years is almost entirely in years of moderate disability. However the study did not estimate the rates of change in disability, nor did it consider their long-run implications.

Bebbington & Darton (1996) also looked at migration patterns among older people. Unlike the rest of the population, those in ill-health are more likely to move than the healthy.

The present report extends this work on trends to include data from the 1996/7 and 1998/9 General Household Surveys, and to estimate rates of change in disability and their implications for the costs of long-term care.

2. Analytic Approach

Healthy life expectancy is defined as the years of life a person may expect to live free of some chronic health condition; or sometimes a related health state such as institutionalisation; or until the first occurrence of some crucial health event. This way of presenting health information is particularly appropriate for health conditions that a large proportion of people may eventually expect to encounter, particular those conditions which tend to occur towards the end of life, such as chronic disability. The methods of analysis are related to those used to estimate the life-time risk and prognosis of health conditions.

[1] Although a similar section was contained in the 1991 GHS, wording differences limited its usefulness for measuring trends. Answers to ADL questions are known to be sensitive to the form of wording.

2.1 Methods of Calculation

Trends in health expectancies are based on a succession of period based estimates using the method introduced by Sullivan (1971) and popularised through the work of the International Network on Health Expectancy (Robine et al., 1995). This is essentially a *period* approach in which the estimates reflect the hypothetical expectation of an individual who through his/her life experienced age-specific mortality and ill-health rates equal to the current average rates. It is to be distinguished from the *cohort* approach that tracks the actual experience of individuals through their life-time.

Sullivan's approach combines mortality table data with information about the prevalence of ill-health from a cross-sectional study. (See Bone et al, 1995, for the method of calculation). This approach is generally agreed to be less satisfactory than true period estimates based on the age-specific rates of transition between good health, ill-health and death which are the intention of the second part of this project, but its limitations are now well understood. In particular, Sullivan's method is not suitable for detecting recent abrupt changes in trends, nor for estimating incidence rates, prognosis, or life-time risk. It is however suitable for measuring steady long term trends, as well as comparisons between population subgroups provided there is little migration among those subgroups.

2.2. Measures of Health

Health expectancy is a generic term that can be applied to a range of chronic or irreversible conditions or health events. The approach has been applied to specific diseases such as cancer and dementia; to impairment, disability and handicap to events such as admission to long stay institutional care. The present report is concerned primarily with disability related measures. Four specific measures are investigated:

- *Limiting Longstanding Illness (LLI).* Whether or not someone has a longstanding illness that limits their ability to undertake normal activities has been asked in every annual General Household Survey since 1976. The question takes the form:
    1. Do you have any longstanding illness or infirmity? By longstanding I mean anything that has troubled you over a period of time or that is likely to affect you over a period of time.
    2. Does this illness or disability limit your activities in any way?

  About 22% of all people, 48% of those aged 65+ report LLI[2]. LLI is one of the few measures of disability that can be used routinely for people of all ages. It has been shown to be highly correlated with use of health care – hence its adoption in the 1991 Census. However it has

[2] Figures quoted in this bullet list are derived from table 1 and are based on 1996/7 GHS rates in England and Wales, with an allowance for those in institutions, unless otherwise indicated.

been criticised as being potentially too subjective. Changes over the period, as well as differences between population subgroups, may be the result of changes in meaning, expectation and social role as much as changes in disability.

- *Activities of Daily Living (ADL).* A series of questions about degree of difficulty with activities of daily living was asked of people aged 65. These questions are of the form:

  Do you usually manage ……

  On your own
  Only with help from someone else
  Not at all

  The definition of disability used here includes people unable to do without help any one or more of the following:

  - washing face and hands;
  - bathing, showering, washing all over;
  - getting in and out of bed;
  - feeding ;
  - getting to the toilet.

  Approximately 13% of all people aged 65+ are disabled in this respect. Disability in this respect is particularly closely linked to institutionalisation. While 11% of people aged 65+ living in the community cannot do one or more of the above unaided, the proportion in residential and nursing homes is 84% (Netten et al, 1998).

- *Climbing Stairs.* A mobility question asked of people aged 65+, of the same form as above. The definition of disability includes people unable to do this without help. Approximately 13% of all people aged 65+ are disabled in this respect.

- *Going Outdoors.* A mobility question asked of people aged 65+, of the same form as above. The definition of disability includes people unable to do this without help. Approximately 20% of all people aged 65+ are disabled in this respect.

The choice of measures is of course determined by availability within the General Household Survey (see Bebbington & Darton, 1996, Appendix A). This excludes those aspects of disability which are not investigated in the GHS, in particular mental state[3]. Few other aspects of disability have long time series of comparable measures available from other sources. The GHS measures have been criticised for over-emphasising the physical aspects of disability, but as we have indicated they are closely linked to the demand for long-term care.

[3] A minor problem is that only limiting long-standing illness is asked in the case of proxy interviews in the GHS. Around 4 percent of people over 65 are interviewed by proxy, and have poorer than average health: 65 per cent report limiting longstanding illness compared with 45 percent of those interviewed personally.

2.3. Residents of Communal Establishments

Healthy life expectancy must be calculated on the entire population. The General Household Survey, which is the primary source of our evidence, excludes people living in communal establishments. This is significant because people living in health care institutions (and this is the majority of those in communal establishments) are particularly likely to have long-term ill-health.

However, the total number of people in communal establishments is comparatively small – only 7 per cent of those with limiting longstanding illness in the 1991 Census were living in communal establishments. For this reason approximate methods will serve.

The general approach is to determine the numbers of long-stay residents of the main health care institutions, by age and sex. This includes NHS psychiatric hospitals, other NHS hospitals, independent psychiatric hospitals, other independent hospitals, local authority homes, housing association hostels, independent nursing homes, independent residential care homes. The sources of evidence for this are described in Appendix A. The estimates involve some approximation particularly in 1998 for which key figures on numbers in residential care establishments are unavailable.

The number s of residents must be combined with the disability rate for people in health care establishments. Essentially the method is to adopt the rates found in the 1991 Census for limiting long-standing illness, and for other measures from the communal establishments part of the 1986-8 UK Disability Survey. This of course assumes that disability rates in communal establishments have not changed through time, which we will discuss further in §3.2.

3. Trends in Health Expectancy

3.1 Calculations

Tables 1-4 show trends in healthy life expectancy in England & Wales, in a manner similar to Bebbington & Darton (1996) but including the additional data for 1996 and 1998[4].

Table 1 contains full details of the workings for limiting longstanding illness calculation for each of the years 1976, 1981, 1985, 1988, 1991, 1992, 1994, 1996 and 1998. This table contains four groups of columns:

- Columns 1 to 3 give population, life table, and life expectancy at the start of each age group. These are generally calculated from the age-specific mortality rates shown in recent editions of *Population Trends*;

[4] There are slight differences for the figures for 1994, as a result of using more recent life tables.

- Columns 4 to 10 show the method of calculating the age-specific LLI rate (col 10) based on the age-specific rates in the community and in health care establishments, and the numbers in health care establishments. The rates in the community are taken from the GHS reports in the earlier years[5] but from 1994 onwards are derived from secondary analysis of the GHS. Determination of rates for health care establishments is described in Appendix A;
- Columns 11 and 12 show the calculation of the healthy life expectancy at the start of each age group;
- Columns 14 and 15 compare life and healthy life expectancy, first as a ratio, second as a difference (the expected years of LLI at the start of each age group).

Thus in 1996, life expectancy at birth was 74.8 years for men and 79.8 years for women: healthy life expectancy (in terms of limiting longstanding illness) was 59.9 years for men and 61.5 years for women.

Tables 2, 3, 4 reproduce the same analysis for disability in terms of ADL's, climbing stairs, and mobility outdoors respectively. This analysis is confined to the years 1980, 1985, 1994 and 1996 and is for people aged 65 and over only. In the interests of brevity, only selected columns of the analysis are shown.

3.2 Accuracy.

The accuracy of the estimates of healthy life expectancy in tables 1-4 rely primarily on the accuracy of the age-sex specific disability rates from the General Household Survey. Bebbington & Darton (1996) calculated standard errors for healthy life expectancy based on LLI in 1994. Given the large sample sizes in the GHS, these are quite small and lead to narrow confidence intervals for the estimates, of about one quarter of a year either side for HLE at birth, and 0.1 of a year for HLE at 65. Given the small size of these standard errors, they have not been recalculated.

Non-sampling errors may be more relevant. Given the nature of the GHS sampling procedure it is not obvious why these might arise. Nevertheless, the long run trends for LLI rates, as for example reported in Figure 3A of the 1994 GHS report, do show that there seem to be quite large variations from year to year, more that can be accounted for by the general trend and the sampling error. The existence of these variations tempers the conclusions that can be drawn from single-year estimates of healthy life expectancy.

The assumption of an unchanging disability rate in communal establishments may also be of concern. The evidence available for residential care and nursing homes, which represents the great majority the largest single category of health care establishments in terms of numbers, suggests that in general disability has increased. The PSSRU Survey of Residential and Nursing

[5] The published figures generally apply to GB as a whole but are assumed to apply equally to England and Wales.

Homes in 1996 enables a check of this assumption. The survey includes approximately 11,000 people aged 65+ living permanently in residential care and nursing homes. Netten et al (1978, table 2.20) show that the proportion of residents with at least one dependent function - roughly equivalent to our ADL scale shown above) increased from 75 percent in 1981 to 77 percent in 1986 and 87 percent in 1996. This is by comparison with earlier PSSRU surveys. and mobility function has also declined. There was an increase in the proportion unable to walk outdoors, and unable to climb stairs, between 1986 and 1996.

Table 5 shows the comparison of disability rates from the Disability Survey and the estimated national rates in residential and nursing homes in 1996, by age and sex[6], using three of the measures we are using here. This also confirms that there are some differences.

However, because a relatively small proportion of people over 65 live in such establishments, these differences are not sufficient to change the estimates of healthy life expectancy greatly. For example, if we were to use the disability rates given in table 5 for the 1996 calculations shown in tables 2,3,4; then the effect is to lower healthy life expectancy at 65 for men and women by no more than 0.1 of a year at most.

3.3 Interpretation.

Tables 6 and 7 summarise graphically the information about trends in life expectancy and healthy life expectancy in table 1, based on limiting longstanding illness. Between 1976 and 1998 there has been a phenomenal rise in period life expectancies for both men and women, equivalent to a gain of about 2 years in each decade. By contrast table 6 shows little comparative rise in healthy life expectancy. The situation is shown more clearly in the amplified table 7. If we disregard the aberrant year of 1996[7] and fit linear trend lines, male healthy life expectancy at birth has increased moderately, at around 6 months per decade. However for females there is no evidence of any improvement. So putting the two together, the consequence is a considerable increase in the lifetime expectancy of limiting long-term ill-health, for both men and women. Judged by this standard, for women all the increase in life expectancy over the last 22 years has been in years of ill-health. For men, three-quarters of the increase has been in years of ill-health.

Table 1 continues to confirm the now well established result that although women live longer than men, a greater proportion of their lives will be in ill-health. Based on 1994 rates, men can expect to

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[6] Note that although the PSSRU Survey was designed to be broadly comparable with the General Household Survey, questions about disability in the Disability Survey were worded differently; particularly the mobility items, for which much more detail was sought. The PSSRU survey sought the view of the head of the home, whereas the Disability Survey was often answered by the subject him/herself, or by a near relative. So differences between the two studies shown in table 5 should not be attributed just to changes through time in the clientele of health-related communal establishments.

[7] The low figures for healthy life expectancy is due particularly to higher than usual LLI rates between 15 and 64. The reason for this is unknown.

live 74 years of which 16 will be with limiting ill-health, while women can expect to live 80 years of which 20 will be with limiting longstanding ill-health.

Table 8 summarises graphically the evidence about healthy life expectancy for all four measures of disability in tables 1 to 4, for people aged 65. The general pattern is similar for men and women. The following table summarises the trends, based on fitting regression lines to this data:

Average improvement, in months per annum, in life expectancy and healthy life expectancy for people at age 65, over the period 1980-1998.

	Life Expectancy	HLE (LLI)	HLE (ADLs)	HLE (Stairs)	HLE (Outdoors)
Males	1.7	0.4	1.7	1.5	1.3
Females	1.2	0.6	1.2	0.6	0.5

This table shows that, for example, there has been an average increase in life expectancy for men at 65, of 1.7 months every year from 1980 to 1998. There are some noteworthy differences in the trends for men and women. The improvement in life expectancy at 65 over the last 20 years has been considerably higher for men than women. For men at least, the improvement in HLE based on ADL's, climbing stairs (the severer forms of disability) have almost kept pace with improvement in life expectancy. However, the improvement in outdoor mobility (moderate disability) has been less, and that in limiting long-standing illness (mild disability), much less. So for men, the additional life expectancy has been in years free from the more severe forms of disability, but with a rising amount of mild disability. The pattern for women is similar, but it seems that though disability with respect to the activities of daily living has kept pace with improvements with life expectancy, the other forms of disability have not. Rising life expectancy is accompanied by with longer periods with poor mobility and limiting long-standing illness..

These findings continue to support the view that there appears to be evidence of an improving trend in healthy life expectancy with regard to the most severe disability, but little sign of improvement at more moderate levels of disability. Because the rate of improvement has not kept up with the improvement in life expectancy, there does appear to be an expansion of morbidity, though that expansion is greatest for the least severe forms of disability.

4. Standardised Disability Rates

The evidence presented in section 3 showed that healthy life expectancy is rising, in line with the rate of improvement in life expectancy though not as fast. The rate of improvement is faster for the more severe forms of disability.

Healthy life expectancy is driven by two things: trends in life expectancy, and in the underlying age-specific disability rates. While life expectancy is raising unabated, such clear trends are not evident in relation to age-specific disability rates. Table 9 summarises the evidence by presenting trends in standardised disability rates, which allows us to assess how over all the population

disability has been changing, independently of changes in the age structure of the population. For this a 'standard' population is used, which we have chosen for this purpose to be the same as the actual population in 1980. It appears as if there has been some improvement in regard to ADL's for people over 65, but a small decline in other disability rates. So it seems that the improvement in healthy life expectancy is being driven primarily by better life expectancy, not improving age-specific disability rates.

We will be examining these trends in more detail in the next section, but in there are however two caveats to this general conclusion that will need to be borne in mind.

First, the age groups we have used in this analysis are rather coarse, and there is significant ageing within them. Estimation of trends in *partial* healthy life expectancies and age-specific disability rates based on the GHS, is limited by the sample size available. If accurate estimates with more detailed age groups were possible, then the conclusion might well be a little less pessimistic.

Second, as mentioned in §3.2, disability rates measured in the GHS do seem to be quite volatile, varying from year to year by more than can be attributed to sampling error and the long-term trend. For example, 1996 seems to have been a 'bad' year with a higher than usual level of disability for LLI's. Why such year-by-year variation occurs is unknown.

5. The Implications for Long Term Care.

5.1 Existing work

There is much concern with the future implications of an ageing population to the demand for, and the fiscal implications of, long-term care during the next 30 years or so. The key factor affecting future demand will be the numbers of dependent people, and it is therefore of great interest to consider what would be the implications of the current trends in disability that we have reported.

However, the number of disabled people is by no means the only factor affecting future demand. Type of disability, informal support particularly from family, personal expectations, care technology, unit costs of services all affect demand and the subsequent fiscal consequences.

As a result there have been several attempts in the UK and elsewhere to construct predictive models for long-term forecasting. We mention in passing

- The Institute of Actuaries (Nuttall et al, 1994) projections of the likely numbers of disabled people and of the costs of caring for them on varying assumptions.
- London Economics and the Institute for Public Policy Research (Richards et al, 1996) projections of future patterns of demand and supply of long-term care and associated costs.

- The Department of Health broad projections of expenditure on long term care on a range of assumptions (Health Committee, 1996).

Similar work has been undertaken in the USA, notably by the Brookings Institution (Wiener et al, 1996).

All the UK studies have been hampered by lack of empirical evidence about trends in most of the factors for which they have taken account, including disability with which we are specifically concerned here. The purpose of this section is to examine the effect of these trends in relation to one specific approach, that has been developed by the PSSRU at LSE (Wittenberg et al, 1998). It should be noted that this investigation is based on trends up until 1996 only, and the empirical testing using the earlier version of Wittenberg's model, which has been further developed by Wittenberg (2000a).

5.2 The PSSRU/LSE model

Wittenberg et al's (1998) approach makes projections of likely demand for long term care for older people for the next 30 years under different scenarios. It assesses the likely impact of different policies and approaches to funding long term care for older people on the balance of expenditure between sectors.

For this purpose the approach aims to make projections, to around the year 2030, of the following:

- estimated numbers of people over 65 with different levels of dependency by age group, gender, and household type;
- estimated levels of long term care services demanded by type of service under current patterns of utilisation and variants that may display greater cost-effectiveness;
- estimated expenditure by funding source given national patterns of costs and current funding mechanisms or specified variants.

and to combine these into a cell-based model for prediction. This work examined the current relationship in practice between receipt of a range of long-term care services and factors likely to be associated with need for these services. Its base case is effectively rooted in the current pattern of services and current policies. One of the features of this approach is the attention paid to the balance of costs between sectors. Informal care provided by relatives and friends could be crucial. To the extent that this substitutes for formal care, changes in the supply of informal care could have profound implications for the future demand for formal care as the London Economics model has shown (Richards et al, 1996).

The model is organised in three stages, corresponding to the steps listed above. The remainder of this subsection describes these briefly, together with more recent findings by Wittenberg et al (2000b) concerning the sensitivity of the projections to variations in these factors.

5.2.1 Projected Numbers of Elderly People

The Government Actuary's Department's 1996 population projections have been used as the basis for the numbers of people in each year under consideration until 2031 by age and gender. The base case assumes that numbers will change in line with the central projection, though there is scope for sensitivity analysis around the central estimate. This is especially important for at the oldest ages as past projections have turned out to be considerable underestimates. The number of people in England aged 65 and over is projected to rise by 60% between 1996 and 2031. The numbers of people aged 85 and over are projected to rise more rapidly, by around 88%. These rates of increase are accelerating from earlier GAD projections. As a variant, Wittenberg et al (2000b) consider the implications of a scenarios adopting GAD high and low projections, and also one in which it was assumed that the numbers of people aged 85 and over would increase by 1% per year faster than the principal GAD projections.

The projected population in each agegender subgroup has been further divided by dependency, as dependency is a key factor influencing receipt of all forms of long term care. For this purpose four categories of dependency are defined, based on the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs), and some consistent with the need for institutional care at various levels. Baseline rates were derived from the age/sex specific disability levels in the General Household Survey for 1994/5, and current rates of use of health-related institutional care. The earlier form of the model produced further subdivisions among people in residential care, and it is this version which has been used in the analysis of the present section.

It was recognised from the outset that trends in disability are likely to be crucial. For example, Nuttall et al (1993) showed that the expected increased cost of long-term care between 1991 and 2031 varied from 4 percent to 64 percent on no more than a 2 percent difference in the annual rate of change in the incidence of disability[8]. As with other models, Wittenberg et al (2000a) have had only limited empirical evidence, which they examined in Wittenberg et al (2000b). The best available is from the US National Long-Term Care Study (Manton et al, 1997) which points to a decline in age-specific prevalence of around 1% per annum for people over 65, though varying according the definition of disability. This became their principal variant in the later report. The baseline position was to assume that age/sex-specific dependency rates remain unchanged.

The projected non-institutionalised population aged over 65 is further broken down between those living alone, single people living with others, those living with their spouse only, and those living with their spouse and others. This is relevant to the availability of informal care. Baseline information was also obtained from the GHS, and GAD marital status projections. The model also includes (i) a breakdown by housing tenure, between those living in owner-occupied tenure and those living in rented accommodation. This can be regarded as a simple proxy for socio-economic

[8] Nuttall et al (1993) Appendix E, comparison of options E and G, with no change in unit care costs.

group, and is relevant to demand for privately or publicly funded care; (ii) people in institutional care, by gender age and former household composition.

5.2.2 Projected Amounts of Services Demanded

The second part of the model is concerned with projections of the volumes of services demanded. One input is the projected numbers of older people, i.e. the output of the first part. The other input is functions assigning packages of care to each cell, i.e. to each sub-group of the older population.

The services covered include a range of services relevant to meeting long-term care needs. Informal care is included both because it is important in its own right and because it is a key determinant of receipt of formal services. Key formal social services, such as home care, day care and meals, are covered. Health services, such as day hospital care, community nursing and chiropody, are also included. Private domestic help is also included, though this should be treated with caution. The probability of receipt of each of these services was estimated, through multivariate (logistic regression) analysis of GHS data, by age, dependency, household type, housing tenure, and receipt of informal help with domestic tasks. Residential care home, nursing home and long stay hospital care are also included in the model. Probability of receipt for these is based on age and gender and whether or not living alone. However, the model contains scope to vary the probabilities of receiving services and the average amounts of care received in the light of changes in policy and practice, possible constraints on the supply of care and other developments.

5.2.3 Projected Expenditure by Funding Source

The third stage is concerned with the total costs of the formal services demanded. It covers the costs to the health service, social services and users of services, for those services included in the model[9]. A key input is the unit costs of care, for which information has been drawn from Netten, Dennett and Knight (1998). The other input is the projected levels of services demanded as estimated in the second part of the model.

Financial projections over a substantial period of time are sensitive to assumptions about changes in the real unit costs of services. These will be affected by changes in input prices especially real wages in the caring sector, changing technical efficiency of service provision, any changes in client dependency, and any changes in the quality of services and expected outcomes. The model has examined the consequences of a range of possibilities.

The costs of the health services included - hospital, day hospital, some nursing home care, district nursing and chiropody - are assigned to the NHS. The costs of the social services included -

[9] Arguably, the total costs of long term care to society should be considered in a general model. That would require inclusion of the costs of a wider range of services to a wider range of public agencies and to service users and the opportunity costs of informal care.

residential and nursing home care, home care, day care and meals - are divided between personal social services and service users. Information on the proportion of residents who are privately funded and on the proportion of gross social services expenditure met by user charges was used for this purpose. The model assumes as a base case that the ratio of privately funded to publicly funded residents will rise in line with the ratio of older owner-occupiers living alone to other older people, based on projections of home ownership by the Anchor Housing Trust (Forrest et al, 1996).

Wittenberg et al (1998) report a base-line scenario from the PSSRU/LSE model in which total long-term care expenditure in 2031 will be almost 2½ times as much as in 1996, in real terms, to meet demographic pressures and to allow for likely real rises in health and social care costs. This later estimate in Wittenberg et al (2000a) is almost the same. The proportion of public expenditure would continue to be about two-thirds of the total, falling just slightly. However an annual 1% increase in age-specific dependency rates would make this a 3¼ fold increase while a similar decrease (as implied by the NLTCS) would imply necessary expenditure levels less than twice today's level.

5.3 Predicting Trends in Disability

We now consider how the trends in healthy life expectancy examined in section 3 can be projected to the year 2031 and inserted in the PSSRU/LSE model of long-term care demand. Clearly there must be a speculative element in extending trends based on the last two decades over 30 years into the future, particularly at a time of notable development in geriatric health care technologies. It is also, as we have argued elsewhere (Bone et al, 1995), inherently more satisfactory to use current incidence data rather than project trends through estimates based on Sullivan's method, but at present there are no national estimates of incidence rates for disability. Nevertheless, section 3 does for the first time, present suitable evidence about trends.

The PSSRU/LSE model requires as input, age/sex specific dependency rates, whereas what is available here are the healthy life expectancies[10]. However, the relationship is a close one, and it is easy to switch between partial healthy life expectancies (pHLE)[11] and dependency rates using the relationship:

$$pHLE(x,x+n) = L(x,x+n) \times \{1 - d(x,x+n)\} \; / \; l(x)$$

Where 'L' denotes the life table estimate of years of life lived between x and x+n, 'd' denotes the average dependency or disability rate in the age group; and 'l' denotes the life table population who reach the age of 'x'.

[10] It might be argued that it would more straightforward to project the disability rates rather than the healthy life expectancies. This alternative has also been examined and the two approaches in fact give very similar results, as might be expected. The author's view in favour of the approach presented is that link between healthy life expectancy and life expectancy helps clarify the prediction relationship

[11] A partial life expectancy is the life expectancy between ages 'x' and 'x+n'. Similarly a partial healthy life expectancy.

Trends in partial healthy life expectancy, and hence disability rates, have for this purpose been based not on time (as in tables 6-9) but rather on the relationship with life expectancy. The 1996 Government Actuary Department forecasts (Shaw, 1998) imply a slowing down of the current rapid rise in life expectancy. Given that we have shown a close relationship between life expectancy and healthy life expectancy, and that ultimately both may be influenced by the same underlying improvement in health, it is reasonable to suppose changes in the rate of improvement in life expectancy will impact on healthy life expectancy.

This is a crucial assumption, central to the forecasts. Because the rate of improvement in healthy life expectancy has not kept up with improvements in life expectancy over the period between 1980 and 1996 we are in effect assuming that it will never do so in the future: that there will be no compression of morbidity, and an aging population will imply more disabled people. Equally though, the numbers of disabled people is not necessarily assumed to rise pro-rata with the aging of the population, but somewhere in-between. Our preference for a fixed relationship between life expectancy and healthy life expectancy, rather than between healthy life expectancy and time, is based on a detailed analysis that shows that the former relationship has in the past been the closer one; but also that such is the nature of the trends that either assumption leads to very similar conclusions.

Further simplifications are to fit a trend jointly for men and women, and to simplify the age structure to two groups, 65-74 and 75+. With these simplifications, table 10 shows the best fitting trend lines (least squares fit) based on age, sex, and life expectancy, for the years for which data is available as shown in tables 1 to 4. This is 8 years for healthy life expectancy based on LLI, and four years for LLI based on ADL's, ability to climb stairs, outdoors mobility. Table 10 shows that healthy life expectancy is increasing with life expectancy, but never as fast, since the regression coefficient never reaches 1. The interpretation of these coefficients is that for every year of life expectancy gained, people at 75 gain 0.44 of a year free from LLI. The negative coefficients for sex in the 75+ age group signify that after allowing for their greater life expectancy, women have a poorer healthy life expectancy. These results accord with observations we made previously.

We are now able to use the trend lines in table 10 to predict healthy life expectancy in the future, which are shown in tables 11 to 14 for each of the four measures of disability. Each table shows separately for men and women, and by age group:

- Partial life expectancies at 65 and 75: actual expectancies for the years 1976 to 1996, and predictions based on the Government Actuary's Department estimates of future population size and death rates, for the years 2001, 2011, 2021 and 2031;

- Partial healthy life expectancies at 65 and 75, actuals and predictions estimated from the trend lines. Also shown are the standard deviation of the estimates[12] ;
- Predicted disability rates for 65-74 and 75+ calculated from these partial healthy life expectancies using the formula given above.

5.4 Five scenarios.

Our analysis will be based on five scenarios, two of which are entirely hypothetical, and three of which are derived from actual trends in healthy life expectancy, after projecting these into the future and determining their implications for age-specific disability rates

These scenarios are as follows:

1. Assume that age-specific disability rates remain unchanged in the future. We refer to this as the *pessimistic scenario.* It is the base-line assumption made by the PSSRU/LSE model.
2. Assume that all the years being gained in life expectancy are years of good health, so that the total expectation of ill health does not increase. This is the *optimistic scenario.* Given the 1996 GAD projections for future life expectancies, table 15 shows the implied change in age-specific disability rates[13].
3. Assume that healthy life expectancy will continue to rise with life expectancy in the way it has in the past, according to the central trend. This is the *central trend scenario.*
4. Ditto, but assume that the rise will be one standard deviation above the predicted trend. This is the *upper variant.*
5. Ditto, but assume that the rise will be one standard deviation below the predicted trend. This is the *lower variant.*

It should be noted that all these scenarios are based on the GAD central projection about life expectancy. It would be useful to adapt the fourth and fifth scenarios further to incorporate the high and low LE projections respectively, as shown by Shaw (1998, figure 6). However at present we lack detailed information regarding the GAD variant projections.

5.5 Fitting disability trends to the PSSRU/LSE model.

The PSSRU/LSE model allows the user to examine the consequences of change through predictions about changes in rates of each of the 7 types of dependency on which the model is based. These changes are expressed as a proportional increase or decrease in each rate, for each of the future years to which the model relates, with a 1995 baseline derived partly from the

[12] These are based on applying the assumptions of a regression model. While the residuals should be independent, they are unlikely to be normally distributed, and the resulting estimates should be regarded with caution.

[13] Calculated on the assumption that the expectation of ill-health *within each age-group* remains unchanged.

1994/5 GHS. An adaptation to the model permits separate changes to be applied to age/sex specific rates, for men and women, those above and below 75.

While the PSSRU/LSE model is based on 7 dependency categories, the present report has examined trends in 4 types of disability. This would seem to be present an obstacle, but for two things. First, four of the definitions of dependency are based on ADL's and IADL's which are very similar to the definitions of disability used in the present study, for which trends have been established by work over a number of years. The other three definitions are linked to the need for institutional forms of care and not defined in terms of needs characteristics. However, as we have shown, these states are strongly associated with severe ADL difficulties. Second, we have shown in section 3 that there seems to be certain general features of trends in disability, or dependency, which transcend specific measures. In particular we have shown that the more severe the condition, the closer the change in healthy life expectancy has been to healthy life expectancy whereas for milder conditions healthy life expectancy has barely changed.

We therefore propose to assume that trends in dependency rates of the dependency categories in the PSSRU/LSE model will be similar to trends in disability measures of comparable severity (i.e. affecting broadly similar numbers of people). Specifically, we assume that the trends in dependency will follow a similar proportional increase (or decrease) to the predicted age/sex-specific disability rates in tables 11 to 14 as follows[14]:

No dependency	No disability
Slight dependency	Unable to walk outdoors unaided
Moderate dependency	Unable to climb stairs unaided
Substantial dependency	Unable to perform an ADL
Dependency at the level of residential care	Ditto
Dependency at the level of nursing home care	Ditto
Dependency at the level of hospital care	Ditto

For example, in table 14, the rate of disability in mobility outdoors for males is predicted to increase from 7.9% to 9.3% between 1994 and 2001: an increase of 18% which is assumed to apply equally to the level of slight dependency in this age/sex group[15].

5.6 Results from the PSSRU/LSE model

[14] Some variants of these assumptions have also been tested.

[15] There is a slight difference between the years used by the PSSRU/LSE model compared with those of tables 11 to 14. The year 1994 in the latter tables is based mainly on data from the 1994/5 GHS which is also the year from which dependency rates for 1995 in the PSSRU/LSE model are derived. The predictions from tables 11 to 14 relating to years 2001, 2011 and 2021 have been applied to the years 2000, 2010, 2020 in the PSSRU/LSE model. It is unlikely that the small differences involved will be very significant in the overall context of the accuracy of long-range forecasts.

Tables 16 to 20 show results from fitting the PSSRU/LSE with different assumptions about trends in dependency. Each table shows the resulting consequence in terms of the expected demand for different types of service. For informal care, this is based on the predicted number of older dependent people living in private households who have a carer, following the model baseline assumptions about trends in the supply of informal care. It also assumes no change in the role and organisation of statutory services and no restrictions on their supply. Also given is the resulting expected cost to the NHS, local authority personal social services (net of charges) and to the clients of services, which will incidentally include costs met through social security payments. These include assumptions about unit cost inflation described in §4.2.3.

- Table 16 shows the baseline results of the PSSRU/LSE model, as given by Wittenberg et al (1998). This model assumes a constant age/sex-specific dependency rate, which we have referred to as the pessimistic scenario.
- Table 17 shows the consequences of no increase in the expectation of disability, the optimistic scenario (§4.4). The implications of this scenario for changes in disability, and hence dependency rates was shown in table 15.
- Table 18 shows the consequences of the central trend forecast in disability, and hence in dependency, as described in §4.3 and §4.5.
- Tables 19 and 20 show the consequences of the upper and lower variants in improvement in healthy life expectancy. The upper variant leads to lower estimates of age-standardised dependency and hence to lower demand for long-term care, and vice-versa.

5.7 Conclusions

We remind the reader of the speculative nature of projecting to the future on the basis of past trends, specially if there are factors which are likely to change. Arguably, the rapid development of geriatric medicine and a greater focus on the disabling conditions of old age may alter the relationship between disability and life expectancy.

Bearing in mind this caution, the five scenarios do seem to indicate how trends in disability and healthy life expectancy might impact on the future cost of long-term care services for older people. The consequences of these scenarios concerning trends (as shown in tables 16 to 20 respectively), can be summarised by the forecast cost of services in 2031:

	£'bn
Constant age-specific dependency (pessimistic case)	23.7
No increase in expectation of ill-health (optimistic case)	21.6
Projection of existing trend in healthy life expectancy (central trend)	23.7
Upper bound of improvement in healthy life expectancy (higher variant)	20.5
Lower bound of improvement in healthy life expectancy (lower variant)	28.0

These projections all use model baseline assumptions about other factors affecting demand and costs, including the supply of informal care, personal resources, role of services and the rise in unit costs.

It is evident from this that our central projection based on existing trends in healthy life expectancy produces an almost identical forecast to that of the PSSRU/LSE baseline assumption of constant age-specific dependency rates.

Suprisingly, the optimistic scenario which assumes that healthy life expectancy will increase in line with life expectancy so that there is no increase in the gross amount of dependency among older people, results in a forecast expenditure need that is only slightly lower. The forecast real increase from 1995 is 131 per cent on this scenario, compared with an increase of 153 per cent for the baseline case.

But the predicted costs are very sensitive to assumptions about the actual trend in healthy life expectancy, and the truth is that the past trend line over the last 15 or so years is not sufficiently consistent to provide very precise forecasts. Assuming one standard deviation either way in the forecast of (partial) healthy life expectancies results in a prediction that varies between an increase of just over 2-fold (119 per cent) to a 3-fold increase in real costs. It is clear from this that the existing trends do not exclude the possibility, raised in particular by Bebbington & Darton (1996), that the *optimistic scenario* might be achieved. In the light of this, inclusion of the evidence from the 1998 GHS in the next version of this report may well help to enable these trends to be confirmed more precisely.

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Appendix A: Methodology for Estimating the Size of the Institutional Population

1. Introduction

This appendix describes the methodology used for estimating the number of permanent residents in communal establishments providing health or social care.

Estimates were calculated for the following categories of establishment:

- NHS hospitals/homes – psychiatric
- NHS hospitals/homes – other
- Non-NHS hospitals – psychiatric
- Non-NHS hospitals – other
- Local authority homes
- Housing association homes and hostels
- Nursing homes
- Residential homes

These estimates had been calculated for the years 1976, 1981, 1985, 1988, 1991, 1992, and 1994, by age-group (0-4, 5-14, 15-44, 45-64, 65-74, 75-84 and 85 and over) and sex in Appendix C of Bebbington & Darton (1996) which more fully describes the method. This appendix briefly summarises the method and calculations but is mainly concerned with the calculations made for the year 1996. The latest estimates for 1998 use a simplified approach for reasons described briefly below. Section 2 describes the methods used for each type of establishment, and Section 3 provides details of the sources of information used.

2. Calculation of Estimates

NHS Hospitals/Homes – Psychiatric; NHS Hospitals/Homes – Other;
Non-NHS Hospitals – Psychiatric; Non-NHS Hospitals – Other

The calculation of the total number of resident patients in hospitals in the years 1976, 1981, 1985, 1988, 1991, 1992, and 1994 was based on linear interpolation and extrapolation from the 1981 Census for other residents and the 1991 Census for residents – non-staff.[16] These estimates were projected through to 1996 to provide the estimated hospital inpatient population.

Housing Association Homes and Hostels

Information on the number of hostel bedspaces contained in the annual reports of the Housing Corporation for 1988/89 and 1989/90, together with the results of the 1994 Housing Corporation survey of stock owned by registered housing associations, suggests that the annual growth in the

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number of hostel bedspaces, excluding individual shared housing bedspaces, was approximately 10 per cent between 1988/89 and 1994.[17]

The calculation of the total number of residents in housing association homes and hostels in the seven years 1976, 1981, 1985, 1988, 1991, 1992 and 1994 proceeded in the following stages:

- Total number of residents in age-groups 0-15, 16-44, 45-64, 65-74, 75-84 and 85 & over) by sex in England and Wales in 1991 taken from the 1991 Census for residents – non-staff in nursing homes, and total number of residents in age-groups 0-4, 5-14 and 15 estimated from 1991 Census age-distribution for residents – non-staff in communal establishments, producing estimated total number of residents in age-groups 0-4, 5-14, 15-44, 45-64, 65-74, 75-84 and 85 & over.
- Calculation of estimated total number of residents by age group and sex for 1976, 1981, 1985, 1988, 1992, 1994 and 1996 from the 1991 Census totals, assuming an annual growth rate of 10 per cent.

Nursing Homes

The calculation of the total number of permanent residents in nursing homes in 1996 proceeded in the following stages:

- Total number of patients in nursing homes in England by age group (under 18, 18-64, 65-74, 75-84 and 85 & over). Source: DH annual return KO36 (Table 6a: Nursing homes, England, 1995-1996)
- Total number of patients in dual registered homes in England by age group (under 18, 18-64, 65-74, 75-84 and 85 & over). Source: DH annual return KO36 (Table 6b: Dual Registered Nursing homes, England, 1995-1996)
- Subtraction of estimates from stage 2 from stage 1.
- Calculation of estimated total number of patients by age group (under 18, 18-64, 65-74, 75-84 and 85 & over) using 1996 population figures.
- Total number of patients in Nursing Homes 1996 – Wales by age group (under 65 and 65 & over). Source: Digest of Welsh Local Area Statistics 1998
- (Table 4.24)
- Calculation of estimated total number of patients by age group (under 18, 18-64, 65-74, 75-84 and 85 & over) using 1996 Welsh population figures.
- Combined the estimates from stages 4 and 6.
- Calculations from the PSSRU Cross-Sectional Survey of Residential and Nursing Homes for Elderly People were applied to Stage 7 in order to estimate the proportion of each sex in each age group.
- Inflate final estimates by 3% to allow for expansion.

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Residential Homes and Local Authority Homes

The calculation of the total number of permanent residents in residential and local authority homes in 1996 proceeded in the following stages:

- Total number of residents in residential and local authority homes in England by age group (under 65, 65-74, 75-84 and 85 & over). Source: DH annual return (Table E5)
- Calculation of estimated total number of residents by age group (under 18, 18-64, 65-74, 75-84 and 85 & over) using 1996 population figures.
- Total number of residents in residential and local authority homes in Wales by age group (under 65 and 65 & over). Source: Digest of Welsh Local Statistics 1998.
- Repetition of stage 2 using population figures for Wales.
- Combined the estimates from stages 2 and 4.
- Calculations from the PSSRU Cross-Sectional Survey of Residential and Nursing Homes for Elderly People were applied to stage 5 in order to estimate the proportion of each sex in each age group.
- Inflate final estimates by 3% to allow for expansion.

Total

The estimated total number of permanent residents in the above categories of communal establishment for 1996 by age group (0-4, 5-14, 15-44, 45-64, 65-74, 75-84 and 85 & over) and sex was obtained by summation.

3. 1998 estimates

No overall estimate of numbers of people in residential homes was produced in 1998, due to problems that the Department of Health experienced in collecting information on privately funding patients. In view of this, only an approximation is possible, based on the increase in numbers of places available from 1996 (and assuming similar occupancy rates). For other, more minor services we have therefore not bothered to update 1996 estimates. There were no major policy changes between the two years likely to have made big differences.

4. Sources of Information

NHS Hospitals/Homes – Psychiatric; NHS Hospitals/Homes – Other;
Non-NHS Hospitals – Psychiatric; Non-NHS Hospitals – Other

1981: Office of Population Censuses and Surveys (1983) *Census 1981. Communal Establishments. Great Britain*, CEN 81 CE, HMSO, London.
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Residential and Local Authority Homes

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Method used for estimating numbers of disabled people in the institutional population in 1996.

Table 1: Life Expectancy and Healthy Life Expectancy: abridged tables between 1976 and 1998, from the General Household Survey limiting longstanding illness question

1976 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\frac{e_{HL}(x)}{e(x)}$	Years LLI
0 - 4	1658	10000	70.0	2.2	905	404	39.8	36.6	2.2	48047	58.4	83	11.6
5 - 14	4091	9817	66.3	6.0	1976	1580	39.8	246.0	6.0	92068	54.6	82	11.7
15 - 44	9985	9786	56.5	9.0	5121	47660	81.7	933.3	9.3	262351	45.3	80	11.2
45 - 64	5583	9411	28.0	24.9	2666	15279	95.2	1400.9	25.1	129709	19.3	69	8.7
65 - 74	1963	7228	12.5	37.9	965	20921	93.2	755.5	38.5	36075	7.1	57	5.4
75+	809	4284	7.4	48.4	519	43573	93.5	411.2	50.8	15588	3.6	49	3.8
Women													
0 - 4	1569	10000	76.1	1.7	811	362	37.2	26.8	1.7	48411	62.1	82	14.0
5 - 14	3876	9858	72.2	4.7	1833	1154	37.2	182.5	4.7	93307	58.0	80	14.2
15 - 44	9678	9837	62.4	8.8	5229	39637	62.8	873.1	9.0	266649	48.7	78	13.7
45 - 64	5901	9603	33.4	23.0	2844	17659	96.3	1370.2	23.2	140108	22.1	66	11.3
65 - 74	2577	8329	16.6	40.0	1213	29235	93.9	1046.6	40.6	44863	8.7	52	7.9
75+	1769	6400	9.8	52.9	963	156196	94.7	1001.1	56.6	27226	4.3	43	5.5

1981 Men	Pop. (thou)	l(x)	e(x)	GHS d LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\frac{e_{HL}(x)}{e(x)}$	Years LLI
0 - 4	1542	10000	71.1	3.0	882	433	39.8	46.4	3.0	48363	58.7	83	12.4
5 - 14	3639	9853	67.1	8.0	1898	1513	39.8	291.6	8.0	90245	54.7	82	12.4
15 - 44	10603	9826	57.3	10.0	4975	46213	81.7	1093.4	10.3	260949	45.7	80	11.6
45 - 64	5405	9480	28.7	26.0	2707	17731	95.2	1417.6	26.2	128952	19.8	69	8.9
65 - 74	2020	7426	13.1	35.0	1040	19054	93.2	718.1	35.5	39543	7.9	60	5.2
75+	951	4606	7.8	44.0	585	44730	93.5	440.6	46.3	19283	4.2	54	3.6
Women													
0 - 4	1464	10000	77.1	3.0	802	359	37.2	44.0	3.0	47909	61.0	79	16.1
5 - 14	3446	9885	73.0	6.0	1800	1045	37.2	207.1	6.0	93107	56.9	78	16.1
15 - 44	10351	9866	63.1	11.0	5233	37437	62.8	1158.0	11.2	260374	47.5	75	15.6
45 - 64	5635	9659	34.1	26.0	2800	19158	96.3	1478.6	26.2	136518	21.6	63	12.5
65 - 74	2599	8438	17.1	41.0	1289	27554	93.9	1080.2	41.6	44282	8.6	50	8.5
75+	1979	6588	10.4	56.0	1087	167903	94.7	1173.2	59.3	27897	4.2	41	6.2

Table 1: (continued)

1985 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\frac{e_{HL}(x)}{e(x)}$	Years LLI
0 - 4	1615	10000	71.9	4.0	905	417	39.8	64.7	4.0	47491	58.9	82	13.0
5 - 14	3262	9875	67.8	8.0	1976	1163	39.8	261.3	8.0	90303	54.8	81	13.0
15 - 44	11019	9851	58.0	10.0	5121	39338	81.7	1130.1	10.3	261445	45.8	79	12.2
45 - 64	5421	9525	29.4	27.0	2666	19684	95.2	1477.1	27.2	129485	19.9	68	9.5
65 - 74	1934	7616	13.4	38.0	965	18359	93.2	745.1	38.5	38857	7.9	59	5.5
75+	1079	4856	8.0	43.0	519	48917	93.5	488.7	45.3	21254	4.4	55	3.6
Women													
0 - 4	1536	10000	77.7	3.0	811	328	37.2	46.2	3.0	47723	61.9	80	15.8
5 - 14	3086	9902	73.5	6.0	1833	783	37.2	185.4	6.0	93156	57.7	79	15.8
15 - 44	10764	9885	63.6	11.0	5229	31846	62.8	1200.5	11.2	262256	48.4	76	15.2
45 - 64	5586	9695	34.4	26.0	2844	17979	96.3	1465.0	26.2	137085	22.3	65	12.1
65 - 74	2461	8537	17.3	38.0	1213	27245	93.9	950.4	38.6	47363	9.3	54	8.0
75+	2159	6717	10.5	51.0	963	194417	94.7	1186.1	54.9	31784	4.7	45	5.8

1988 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\frac{e_{HL}(x)}{e(x)}$	Years LLI
0 - 4	1684	10000	72.4	4.0	882	460	39.8	67.5	4.0	47420	58.5	81	13.9
5 - 14	3144	9877	68.3	9.0	1898	1122	39.8	283.3	9.0	90193	54.4	80	13.9
15 - 44	11245	9854	58.4	11.0	4975	38258	81.7	1264.0	11.2	258716	45.4	78	13.0
45 - 64	5336	9530	29.8	27.0	2707	21712	95.2	1455.5	27.3	129753	19.8	66	10.0
65 - 74	1194	7706	13.7	41.0	1040	20766	93.2	500.4	41.9	37526	7.6	56	6.1
75+	1173	4997	8.2	46.0	585	60134	93.5	568.1	48.4	21129	4.2	52	4.0
Women													
0 - 4	1604	10000	78.1	3.0	802	329	37.2	48.2	3.0	48507	61.2	78	16.9
5 - 14	2978	9905	73.8	7.0	1800	699	37.2	208.7	7.0	92139	56.9	77	16.9
15 - 44	11010	9889	63.9	12.0	5233	30066	62.8	1336.5	12.1	258587	47.7	75	16.2
45 - 64	5458	9701	34.8	26.0	2800	18096	96.3	1431.8	26.2	137626	22.0	63	12.8
65 - 74	2489	8581	17.6	40.0	1289	28979	93.9	1011.2	40.6	46154	8.8	50	8.8
75+	2283	6786	10.8	56.0	1087	229062	94.7	1367.1	59.9	29401	4.3	40	6.5

Table 1: (continued)

1991 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\underline{e_{HL}(x)}$ e(x)	Years LLI
0 - 4	1761	10000	73.3	4.0	891	441	39.8	70.6	4.0	47767	59.9	82	13.4
5 - 14	3231	9902	69.0	7.0	1830	892	39.8	226.5	7.0	91394	55.7	81	13.3
15 - 44	11314	9881	59.2	10.0	4808	35903	81.7	1157.1	10.2	262814	46.5	79	12.7
45 - 64	5433	9549	30.6	25.0	2628	24785	95.2	1375.6	25.3	133421	20.6	67	10.0
65 - 74	2027	7940	14.3	40.0	967	22286	93.2	822.7	40.6	39553	8.0	56	6.3
75+	1229	5399	8.7	46.0	606	71309	93.5	599.2	48.8	24070	4.5	51	4.2
Women													
0 - 4	1670	10000	78.8	3.0	891	315	37.2	50.2	3.0	47271	62.8	80	16.0
5 - 14	3050	9923	74.5	5.0	1768	548	37.2	152.7	5.0	95182	58.5	79	16.0
15 - 44	10987	9908	64.5	11.0	4959	28266	62.8	1223.2	11.1	261791	49.0	76	15.5
45 - 64	5527	9731	35.4	25.0	2789	19360	96.3	1395.6	25.2	126056	23.0	65	12.4
65 - 74	2479	9715	18.1	34.0	1212	31323	93.9	861.6	34.8	63139	10.1	56	8.0
75+	2391	6997	11.3	51.0	983	280029	94.7	1341.8	56.1	34696	5.0	44	6.3

1992 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\underline{e_{HL}(x)}$ e(x)	Years LLI
0 - 4	1772	10000	73.7	5.0	870	436	39.8	88.8	5.0	47150	59.7	81	14.0
5 - 14	3282	9913	69.4	8.0	1780	883	39.8	262.8	8.0	91137	55.5	80	13.9
15 - 44	11192	9894	59.5	10.0	4610	36364	81.7	1145.3	10.2	262914	46.4	78	13.1
45 - 64	5571	9570	30.9	26.0	2739	25304	95.2	1466.0	26.3	132381	20.5	66	10.4
65 - 74	2049	8016	14.5	40.0	1039	22179	93.2	831.4	40.6	40113	7.9	55	6.5
75+	1234	5497	8.9	49.0	601	71764	93.5	636.6	51.6	23552	4.3	48	4.6
Women													
0 - 4	1683	10000	79.2	2.0	840	309	37.2	33.8	2.0	48687	61.9	78	17.3
5 - 14	3104	9932	74.8	7.0	1694	536	37.2	217.4	7.0	92223	57.5	77	17.3
15 - 44	10855	9919	64.9	13.0	4938	27903	62.8	1425.0	13.1	256904	48.2	74	16.6
45 - 64	5658	9740	35.7	26.0	2864	19657	96.3	1484.9	26.2	138086	22.7	64	13.0
65 - 74	2488	8756	18.3	38.0	1241	31348	93.9	963.0	38.7	48489	9.5	52	8.8
75+	2391	7059	11.5	52.0	972	283457	94.7	1364.4	57.1	34947	5.0	43	6.6

Table 1: (continued)

1994 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\frac{e_{HL}(x)}{e(x)}$	Years LLI
0 - 4	1754	10000	74.2	5.0	787	414	39.8	87.8	5.0	47591	59.2	80	15.0
5 - 14	3371	9918	69.8	9.5	1523	837	39.8	320.5	9.5	89763	54.9	79	14.9
15 - 44	11096	9900	59.9	12.7	4122	36122	81.7	1434.1	12.9	255300	46.0	77	13.9
45 - 64	5759	9576	31.3	26.5	2327	25716	95.2	1543.9	26.8	131977	20.9	67	10.4
65 - 74	2109	8071	14.8	38.5	912	22968	93.2	824.4	39.1	42503	8.5	57	6.3
75+	1214	5574	9.0	45.1	477	72198	93.5	582.5	48.0	25915	4.7	52	4.3
Women													
0 - 4	1669	10000	79.6	4.1	840	290	37.2	68.5	4.1	48047	62.2	78	17.4
5 - 14	3197	9935	75.1	7.2	1623	503	37.2	230.3	7.2	92254	57.9	77	17.3
15 - 44	10734	9922	65.2	12.5	4885	26372	62.8	1355.0	12.6	258190	48.6	75	16.6
45 - 64	5837	9746	36.1	26.3	2642	19708	96.3	1548.9	26.5	137880	23.0	64	13.1
65 - 74	2516	8788	18.6	39.2	1192	32753	93.9	1004.0	39.9	48476	9.9	53	8.8
75+	2345	7083	11.7	48.4	868	291144	94.7	1269.7	54.1	38096	5.4	46	6.4

1996 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\frac{e_{HL}(x)}{e(x)}$	Years LLI
0 - 4	1705	10000	74.2	3.9	717	615	39.8	66.7	3.9	47857	57.9	78	16.3
5 - 14	3430	9922	69.8	7.7	1416	1197	39.8	264.5	7.7	91495	53.5	77	16.3
15 - 44	11158	9906	59.9	14.1	3886	19696	81.7	1586.6	14.2	251040	44.4	74	15.5
45 - 64	5890	9604	31.3	30.9	2250	13235	95.2	1828.5	31.0	123118	19.7	63	11.7
65 - 74	2059	8250	14.8	41.9	811	7624	93.2	866.6	42.1	41033	8.0	54	6.9
75+	1315	5724	9.0	49.7	577	72800	93.5	685.4	52.1	24609	4.3	48	4.7
Women													
0 - 4	1620	10000	79.6	4.3	729	136	37.2	69.7	4.3	47701	59.8	75	19.9
5 - 14	3253	9938	75.1	8.0	1397	211	37.2	260.3	8.0	91381	55.3	74	19.8
15 - 44	10741	9927	65.2	15.8	4146	17973	62.8	1705.5	15.9	248424	46.2	71	19.0
45 - 64	5955	9760	36.1	32.1	2365	7898	96.3	1916.6	32.2	126431	21.5	60	14.5
65 - 74	2430	8883	18.6	39.4	941	33924	93.9	975.9	40.2	48581	9.4	51	9.2
75+	2454	7191	11.7	54.0	782	264654	94.7	1432.9	58.4	35098	4.9	42	6.8

Table 1: (continued)

1998 Men	Pop. (thou)	l(x)	e(x)	GHS LLI %	GHS n	Inst pop	Inst LLI %	All LLI (thou)	All LLI %	$L_{HL}(x)$	$e_{HL}(x)$	$\underline{e_{HL}(x)}$ e(x)	Years LLI
0 - 4	1666	10000	74.8	3.7	678	615	39.8	62	3.7	47653	59.9	80	14.9
5 - 14	3484	9922	70.4	8.0	1282	1197	39.8	279	8.0	91249	55.5	79	14.9
15 - 44	11226	9906	60.5	12.1	3713	19696	81.7	1373	12.2	257673	46.4	77	14.1
45 - 64	6019	9585	31.9	27.4	2153	13235	95.2	1658	27.5	131345	21.1	66	10.8
65 - 74	2040	8189	15.2	36.5	808	8081	93.2	749	36.7	45301	8.6	57	6.6
75+	1383	5811	9.1	49.3	489	77168	93.5	716	51.8	25506	4.4	48	4.7
Women													
0 - 4	1582	10000	79.8	4.9	648	136	37.2	78	4.9	47233	61.5	77	18.3
5 - 14	3309	9938	75.3	7.9	1261	211	37.2	262	7.9	91274	57.1	76	18.2
15 - 44	10769	9927	65.4	13.3	3728	17973	62.8	1706	13.4	256532	48.0	73	17.4
45 - 64	6085	9753	36.2	28.4	2261	7898	96.3	1917	28.5	134503	22.6	62	13.6
65 - 74	2361	8853	18.6	39.1	911	35964	93.9	976	39.9	49227	9.7	52	9.0
75+	2505	7219	11.5	51.3	766	280533	94.7	1433	56.2	36395	5.0	44	6.5

Table 2: Life Expectancy and Healthy Life Expectancy for people aged 65+: abridged tables between 1980 and 1998, based on five ADL's from the General Household Survey

2A: Men

	Life expect.	GHS Disab rate	Inst Disab rate	Total Disab rate	Healthy L.E.	HLE LE	Years Of Disab
	years	%	%	%	years	%	years
Men, 1980							
65 - 69	12.9	3.7	60.2	4.2	11.6	90	1.3
70 - 74	10.0	6.2	70.6	6.9	8.6	87	1.3
75 - 79	7.6	8.4	79.1	10.1	6.2	82	1.4
80 - 84	5.8	17.9	84.4	22.1	4.1	72	1.6
85+	4.3	30.9	88.0	38.7	2.7	61	1.7
Men, 1985							
65 - 69	13.3	4.7	60.2	5.2	12.1	90	1.3
70 - 74	10.4	3.9	70.6	4.6	9.1	88	1.2
75 - 79	7.9	11.4	79.1	12.9	6.5	83	1.4
80 - 84	5.9	13.1	84.4	16.8	4.6	78	1.3
85+	4.5	22.7	88.0	31.2	3.1	69	1.4
Men, 1994							
65 - 69	14.8	4.1	60.2	4.7	13.5	91	1.4
70 - 74	11.6	4.8	70.6	5.6	10.3	89	1.3
75 - 79	9.0	5.5	79.1	7.8	7.6	85	1.3
80 - 84	6.9	12.5	84.4	16.4	5.4	79	1.5
85+	5.3	17.5	88.0	27.5	3.8	72	1.5
Men, 1996							
65 - 69	15.0	6.3	60.2	6.5	13.7	91	1.4
70 - 74	11.8	4.1	70.6	4.3	10.7	90	1.2
75 - 79	9.1	7.8	79.1	10.5	7.8	86	1.2
80 - 84	6.8	7.2	84.4	10.1	5.7	84	1.1
85+	5.2	15.7	88.0	25.1	3.9	75	1.3
Men, 1998							
65 - 69	15.4	3.9	60.2	4.1	14.2	92	1.2
70 - 74	12.1	3.2	70.6	3.5	10.9	91	1.2
75 - 79	9.3	5.6	79.1	8.3	8.1	87	1.2
80 - 84	7.0	11.3	84.4	14.4	5.6	83	1.2
85+	5.3	11.6	88.0	21.3	4.2	79	1.2

Table 2 (continued)

2B Women

	Life expect.	GHS Disab Rate	Inst Disab rate	Total Disab rate	Healthy L.E.	HLE LE	Years Of Disab
	years	%	%	%	years	%	Years
Women,1980							
65 - 69	16.9	4.4	72.3	4.9	14.4	85	2.5
70 - 74	13.3	7.7	85.0	8.8	10.8	81	2.5
75 - 79	10.1	9.9	87.8	12.4	7.7	76	2.4
80 - 84	7.4	13.2	87.9	20.0	5.0	67	2.4
85+	5.3	35.6	93.3	48.3	2.7	52	2.6
Women,1985							
65 - 69	17.3	3.0	72.3	3.6	14.2	82	3.1
70 - 74	13.7	6.0	85.0	7.1	10.5	77	3.2
75 - 79	10.5	11.0	87.8	13.6	7.2	68	3.3
80 - 84	7.8	26.0	87.9	31.4	4.3	55	3.5
85+	5.6	51.0	93.3	60.1	2.2	40	3.4
Women, 1994							
65 - 69	18.6	5.5	72.3	6.2	15.6	84	3.0
70 - 74	15.0	6.5	85.0	7.8	12.0	80	2.9
75 - 79	11.7	9.5	87.8	13.2	8.8	75	2.9
80 - 84	9.0	14.8	87.9	21.9	6.1	67	2.9
85+	6.8	24.6	93.3	42.0	4.0	58	2.9
Women, 1996							
65 - 69	18.6	4.2	72.3	5.2	15.6	84	3.0
70 - 74	14.9	6.2	85.0	7.3	11.9	80	2.9
75 - 79	11.6	7.9	87.8	12.6	8.7	75	2.9
80 - 84	8.8	20.5	87.9	24.5	5.8	67	2.9
85+	6.6	26.7	93.3	41.8	3.8	58	2.7
Women, 1998							
65 - 69	18.8	4.3	72.3	5.3	16.1	86	2.7
70 - 74	15.0	6.1	85.0	7.3	12.4	82	2.6
75 - 79	11.7	10.6	87.8	15.1	9.1	78	2.6
80 - 84	8.8	12.6	87.9	17.7	6.4	73	2.4
85+	6.6	17.7	93.3	35.3	4.3	65	2.3

Table 3: Life Expectancy and Healthy Life Expectancy for people aged 65+: abridged tables between 1980 and 1998, based on ability to climb stairs from the GHS

	Life expect.	GHS Disab rate	Inst Disab rate	Total Disab rate	Healthy L.E.	HLE / LE	Years Of Disab
	years	%	%	%	years	%	years
Men, 1980							
65 - 69	12.9	2.0	28.7	2.2	11.9	93	0.9
70 - 74	10.0	5.1	39.7	5.5	9.0	90	1.0
75 - 79	7.6	5.3	46.3	6.3	6.6	87	1.0
80 - 84	5.8	12.5	55.9	15.2	4.5	79	1.2
85+	4.3	28.6	57.0	32.5	2.9	68	1.4
Men, 1985							
65 - 69	13.3	3.2	28.7	3.4	12.4	93	1.0
70 - 74	10.4	3.9	39.7	4.3	9.4	91	0.9
75 - 79	7.9	7.1	46.3	8.0	6.9	87	1.0
80 - 84	5.9	8.8	55.9	11.3	4.9	82	1.1
85+	4.5	25.0	57.0	29.2	3.2	71	1.3
Men, 1994							
65 - 69	14.8	5.9	28.7	6.1	13.8	93	1.1
70 - 74	11.6	3.4	39.7	3.8	10.8	92	0.9
75 - 79	9.0	4.6	46.3	5.9	8.1	90	0.9
80 - 84	6.9	8.3	55.9	10.9	6.0	87	0.9
85+	5.3	10.0	57.0	16.7	4.4	83	0.9
				6.7			
Men, 1996							
65 - 69	15.0	3.3	28.7	3.4	13.9	93	1.1
70 - 74	11.8	4.7	39.7	4.8	10.7	91	1.1
75 - 79	9.1	9.7	46.3	11.1	8.0	88	1.1
80 - 84	6.8	8.8	55.9	10.6	5.9	87	0.9
85+	5.2	10.5	57.0	16.5	4.3	84	0.9
Men, 1998							
65 - 69	15.4	4.6	28.7	4.8	14.1	92	1.3
70 - 74	12.1	1.7	39.7	2.0	10.8	90	1.2
75 - 79	9.3	6.3	46.3	9.0	7.9	85	1.4
80 - 84	7.0	16.7	55.9	19.6	5.6	80	1.4
85+	5.3	11.5	57.0	21.3	4.2	79	1.1

Table 3: (continued)

	Life expect.	GHS Disab rate	Inst Disab rate	Total Disab rate	Healthy L.E.	HLE / LE	Years Of Disab
	years	%	%	%	years	%	years
Women,1980							
65 - 69	16.9	3.4	48.2	3.7	14.7	87	2.2
70 - 74	13.3	5.9	45.2	6.5	11.1	84	2.2
75 - 79	10.1	10.4	53.7	11.8	7.9	78	2.2
80 - 84	7.4	17.5	59.7	21.3	5.3	71	2.2
85+	5.3	31.2	66.3	38.9	3.2	61	2.1
Women,1985							
65 - 69	17.3	4.5	48.2	4.9	14.7	85	2.5
70 - 74	13.7	6.6	45.2	7.1	11.2	82	2.5
75 - 79	10.5	12.8	53.7	14.2	8.0	76	2.5
80 - 84	7.8	22.0	59.7	25.3	5.3	69	2.4
85+	5.6	30.8	66.3	38.4	3.5	62	2.2
Women, 1994							
65 - 69	18.6	4.7	48.2	5.1	15.8	85	2.9
70 - 74	15.0	8.9	45.2	9.5	12.1	81	2.8
75 - 79	11.7	11.2	53.7	13.2	9.0	77	2.7
80 - 84	9.0	14.8	59.7	19.1	6.3	71	2.6
85+	6.8	29.4	66.3	38.8	4.2	61	2.6
				14.7			
Women, 1996							
65 - 69	18.6	5.3	48.2	5.9	15.4	83	3.2
70 - 74	14.9	6.7	45.2	7.2	11.7	79	3.1
75 - 79	11.6	10.3	53.7	12.8	8.4	73	3.2
80 - 84	8.8	22.2	59.7	24.4	5.6	63	3.2
85+	6.6	42.4	66.3	47.8	3.4	52	3.2
Women, 1998							
65 - 69	18.8	4.8	48.2	5.8	15.4	82	3.4
70 - 74	15.0	8.9	45.2	10.1	11.6	78	3.4
75 - 79	11.7	15.7	53.7	19.9	8.4	77	3.3
80 - 84	8.8	15.3	59.7	20.2	5.9	67	2.9
85+	6.6	30.6	66.3	45.2	3.6	55	3.0

Table 4: Life Expectancy and Healthy Life Expectancy for people aged 65+: abridged tables between 1980 and 1998, based on mobility outdoors from the General Household Survey

	Life expect.	GHS Disab rate	Inst Disab rate	Total Disab rate	Healthy L.E.	HLE / LE	Years Of Disab
	years	%	%	%	years	%	years
Men, 1980							
65 - 69	12.9	3.2	63.4	3.7	11.6	90	1.3
70 - 74	10.0	7.6	58.8	8.2	8.6	86	1.4
75 - 79	7.6	7.9	67.6	9.3	6.2	82	1.4
80 - 84	5.8	16.8	69.4	20.1	4.1	72	1.6
85+	4.3	37.5	78.0	43.0	2.5	57	1.9
Men, 1985							
65 - 69	13.3	4.8	63.4	5.3	12.0	90	1.4
70 - 74	10.4	6.2	58.8	6.8	9.0	87	1.3
75 - 79	7.9	11.4	67.6	12.7	6.5	83	1.4
80 - 84	5.9	15.3	69.4	18.1	4.6	77	1.3
85+	4.5	22.7	78.0	29.9	3.1	70	1.3
Men, 1994							
65 - 69	14.8	7.5	63.4	8.0	12.9	87	1.9
70 - 74	11.6	7.1	58.8	7.7	9.9	85	1.7
75 - 79	9.0	9.2	67.6	11.0	7.3	81	1.7
80 - 84	6.9	20.2	69.4	22.8	5.0	73	1.8
85+	5.3	23.8	78.0	31.5	3.6	69	1.7
				11.9			
Men, 1996							
65 - 69	15.0	5.0	63.4	5.2	13.6	91	1.4
70 - 74	11.8	6.1	58.8	6.3	10.5	89	1.3
75 - 79	9.1	8.2	67.6	10.5	7.8	86	1.3
80 - 84	6.8	9.5	69.4	11.8	5.7	83	1.2
85+	5.2	16.3	78.0	24.3	3.9	76	1.3
Men, 1998							
65 – 69	15.4	7.3	63.4	7.5	13.5	88	1.9
70 – 74	12.0	4.5	58.8	4.8	10.3	86	1.7
75 – 79	9.3	10.7	67.6	13.2	7.4	80	1.9
80 – 84	7.0	22.2	69.4	24.9	5.2	74	1.9
85+	5.3	19.2	78.0	28.0	3.9	72	1.5

Table 4: Life Expectancy and Healthy Life Expectancy for people aged 65+: abridged tables between 1980 and 1998, based on mobility outdoors from the General Household Survey

	Life expect.	GHS Disab rate	Inst Disab rate	Total Disab rate	Healthy L.E.	HLE / LE	Years Of Disab
	years	%	%	%	years	%	years
Men, 1980							
65 - 69	12.9	3.2	63.4	3.7	11.6	90	1.3
70 - 74	10.0	7.6	58.8	8.2	8.6	86	1.4
75 - 79	7.6	7.9	67.6	9.3	6.2	82	1.4
80 - 84	5.8	16.8	69.4	20.1	4.1	72	1.6
85+	4.3	37.5	78.0	43.0	2.5	57	1.9
Women,1980							
65 - 69	16.9	6.5	77.9	7.0	13.3	79	3.6
70 - 74	13.3	10.4	81.1	11.4	9.7	73	3.5
75 - 79	10.1	16.3	83.5	18.5	6.6	65	3.5
80 - 84	7.4	32.5	84.5	37.2	3.9	52	3.5
85+	5.3	51.8	91.3	60.5	2.1	40	3.2
Men, 1985							
65 - 69	13.3	4.8	63.4	5.3	12.0	90	1.4
70 - 74	10.4	6.2	58.8	6.8	9.0	87	1.3
75 - 79	7.9	11.4	67.6	12.7	6.5	83	1.4
80 - 84	5.9	15.3	69.4	18.1	4.6	77	1.3
85+	4.5	22.7	78.0	29.9	3.1	70	1.3
Women,1985							
65 - 69	17.3	7.6	77.9	8.2	13.3	77	4.0
70 - 74	13.7	10.7	81.1	11.7	9.7	71	4.0
75 - 79	10.5	17.9	83.5	20.1	6.5	62	4.0
80 - 84	7.8	33.0	84.5	37.5	3.8	49	4.0
85+	5.6	59.6	91.3	66.4	1.9	34	3.7
Men, 1994							
65 - 69	14.8	7.5	63.4	8.0	12.9	87	1.9
70 - 74	11.6	7.1	58.8	7.7	9.9	85	1.7
75 - 79	9.0	9.2	67.6	11.0	7.3	81	1.7
80 - 84	6.9	20.2	69.4	22.8	5.0	73	1.8
85+	5.3	23.8	78.0	31.5	3.6	69	1.7
				11.9			
Women, 1994							
65 - 69	18.6	9.9	77.9	10.6	14.0	75	4.7
70 - 74	15.0	13.0	81.1	14.1	10.5	70	4.5
75 - 79	11.7	19.2	83.5	22.3	7.3	63	4.4
80 - 84	9.0	26.1	84.5	31.7	4.8	53	4.2
85+	6.8	50.2	91.3	60.6	2.7	39	4.1
				24.0			
Men, 1996							
65 - 69	15.0	5.9	63.4	6.1	13.1	88	1.9
70 - 74	11.8	7.7	58.8	7.9	10.0	85	1.8
75 - 79	9.1	14.4	67.6	16.4	7.3	80	1.8
80 - 84	6.8	15.8	69.4	17.8	5.2	77	1.6
85+	5.2	23.0	78.0	30.1	3.6	70	1.6
Women, 1996							
65 - 69	18.6	7.8	77.9	8.8	13.8	74	4.8
70 - 74	14.9	12.5	81.1	13.5	10.1	68	4.7
75 - 79	11.6	16.9	83.5	20.8	6.9	60	4.7
80 - 84	8.8	34.5	84.5	37.4	4.1	47	4.6
85+	6.6	59.7	91.3	66.8	2.2	33	4.4

Table 5: Assumptions about disability levels in communal establishments

	Disabled in any ADL		Unable to climb stairs (without help)		Not mobile outdoors (without help)	
	DS, 1986-8	PSSRU, 1996	DS, 1986-8	PSSRU, 1996	DS, 1986-8	PSSRU, 1996
	%	%	%	%	%	%
Males						
65-69	60	72	29	46	63	44
70-74	71	79	40	53	59	52
75-79	79	79	46	60	68	58
80-84	84	81	56	61	69	62
85+	88	83	57	69	78	66
All males	82	81	51	62	72	60
Females						
65-69	72	74	48	51	78	55
70-74	85	80	45	60	81	63
75-79	88	83	54	66	84	67
80-84	88	86	60	67	85	69
85+	93	88	66	76	91	77
All females	89	86	61	72	87	73

Columns marked DS give the age-specific disability rates assumed in tables 2-4 (based on the 1986-8 Disability Surveys, Communal Establishments). Columns marked PSSRU give actual rates from the 1996 cross-sectional survey of residential and nursing homes.

Table 6: Trends in Life Expectancy and Healthy Life Expectancy at Birth

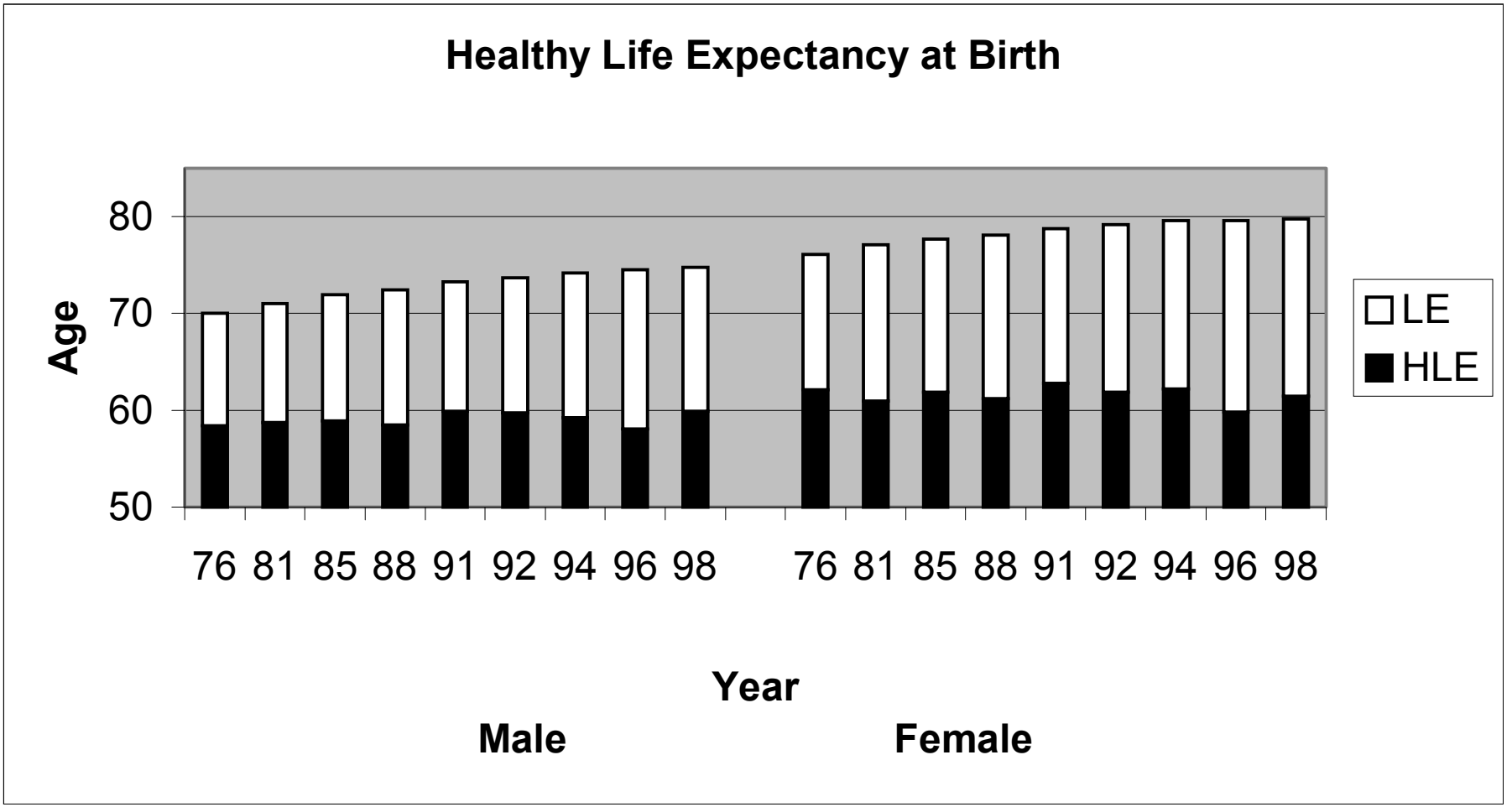
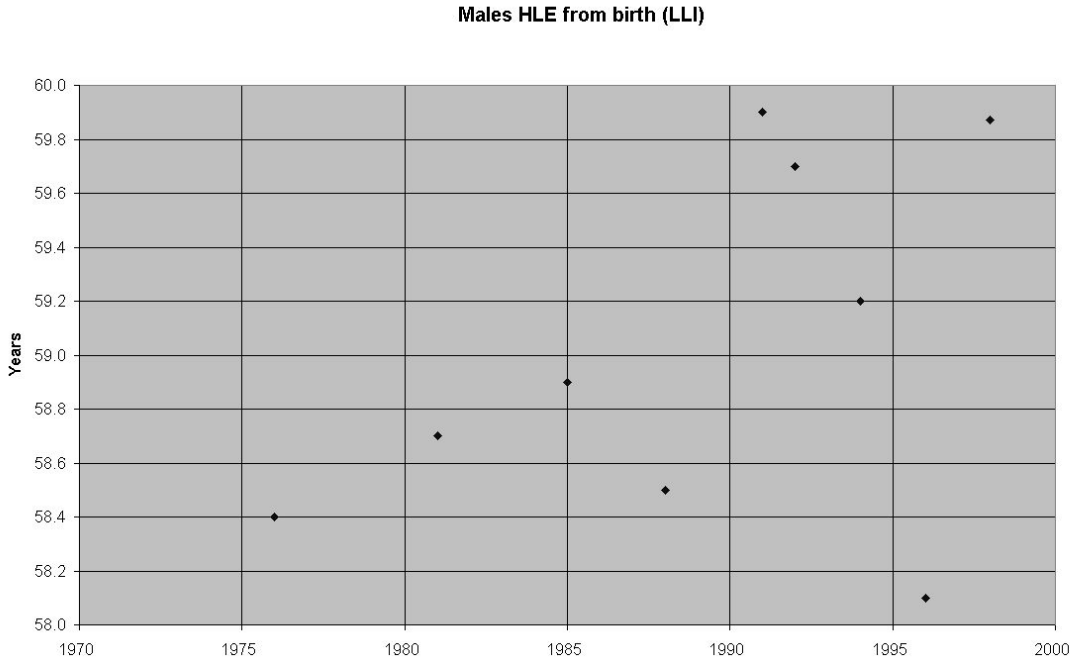


Table 7. Trends in healthy life expectancy at birth (detail)



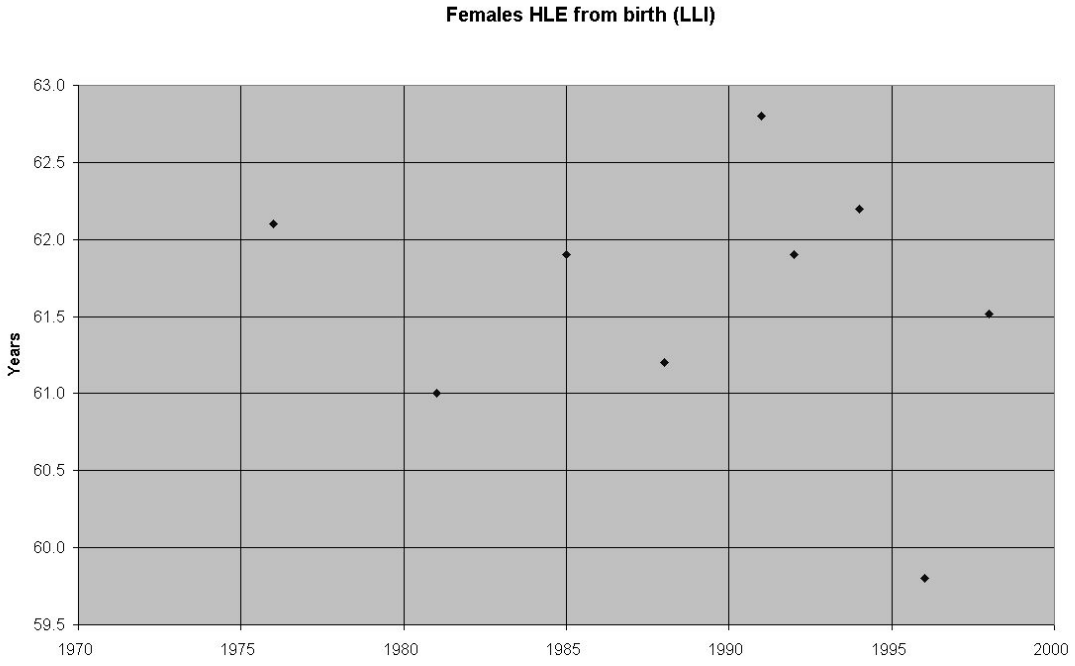
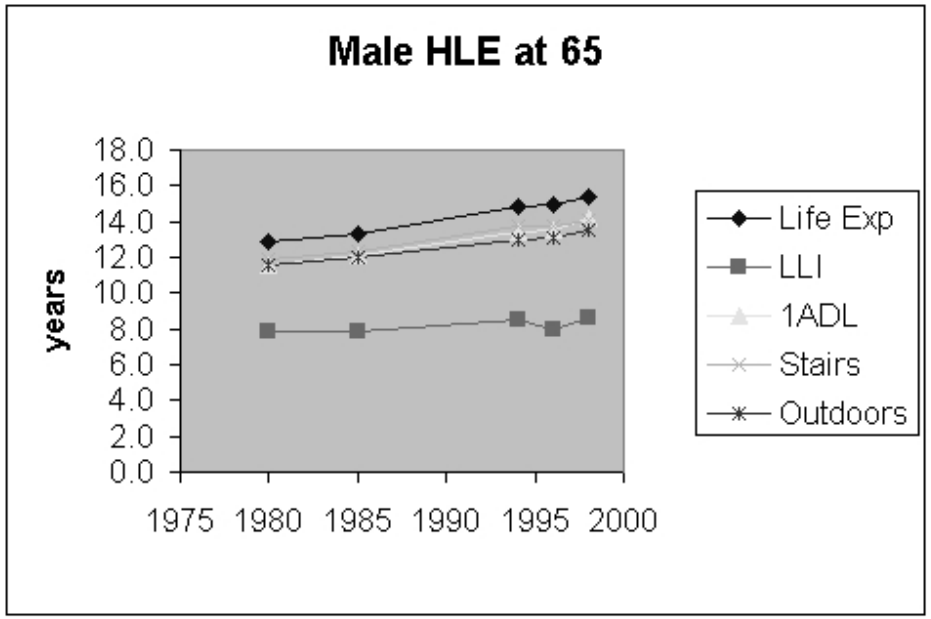


Table 8. Trends in healthy life expectancy at 65, using four health definitions



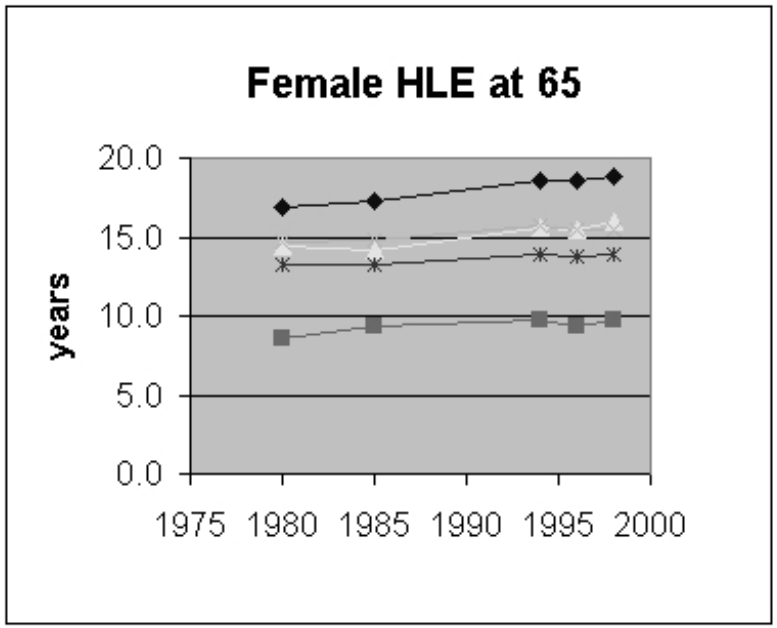


Table 9: Trends in standardised population disability rates

A. Limiting longstanding illness rates, all age groups.

	1976 %	1981 %	1985 %	1988 %	1991 %	1992 %	1994 %	1996 %	1998 %
Men	16.0	16.6	17.1	18.1	16.8	17.3	18.6	20.2	18.1
Women	18.1	20.2	19.5	20.7	18.9	20.6	20.5	23.5	21.5

B. Disability rates, for people over 65.

	ADL's		Climbing Stairs		Mobility Outdoors	
	Men %	Women %	Men %	Women %	Men %	Women %
1980	9.0	13.2	6.3	11.4	9.1	19.1
1985	8.5	15.0	6.3	12.9	9.2	20.4
1994	7.5	13.2	6.2	12.7	10.7	21.0
1996	7.7	11.6	6.4	13.4	7.9	18.2
1998	6.3	12.1	6.7	15.1	10.0	21.9

These rates are derived from tables 1-4. Standardised disability rates are computed by applying age-specific disability rates to a population with the same age distribution as in 1981 (part A) or 1980 (part B). The method uses direct standardisation.

Table 10: Trend equations for (partial) healthy life expectancy

	LLI		ADLs		Climbing Stairs		Outdoors Mobility	
	65-74	75+	65-74	75+	65-74	75+	65-74	75+
Constant	4.667	0.589	0.596	0.203	3.028*	1.644	4.788*	2.986*
Partial life expectancy	0.047	0.440*	0.876*	0.819*	0.598*	0.688*	0.365	0.465*
Sex (Female)	0.405	-0.701*	-0.048	-1.02*	0.058	-0.765	0.018	-1.086*
Data Points	16	16	8	8	8	8	8	8
R^2	0.65	0.76	0.98	0.92	0.97	0.92	0.85	0.82

The table shows eight regression equations fitting partial healthy life expectancy (in years) to partial life expectancy (in years) and sex, based on the data of tables 1 to 4. The equations are for each of the four types of disability analysed in this report, separately for people aged 65-74 and those aged 75+. * Denotes coefficients that are significantly different from zero (at 5% level).

Table 11: Predicted Partial Healthy Life Expectancy and Disability Rates: Limiting Longstanding Illness

	Males aged 65-74			Males aged 75+			Females aged 65-74			Females aged 75+		
	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %
1976	8.11	4.99	39	7.40	3.64	51	9.07	5.39	41	9.80	4.25	57
1981	8.26	5.33	36	7.80	4.19	46	8.98	5.24	42	10.40	4.23	59
1985	8.30	5.10	39	8.00	4.38	45	9.04	5.55	39	10.50	4.74	55
1988	8.38	4.87	42	8.20	4.23	48	9.06	5.38	41	10.80	4.33	60
1991	8.38	4.98	41	8.70	4.45	49	9.03	5.89	35	11.30	4.96	56
1992	8.40	4.99	41	8.90	4.31	52	9.03	5.53	39	11.50	4.93	57
1994	8.61	5.25	39	9.00	4.68	48	9.17	5.51	40	11.70	5.37	54
1996	8.56	4.95	42	9.00	4.31	52	9.13	5.46	40	11.70	4.87	58
2001	8.77	5.08 (0.17)	42	9.31	4.68 (0.11)	50	9.25	5.50 (0.09)	40	11.72	5.05 (0.10)	57
2011	8.94	5.08 (0.23)	43	10.00	4.99 (0.16)	50	9.36	5.51 (0.13)	41	12.31	5.30 (0.14)	57
2021	9.03	5.09 (0.27)	44	10.55	5.23 (0.21)	50	9.41	5.51 (0.15)	41	13.09	5.65 (0.20)	57
2031	9.08	5.09 (0.29)	44	10.89	5.38 (0.24)	51	9.48	5.51 (0.18)	42	13.77	5.94 (0.26)	57

Figures for 1976-1996 are actuals, calculated from the same sources as table 1. Partial life expectancies for 2001 to 2031 are from GAD 1996 projections. Partial healthy life expectancies are calculated from table 10 (columns 1 and 2). Standard errors of estimates are shown. Predicted age-specific disability rates are calculated from partial healthy life expectancies using the formula given in the text.

Table 12: Predicted Partial Healthy Life Expectancy and Disability Rates: ADLs

	Males aged 65-74			Males aged 75+			Females aged 65-74			Females aged 75+		
	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %
1980	8.19	7.75	5.4	7.60	6.30	17.2	9.00	8.39	6.9	10.10	7.88	22.0
1985	8.30	7.89	4.9	8.00	6.68	16.5	9.04	8.56	5.3	10.50	7.42	27.3
1994	8.61	8.18	5.1	9.00	7.70	14.4	9.17	8.53	7.0	11.70	8.83	24.5
1996	8.56	8.39	5.7	9.00	7.65	15.0	9.13	8.55	6.3	11.70	8.61	26.4
2001	8.77	8.29 (0.06)	6.3	9.31	7.82 (0.19)	18.0	9.25	8.65 (0.04)	6.8	11.72	8.77 (0.17)	26.6
2011	8.94	8.44 (0.08)	6.6	10.00	8.39 (0.27)	18.8	9.36	8.75 (0.05)	7.0	12.31	9.25 (0.24)	26.7
2021	9.03	8.52 (0.10)	6.8	10.55	8.84 (0.34)	19.5	9.41	8.80 (0.06)	7.1	13.09	9.89 (0.34)	27.0
2031	9.08	8.56 (0.11)	7.0	10.89	9.11 (0.39)	19.8	9.48	8.86 (0.07)	7.3	13.77	10.44 (0.43)	27.2

Figures for 1980-1996 are actuals, calculated from the same sources as table 2. Partial life expectancies for 2001 to 2031 are from GAD 1996 projections. Partial healthy life expectancies are calculated from table 10 (columns 3 and 4). Standard errors of estimates are shown in brackets. Predicted age-specific disability rates are calculated from predicted partial healthy life expectancies using the formula given in the text.

Table 13: Predicted Partial Healthy Life Expectancy and Disability Rates: Ability to Climb Stairs

	Males aged 65-74			Males aged 75+			Females aged 65-74			Females aged 75+		
	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %
1980	8.19	7.89	3.6	7.60	6.67	12.2	9.00	8.54	5.0	10.10	8.06	20.2
1985	8.30	7.98	3.8	8.00	7.06	11.7	9.04	8.50	6.0	10.50	8.09	23.0
1994	8.61	8.18	5.0	9.00	8.14	9.6	9.17	8.50	7.3	11.70	9.05	22.7
1996	8.56	8.18	4.4	9.00	7.81	13.2	9.13	8.53	6.6	11.70	8.58	26.7
2001	8.77	8.27 (0.05)	6.3	9.31	8.04 (0.18)	15.5	9.25	8.62 (0.03)	7.2	11.72	8.94 (0.16)	25.1
2011	8.94	8.37 (0.08)	7.2	10.00	8.52 (0.25)	17.3	9.36	8.69 (0.04)	7.7	12.31	9.35 (0.22)	25.9
2021	9.03	8.43 (0.09)	7.7	10.55	8.90 (0.32)	18.7	9.41	8.72 (0.05)	8.0	13.09	9.88 (0.31)	26.9
2031	9.08	8.46 (0.09)	7.9	10.89	9.13 (0.36)	19.5	9.48	8.76 (0.06)	8.3	13.77	10.35 (0.40)	27.8

Figures for 1980-1996 are actuals, calculated from the same sources as table 3. Partial life expectancies for 2001 to 2031 are from GAD 1996 projections. Partial healthy life expectancies are calculated from table 10 (columns 5 and 6). Standard errors of estimates are shown in brackets. Predicted age-specific disability rates are calculated from partial healthy life expectancies using the formula given in the text.

Table 14: Predicted Partial Healthy Life Expectancy and Disability Rates: Outdoors Mobility

	Males aged 65-74			Males aged 75+			Females aged 65-74			Females aged 75+		
	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %	Partial LE (years)	Partial HLE (years)	Disability Rate %
1980	8.19	7.73	5.6	7.60	6.33	16.8	9.00	8.18	9.1	10.10	6.80	32.7
1985	8.30	7.80	6.0	8.00	6.68	16.5	9.04	8.14	9.9	10.50	6.75	35.7
1994	8.61	7.93	7.9	9.00	7.31	18.8	9.17	8.04	12.3	11.70	7.42	36.6
1996	8.56	7.96	6.9	9.00	7.25	19.5	9.13	8.12	11.1	11.70	7.08	39.5
2001	8.77	7.98 (0.08)	9.3	9.31	7.32 (0.13)	22.9	9.25	8.18 (0.05)	12.1	11.72	7.35 (0.12)	38.3
2011	8.94	8.05 (0.11)	11.2	10.00	7.63 (0.19)	25.5	9.36	8.22 (0.06)	12.9	12.31	7.62 (0.17)	39.4
2021	9.03	8.10 (0.13)	11.9	10.55	7.89 (0.24)	27.5	9.41	8.24 (0.07)	13.3	13.09	7.98 (0.23)	40.8
2031	9.08	8.18 (0.14)	12.3	10.89	8.05 (0.27)	28.6	9.48	8.26 (0.09)	13.7	13.77	8.30 (0.29)	41.9

Figures for 1980-1996 are actuals, calculated from the same sources as table 4. Partial life expectancies for 2001 to 2031 are from GAD 1996 projections. Partial healthy life expectancies are calculated from table 10 (columns 7 and 8). Standard errors of estimates are shown in brackets. Predicted age-specific disability rates are calculated from partial healthy life expectancies using the formula given in the text.

Table 15: Implications of a zero rise in unhealthy life expectancy (optimistic scenario)

	Change in disability rate %			
	Males, 65-74	Males 75+	Females 65-74	Females 75+
1994	100.0	100.0	100.0	100.0
2001	98.2	96.7	99.1	99.9
2011	96.3	90.0	98.0	94.9
2021	95.3	84.9	97.4	89.4
2031	94.9	82.4	96.7	91.7

This table shows the proportional change in age-specific disability rate required to ensure no rise in unhealthy life expectancy, given the GAD projections for increasing life expectancy. For example, the disability rate for males aged 65-74 in 2001 would need to be 98.2% of its rate in 1994 (base year). These change rates apply to all types of disability.

Table 16: PSSRU/LSE model baseline forecast: constant age-specific disability rates (pessimistic scenario)

	Total numbers receiving selected services					% Increase,
	1995	2000	2010	2020	2031	1995 – 2031.
Informal care	1713193	1752132	1853070	2156156	2685032	57
Home help	516824	518847	540567	632795	804270	55
Community nurse	444182	454330	485730	565093	716596	61
Day centre	218211	217795	226863	269511	336943	54
Private domestic help	567273	600686	661016	784945	967442	70
Meals-on-wheels	206454	208507	226085	264654	339529	64
Luncheon club	245908	249501	266648	321459	398875	62
Chiropody	1749907	1776847	1898834	2252090	2804109	60
Residential care	244840	255589	273877	313718	400265	63
Nursing home care	133390	139803	149701	171702	219255	64
Hospital care	28695	29337	31430	37468	46479	62
	Total net cost (£m)					
NHS	2159	2376	2942	4017	5910	174
LA PSS	3816	4072	4649	5879	8542	124
Clients (private costs)	3379	3841	4834	6383	9216	173
Total	9353	10290	12424	16279	23668	153

The table shows the resulting service demand and costs, corresponding to the baseline case of Wittenberg et al (1998). Informal care is the estimated number of dependent people living in households who have a carer. LA PSS costs are net of client charges. Private costs exclude costs associated with informal care.

Table 17: PSSRU/LSE model forecasts with no increase in lifetime expectation of disability (optimistic scenario)

	Total numbers receiving selected services					% Increase,
	1995	2000	2010	2020	2031	1995 – 2031.
Informal care	1713193	1737771	1765556	1985495	2467383	44
Home help	516824	518717	525769	602524	766463	48
Community nurse	444182	453223	471692	537683	680919	53
Day centre	218211	217538	222301	260475	325599	49
Private domestic help	567273	602140	660789	784162	967097	71
Meals-on-wheels	206454	208894	220460	252827	324913	57
Luncheon club	245908	249767	265827	319919	396992	61
Chiropody	1749907	1776861	1886331	2228414	2773339	59
Residential care	244840	250701	258094	280320	360726	47
Nursing home care	133390	136478	140787	153280	196645	47
Hospital care	28695	28567	29707	34014	42147	47
	Total net cost (£m)					
NHS	2159	2335	2807	3704	5446	152
LA PSS	3816	4009	4410	5332	7786	104
Clients (private costs)	3379	3773	4581	5772	8381	148
Total	9353	10117	11797	14808	21613	131

Table 18: PSSRU/LSE model forecasts with the central assumptions about trends in disability from table 11

	Total numbers receiving selected services					% Increase,
	1995	2000	2010	2020	2031	1995 – 2031.
Informal care	1713193	1793129	1971295	2341216	2976973	74
Home help	516824	522430	552452	650498	836230	62
Community nurse	444182	458260	497615	582154	746013	68
Day centre	218211	219792	232522	278305	350956	61
Private domestic help	567273	601137	662905	787756	972540	71
Meals-on-wheels	206454	209605	230267	270718	351085	70
Luncheon club	245908	250760	270557	328197	408928	66
Chiropody	1749907	1783313	1919917	2285775	2858724	63
Residential care	244840	256486	272870	310531	393149	61
Nursing home care	133390	140439	149530	170630	216585	62
Hospital care	28695	29562	31693	37776	46744	63
	Total net cost (£m)					
NHS	2159	2395	2983	4083	6020	179
LA PSS	3816	4093	4672	5895	8552	124
Clients (private costs)	3379	3856	4827	6343	9106	170
Total	9353	10344	12483	16321	23678	153

The table shows the resulting service demand and costs. Informal care is the estimated number of dependent people living in households who have a carer. LA PSS costs are net of client charges. Private costs exclude costs associated with informal care.

Table 19: PSSRU/LSE model forecasts with lower limit assumptions about trends in disability from table 11

	Total numbers receiving selected services					% Increase,
	1995	2000	2010	2020	2031	1995 – 2031.
Informal care	1713193	1674151	1797282	2086807	2626303	53
Home help	516824	505062	526409	610701	780705	51
Community nurse	444182	439672	469163	540435	687251	55
Day centre	218211	212801	222340	263080	330069	51
Private domestic help	567273	600921	661493	784671	969724	71
Meals-on-wheels	206454	203746	220500	255217	329652	60
Luncheon club	245908	249088	267598	323512	403322	64
Chiropody	1749907	1766052	1893010	2246608	2806325	60
Residential care	244840	235383	245303	269699	332796	36
Nursing home care	133390	128109	133651	147371	182234	37
Hospital care	28695	26760	28026	32375	39133	36
	Total net cost (£m)					
NHS	2159	2218	2707	3610	5234	142
LA PSS	3816	3797	4250	5209	7404	94
Clients (private costs)	3379	3565	4379	5580	7829	132
Total	9353	9580	11336	14399	20467	119

The table shows the resulting service demand and costs. Informal care is the estimated number of dependent people living in households who have a carer. LA PSS costs are net of client charges. Private costs exclude costs associated with informal care.

Table 20: PSSRU/LSE model forecasts with upper limit assumptions about trends in disability from table 11

	Total numbers receiving selected services					% Increase,
	1995	2000	2010	2020	2031	1995 – 2031.
Informal care	1713193	1925756	2214368	2735271	3495920	104
Home help	516824	542041	590155	715349	921300	78
Community nurse	444182	478699	536645	646871	831195	87
Day centre	218211	227805	247521	303555	383530	76
Private domestic help	567273	601201	663425	791151	972947	72
Meals-on-wheels	206454	216318	244921	296772	384896	86
Luncheon club	245908	252926	275396	336616	418152	70
Chiropody	1749907	1804673	1964728	2358242	2949358	69
Residential care	244840	277700	305912	365574	477048	95
Nursing home care	133390	152815	168084	201122	262429	97
Hospital care	28695	32371	35748	44553	56017	95
	Total net cost (£m)					
NHS	2159	2577	3309	4712	7031	226
LA PSS	3816	4396	5191	6848	10157	166
Clients (private costs)	3379	4147	5359	7359	10844	221
Total	9353	11120	13860	18919	28032	200

The table shows the resulting service demand and costs. Informal care is the estimated number of dependent people living in households who have a carer. LA PSS costs are net of client charges. Private costs exclude costs associated with informal care.