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Personal Social Services
Research Unit

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Future Demand for Long-Term Care, 2001 to 2031

Projections of Demand for Long-Term Care for Older People in England

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Introduction

The financing of long-term care raises a great many questions. How many older people are likely to require long-term care services in the coming decades? How much are these services likely to cost? Will the cost to public funds prove affordable? Who should pay? How should costs be divided between public expenditure and private sources of finance? In order to address these issues, reliable projections are needed of future demand for long-term care and future long-term care expenditure.

This paper presents projections of demand for long-term care for older people in England to 2031 and associated future expenditure. The projections were produced using an updated and expanded version of the Personal Social Services Research Unit's (PSSRU) long-term care projections model. The version of the model used here has a base year of 2001 and incorporates the recent 2001-based interim population projections.

The first part of the paper describes the PSSRU long-term care finance research programme and recent associated projects. The second part of the paper describes the PSSRU long-term care projections model, including details of the data used in this updated version. The third part presents a set of base case assumptions and the projections obtained using those assumptions. The fourth part investigates the sensitivity of the projections to changes in those assumptions. Section five discusses the findings and planned future developments of the model. A final section sets out some conclusions.

1 The PSSRU study of long-term care finance

The PSSRU long-term care projections model was constructed as part of a project on long-term care finance, which is funded by the Department of Health. The project is concerned with two related policy issues on the funding of long-term care for older people. The first is whether expenditure, and specifically public expenditure, on long-term care will remain sustainable over the coming decades, despite demographic pressures and potentially rising expectations. The second is what should be the balance between public and private expenditure on long-term care.

A detailed account of the long-term care projections model and of the data and assumptions used can be found in Wittenberg *et al* (1998), a report that describes the first version of the model. The model has been regularly updated and expanded. A paper exploring the sensitivity of an updated version of the model to various assumptions was published in Health Statistics Quarterly in 2001 (Wittenberg *et al*, 2001).

An important strand of work for the project has been how to model the supply of informal care and the relationship between informal care and formal services. The study has investigated in some detail the impact of changes in the availability of informal care on projected future demand for services (Pickard *et al*, 2000).

The initial model was used to provide projections for the Royal Commission on Long-Term Care (1999). More recently, new versions of the model have been used to provide projections for the HM Treasury Health Trends Review (Wanless, 2002) and for the Institute of Public Policy Research (Wittenberg *et al*, 2002 and Hancock *et al*, forthcoming). The latter involved innovative linkage between the PSSRU model and a microsimulation model developed by the Nuffield Community Care Studies Unit (NCCSU) at the University of Leicester.

A version of the model that investigates future long-term care costs of cognitive impairment, using MRC CFAS data (MRC CFAS, 1998), has been developed with funding from the Alzheimer's Research Trust (Comas-Herrera et al., 2003a). This enabled separate projections to be made of services for older people with cognitive impairment under a range of assumptions about future prevalence rates of cognitive impairment.

The European Commission financed a comparative study of future long-term care expenditure in Germany, Spain, Italy and the UK (Comas-Herrera and Wittenberg 2003). This study involved the development of a number of scenarios for possible changes in patterns of care that were investigated across the four countries. The scenarios included changes in the balance between informal care and formal services and changes in the availability of formal home-based services.

The National Assembly for Wales recently commissioned a version of the model that makes projection of future demand for long-term care in Wales (Comas-Herrera et al, 2003b). Projections of future demand for residential care in Wales were produced to match those produced for a Department of Health study of residential care supply in England (Comas-Herrera et al, 2001).

These projects, in particular the international study, have had a substantial influence on the core model. It has recently been expanded to be able to make projections under a wider range of future scenarios, especially on patterns of care.

2 Description of the PSSRU long-term care projections model

The PSSRU long-term care projections model aims to make projections of three key variables: the future numbers of dependent older people, the likely level of demand for long-term care services for elderly people and the costs associated with meeting this demand.

The model does not make forecasts about the future. It makes projections on the basis of specific assumptions about future trends. The approach involves simulating the impact on demand of specified changes in demand drivers, such as demographic pressures, or specified changes in policy, such as the introduction of free personal care. It does not involve forecasting future policies or future patterns of care.

The model is updated regularly as new data becomes available, in particular new versions of the General Household Survey, population projections, data on numbers of older people in institutions and estimates of the unit costs of care. The version of the model used to make the projections in this paper uses data from the 1998-based General Household Survey, 2001-based interim population projections, March 2000 data on residential care and unit costs uprated to 2001 prices.

The model is cell-based (a macro-simulation model) and takes the form of a spreadsheet. It consists of four main parts. The first part estimates the numbers of older people with different levels of dependency by age group, gender, household type and housing tenure. The second part estimates the levels of long-term care services required, by attaching a probability of receiving health and social care services to each cell. The third part of the model estimates total health and social services expenditure, and finally, in the fourth part, total expenditure is allocated to the various sources of funding.

Projected numbers of older people

The first part of the model classifies the projected numbers of older people into subgroups (or cells), according to age bands, gender, dependency and other key characteristics. The model uses the Government Actuary's Department (GAD 2003, Shaw 2003) 2001-based interim population projections as the basis for the numbers of people by age band and gender in each year under consideration until 2031.

The projected older population by age band and gender are separated into dependency groups. Dependency is a crucial factor in considering need for long-term care, as it is dependency rather than age which influences need for care. Previous studies have shown that projections of long-term care expenditure are sensitive to assumptions about future rates of dependency among older people

(Nuttall *et al.* 1994, House of Commons Health Committee 1996). The model uses as a measure of dependency the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Four dependency groups have been used in the model (box 1). Information from the 1998/9 General Household Survey (GHS) was used to break down the private household population into the four groups.

Box 1: Dependency groups used in the PSSRU model

The four dependency groups used in the model are as follows:

1. People able to perform ADL (personal care) tasks and IADL (domestic care) tasks without difficulty.
2. People with difficulty with IADL but not ADL tasks.
3. People with difficulty with one ADL task.
4. People who live in the community and have difficulty with two or more ADL tasks, and people who are in institutional care (hospital, nursing home or residential care home).

Another key factor in the receipt of long-term care is household type (Arber *et al.* 1988, Davies *et al.* 1990, McNamee *et al.* 1999). Household type is an important structural correlate of informal care (Pickard *et al.* 2000). Informal care is combined with household composition in a five-fold classification: living alone without informal help; living alone with informal help; *de facto* single, living with others; married/cohabiting couple; and married/cohabiting couple, living with others. Household types where older people live with others, including married/cohabiting couples, have not been broken down between those with and without informal carers because all older people living with others have a potential carer and most of those who are dependent have an actual carer. In the 1998/9 General Household Survey (GHS), over 90% of dependent older people living with others received informal help with domestic tasks.

Projections of informal care/household composition in the PSSRU model are driven by the 1996-based GAD marital status and cohabitation projections (Shaw 1999, Shaw and Haskey 1999). The two marital status groups (those who are *de facto* married and those who are *de facto* single) are broken down into five household types using the 1998/9 GHS. The projections assume a 'steady state' regarding the propensity within marital status groups to live with others.

The model includes, for those living in private households, a simple breakdown by housing tenure, between those living in owner-occupied tenure and those living in rented accommodation. One reason for the inclusion of housing tenure is that it can be regarded as a simple proxy for socio-economic group. Another is that it is relevant, in the case of older people living alone, to the division between those who fund their own residential or nursing home care and those who are funded by their local authority or health authority. The current means test for public support in residential or nursing home care generally takes account of the value of the person's home (unless it is occupied by their spouse or an older or disabled relative). This means that older home-owners who live alone generally need to fund their residential or nursing home care privately, while older tenants and older home-owners living with their spouse are often eligible for public funding.

The model divides the population into 440 cells. 40 of these relate to the institutional population by age (5 bands), gender, previous household type (2 categories) and previous housing tenure (2 categories), and 400 to the household population by age (5 bands), gender, dependency (4 groups), household type/informal care (5 categories) and tenure (2 categories).

Projected numbers of service recipients

The second part of the model projects the volumes of services demanded by combining the output of the first part of the model (the projected numbers of older people by dependency, household type/informal care and other characteristics) with functions that assign receipt of services to each sub-group of the older population. The services covered include a range of health and social services relevant to meeting long-term care needs.

The probability of receipt of each non-residential service, such as home care, day care, and community nursing, was estimated through multivariate (logistic regression) analysis of the 1998/9 GHS data. The independent variables were age, gender, dependency, marital status, household type/informal care and housing tenure. Separate analyses were undertaken for dependent and non-dependent older people, as few non-dependent older people received services other than chiropody and private domestic help. For non-dependent people, age was statistically significantly associated with probability of receipt of each service and gender, marital status and tenure with receipt of some services. For dependent people, age, severity of dependency and marital status or household type were statistically significantly associated with probability of receipt of most services, and gender and housing tenure with receipt of some services.

Demand for domiciliary services was calculated by using the fitted values from the logistic regression models as the estimated probabilities of receipt of each service by age band, gender, dependency and the other factors described above. These fitted values were then multiplied by the projected numbers of older people within each cell by age band and other needs-related circumstances to produce estimates of the numbers of service recipients. Finally, these estimates of numbers of service recipients were multiplied by estimates of the average intensity of service receipt, i.e. the average number of home help hours or district nursing visits per recipient week. Information on intensity of service receipt by dependency was also obtained from the 1998/9 GHS.

The probability of receiving residential, nursing home or long-stay hospital care was estimated using a combination of data. Official national statistics were used on the total numbers in residential care homes and nursing homes (Department of Health, 2000a). A proportionate breakdown of care home residents by age band, gender, previous household type and previous housing tenure was derived from PSSRU surveys of residential care (Netten *et al*. 1998) and applied to the totals. This approach enabled the proportion of older people in residential care and nursing home to be estimated by age band, gender, household type and housing tenure. Hospital Episode Statistics data on the numbers of older patients by age and gender with stays exceeding 55 days were used as estimates of the numbers in long-stay hospital care. In the absence of data on this group's previous household type and housing tenure, a breakdown from the PSSRU survey data on nursing home residents was applied to hospital residents.

In summary, the numbers of recipients (*SERNO*) of each service (*j*) was estimated as:

$$SERNOj = \sum_{i=1}^{440} p_{ij} \cdot n_i ,$$

where p_{ij} is the probability of a person in cell i (i=1 to 440) receiving service j (j=1 to 9) and n_i is the number of older people in cell i.

Projected aggregate expenditure on long-term care services

The third part of the model projects the total expenditure on the formal services demanded applying unit costs of formal care, drawn from a PSSRU study (Netten *et al.* 2001) and from Laing and Buisson (2001), to the volume of services projected in the second part of the model. The unit costs were uprated to 2001 prices using the health and social services deflators available from Netten *et al* (2002). The model covers the costs to the health service, social services and users of services, for those services included in the model. Estimated expenditure on home care and community nursing services has been grossed up broadly to match official data.

In summary, the model estimates total expenditure on long-term care (E_t), for each year (t), as the sum across all formal health and social services considered, j (j = 1 to 9) of the following: projected number of service recipients in year t ($SERNO_{jt}$) multiplied by the intensity of service receipt in terms of hours/visits per week (int_j) and multiplied by the unit cost of care inflated to the year to which the projection year relates (c_{jt}). This can be shown as:

$$E_t = \sum_{j=1}^{10} SERNO_{jt} \cdot int_j \cdot c_{jt}$$

Projected breakdown of expenditure between funders

The fourth part of the model breaks down projected aggregate expenditure by source of funding: NHS, social services and service users. The costs of the health services included are assigned to the NHS. The costs of the social services are divided between personal social services and service users. As there are no national data on the quantities of privately funded care, the projections for privately funded care, especially on non-residential care, need to be treated with caution as it is not possible to verify that all privately funded care is captured by the model.

Residents of residential care and nursing homes are divided into privately and publicly funded residents. The breakdown for 2000 is based on Laing & Buisson data (Laing & Buisson, 2001) for independent sector homes and 1996 PSSRU survey data (Netten *et al*, 1998) for local authority homes. The Laing & Buisson estimates for the proportion of residents who are privately funded were reduced by two percentage points to take account of the changes to the funding system introduced in April 2001. The future trend in this proportion is derived from the projected rise in home-ownership by older people who live alone.

Expenditure on local authority funded residential care, home care, day care and meals is divided between local authority social services and users on the basis of Department of Health data on the proportion of gross costs of social services met by user charges. The proportion of costs met by users is held constant for future years. The full costs of privately funded residential and nursing home care and private domestic care, and a proportion of the costs of all other social services, are thus assigned to users.

3 Base case assumptions and projections

The PSSRU model produces projections on the basis of specific assumptions about future trends in the key drivers of demand for long-term care. The main assumptions used in the base case of the model are summarised in box 2 below. The base case projections take account of expected changes in factors exogenous to long-term care policy, such as demographic trends. The base case projections hold constant factors endogenous to long-term care policy, such as patterns of care and the funding system. The base case is used as a point of comparison when the assumptions of the model are subsequently varied in alternative scenarios.

Box 2: Key assumptions of the base case of the PSSRU model

- The number of people by age, gender changes in line with the latest Government Actuary's Department (GAD, 2003) 2001-based population projections.

- Marital status changes in line with GAD 1996-based marital status and cohabitation projections.

- There is a constant ratio of single people living alone to single people living with others and of married people living with partner only to married people living with partner and others

- Prevalence rates of dependency by age and gender remain unchanged, as reported in the 1998/9 General Household Survey (GHS) for Great Britain.

- Home-ownership rates, as reported in the 1998/9 GHS, rise in line with the Anchor Housing Trust projections (Forrest *et al*, 1996).

- All dependent older people living with others receive informal care.

- The proportions of older people receiving informal care, formal community care services and residential and nursing home care services remain constant for each sub-group by age, dependency and other needs-related characteristics.

- Social care unit costs rise by 1% per year and health care unit costs by 1.5% per year in real terms. Real Gross Domestic Product would grow by 2.25% per year.

- The supply of formal care will adjust to match demand[1] and demand will be no more constrained by supply in the future than in the base year.

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1 The model effectively assumes that the real rise in wages and other payments for care will ensure that supply is sufficient.

The GAD 2001-based principal population projections for England project that between 2001 and 2031 the numbers of people aged 65 or more will rise by 54%. The numbers of those aged 85 or more are projected to rise faster during this period, by 81%, from more than 950,000 to around 1,732,000. Much of this increase is a result of a projected rise in male life expectancy. Between 2001 and 2031, the numbers of men aged 85 or more are projected to rise by 155%, compared to a 52% rise in the number of women in that age group.

Under the base case assumptions, the numbers of dependent older people[2] would grow by 57% between 2001 and 2031, from 2,567,000 to 4,020,000. The numbers of users of non-residential formal services would rise by 58%, from 1,532,000, to 2,416,000. The numbers of older people in institutions would also rise by 58%, from nearly 400,000 to 627,000.

2 Defined as having problems with at least one IADL or one ADL.

Projected long-term care expenditure would grow by 118%, from nearly 11.6 billion in 2001 to just above 25 billion in 2031 (figure 1). If Gross Domestic Product rose by 2.25% per year, long-term care expenditure would grow from 1.46% of GDP in 2001 to 1.64% in 2031. Table 1 shows these base case projections in greater detail.

Figure 1: Projected expenditure (£m) by source of funding in England, 2001–2031, under base case asssumptions
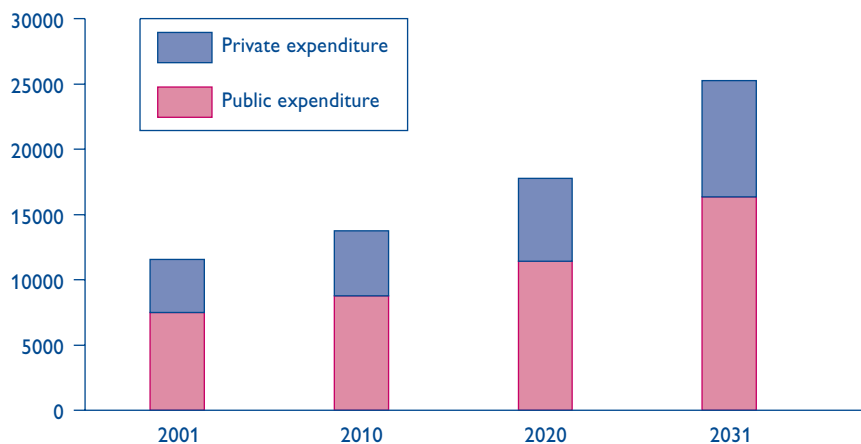
Table 1: Projected numbers of older people (thousands), service recipients (thousands) and expenditure (£ billion) under base case assumptions, 2001 to 2031

	2001	2010	2020	2031	% growth 2001 to 2031
Numbers of older people (aged 65 or more)	7,821	8,455	10,073	12,049	54.1
Numbers of people aged 85 or more	957	1,127	1,313	1,732	80.9
Numbers of older people with some dependency	2,567	2,773	3,258	4,020	56.6
Numbers of users of local authority home help services	372	399	457	586	57.8
Numbers of users of community nursing services	422	453	533	657	55.7
Numbers of users of private domestic help	745	846	993	1,231	65.2
Numbers of users of any non-residential service[a]	1,532	1,653	1,935	2,416	57.7
Numbers of people in residential care homes	238	257	293	373	57.1
Numbers of people in nursing homes	134	145	168	213	59.1
Numbers of people in institutions	397	430	493	627	57.8
Public long-term care expenditure (£ billion)	7.5	8.8	11.4	16.3	117.4
Private[b] long-term care expenditure (£ billion)	4.1	5.0	6.3	8.9	120.2
Total long-term care expenditure (£ billion)	11.6	13.8	17.7	25.3	118.4
Total long-term care expenditure as a % of GDP	1.46	1.42	1.44	1.64	12.3

Source: model estimates.
Notes
a   Local authority home care, district nursing, day centre care, meals or private domestic help.
b   Includes user fees and co-payments.

4 Sensitivity analysis: the effect of changes in the key assumptions

This section investigates the sensitivity of the projections to changes in the base case assumptions, in particular to changes in the assumptions about life expectancy, dependency rates, availability of informal care, patterns of formal care and the unit costs of care. Table 2 summarises the projections obtained under different assumptions.

Assumptions about increases in life expectancy

Mortality rates in old age are the key factor affecting the projected number of older people (Murphy, 1995). The base case of this version of the model uses the Government Actuary's Department (GAD) interim 2001-based principal population projection (GAD 2003). A number of variants have been tested to assess the effects of differing increases in life expectancy and hence differing increases in the future numbers of older people.

The GAD 2001 principal population projections assume that, between 2001 and 2031, male life expectancy will rise from 76.1 to 79.6 years and female life expectancy from 80.8 to 83.7 years (GAD, 2003). The GAD produces higher and lower life expectancy variants to their population projections. At the time of writing the 2001-based variant population projections were not readily available. The 2000-based variants have been used to illustrate the impact of changes in the life expectancy assumptions on future long-term care expenditure. In order to improve comparability, the 2000 variants are compared to the 2000-based principal population projections.

The GAD 2000-based principal population projections assume the same life expectancy rises as the 2001 projections. The 2000-based high life expectancy projection assumes that life expectancy would rise from 76.1 in 2001 to 81.7 in 2031 for men and from 80.8 in 2001 to 85.3 in 2031 for women. The low life expectancy projection assumes a more moderate rise to 77.7 years for men and to 82.4 for women in 2031.

A third variant assumption allows the numbers of people aged 85 and over to rise by 1 per cent per year faster than the GAD 2001-based projections to 2031. This assumption has been chosen because it corresponds roughly to the extent of past under-estimation of the numbers of very elderly people (Shaw, 1994). It is debatable whether the most recent projections, based on a changed approach (Shaw, 2000), will prove to be under-estimates. The assumption is included, however, because the assumptions underlying the GAD high and low variants produce a range in life expectancy at birth which is somewhat narrow compared with variants produced by other organisations (personal correspondence with GAD). Moreover, as the proportion of older people receiving services rises

sharply with age, the model projections are most sensitive to assumptions about the numbers of very elderly people.

Under the base case the future numbers of older people are projected to grow from 7.8 million in 2001 to 12.0 million in 2031, a 54% increase. Long-term care expenditure would grow by 118% between 2001 and 2031 on base case assumptions. Under the 2000-based GAD population projections, the numbers of older people were projected to rise slightly faster, to 12.5 million by 2031, a 60% increase. Long-term care expenditure would rise by 121% between 2001 and 2031 on the basis of these population projections (and the remaining base case assumptions).

Using the GAD low life expectancy variant long-term care expenditure in England would rise by 108% between 2001 and 2031, compared to 132% using the GAD high life expectancy variant. If the numbers of people aged 85 or more grew by 1 per cent per year faster than under GAD's 2001-based projections, long-term care expenditure would rise by 151% between 2001 and 2031. These findings, illustrated in figure 2, indicate the sensitivity of long-term care projections to assumptions about future increases in life expectancy.

Figure 2: Projected expenditure as a % of GDP, England, 2031, under alternative assumptions about changes in life expectancy
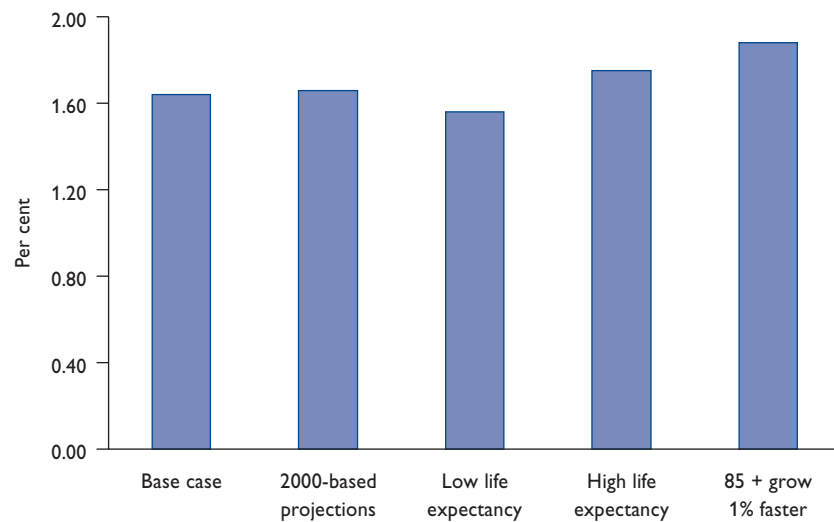
Assumptions about trends in functional dependency

There are different views about whether age-specific dependency rates can be expected to rise, fall or remain broadly constant in the future (Bone *et al,* 1995 and Dunnell, 1995). Constant age-specific dependency rates may be regarded as a neutral assumption. Yet, if age-specific dependency rates remain constant while life expectancy rises, the number of years with dependency will rise as well as the number of years without dependency. A less pessimistic assumption for future dependency would be to assume that, as life expectancy rises, the number of years without dependency rise by the same amount and the same number of years with dependency remains constant. An assumption on these lines was developed by Wiener et al. (Wiener et al, 1994). This assumption (referred to as the 'Brookings assumption') involves moving the age-specific dependency rate upward by one year for each one year increase in life expectancy.

Table 2 presents the impact of three alternative assumptions about trends in age-specific dependency rates: rates increasing by 1% per year, rates decreasing by

1% per year, and the Brookings assumption. It shows that the numbers of dependent older people would increase by 16% if dependency rates decreased by 1% per year, by 39% under the Brookings assumption, by 111% if rates rose by 1% per year, and by 57% if rates remained constant as in the base case. Overall expenditure is projected to increase by 72% between 2001 and 2031 with rates falling by 1% per year, by 82% under the Brookings assumption and by 181% with rates rising by 1% per year, compared to 118% with constant dependency rates.

These findings, illustrated in figure 3, show that projections of demand for long-term care are highly sensitive to assumptions about trends in dependency rates. Falling dependency rates would off-set part of the impact of the rise in numbers of older people. If falling mortality rates are accompanied by falling dependency rates, the impact of demographic pressures on demand for long-term care would be mitigated.

Figure 3: Projected expenditure as a % of GDP, England, 2031, under alternative assumptions about dependency trends
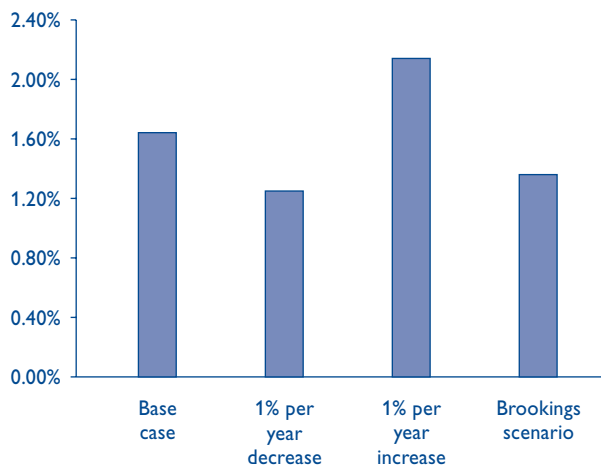
Assumptions about availability of informal care

The PSSRU model takes into account the effects of projected changes in marital status on informal care/household composition to 2020. This is because the model incorporates assumed changes in marital status and cohabitation based on GAD 1996-based projections of the older population by marital status and cohabitation. These projections imply that there is likely to be an increase in spouse carers of dependent older people in future years, to at least 2020 (Pickard *et al* 2000). Several assumptions are investigated in order to explore other possible changes in the availability of informal care in the future.

Decline in supply of care by co-resident children

This assumption looks at the possible consequences if the supply of intensive informal care by children is restricted in the future. It is plausible to anticipate a decline in arrangements whereby older people receive care from children living in the same household. The proportion of older people living with an adult child has declined from 42 per cent in 1962 to 14 per cent in 1986, with a further decline during the late 1980s (Grundy 1995, Grundy and Glaser 1997).

The assumption allowing for a fall in co-residence with adult children draws on a breakdown of the households of dependent older people derived from the 1998/99 GHS data on people aged 65 and over. In the GHS sample, approximately a third (35.6 per cent) of the single dependent older people living with others were the parents or parents-in-law of the head of the household. The assumption uses this information from the GHS by assuming a decline by one third in the proportion of single dependent older people living with others by 2031. It is assumed that the older people who no longer move in with their children under this assumption, move into residential homes instead. There is some evidence that institutional care may act as a substitute for informal care.

Fall in supply of informal care leads to more wholesale increase in institutional care

As in the previous assumption, it is assumed that a fall in the supply of informal care would have the effect of increasing admissions to residential care. This scenario, however, increases the probability of admissions to institutions not just for single dependent older people living with others but for married couples and married couples living with others as well. The scenario is explored by assuming that dependent older people who live with others will in the future have the same likelihood of admission to residential care as those who live alone. The probability of admission to institutions of dependent older people who live with others is assumed to rise linearly over time to match by 2031 the probability of admission of those who live alone.

Decline in the proportion of severely dependent[3] older people who rely exclusively on informal care

Three more scenarios were developed which test the sensitivity of the model projections for formal services to a decline in informal care. The first two scenarios both assume a decline of 0.5% a year in the proportion of dependent older people receiving informal care. The definition of informal care used in these scenarios refers only to dependent older people who rely *exclusively* on informal care. Dependent older people who use formal services as well as informal care are excluded from the definition. The first assumes that the people no longer receiving informal care will receive an average package of home help. The second assumes that they will move into residential care. The third scenario allows for a decline of 1% in the proportion of dependent older people receiving informal care, with half moving into residential care and half receiving an average package of home help.

Results

Under the assumption in which co-resident care by children declines, the numbers in institutional care would be around 650 thousand in 2031, compared with 630 thousand under the base case. Expenditure on long-term care would rise by around 123% between 2001 and 2031 under this assumption compared with 118% under the base case. As the proportion of dependent older people living with their children is already low, projections under this scenario do not differ much from the base case.

Under the assumption in which there is a more wholesale fall in informal care and rise in institutional care, the numbers in institutional care (residential, nursing and hospital care) would be around 780 thousand in 2031, compared with 630 thousand under the base case. Expenditure on long-term care would rise by over 150% between 2001 and 2031 under this assumption, compared with 118% under the base case. Public expenditure on long-term care would be around three and a half billion pounds more in 2031 than under the base case. Total

expenditure on long-term care would represent around 1.87% of GDP in 2031 under this assumption, compared with 1.64% under the base case (table 2).

If there was a 0.5% decline per year in the proportion of dependent older people who relied exclusively on informal care and those who no longer receive informal care received an average package of home care, long-term care expenditure would rise by 122% between 2001 and 2031, compared to 118% under the base case. If, however, those who no longer relied on informal care moved into residential care, there would be 706 thousand older people in institutions in 2031, compared to nearly 630 under the base case. Long-term care expenditure would grow by 132% between 2001 and 2031 under this assumption, compared to 118% under the base case. It would represent 1.74% of GDP in 2031, compared to 1.64% under the base case.

If there was a decline of 1% per year in the proportion of dependent older people relying exclusively on informal care, and half of those who no longer relied exclusively on informal care moved to residential care and half received an average package of home help, long-term care expenditure is projected to increase by 135% between 2001 and 2031 compared to 118% under the base case.

These projections suggest that a decline in the availability of informal care could have a substantial impact on future expenditure on long-term care. Much depends on the size of the decline in informal care and the extent to which informal care is substituted by residential care or by moderate packages of home care. Figure 4 illustrates the impact of these informal care scenarios on projected long-term care expenditure as a per cent of GDP.

Figure 4: Projected expenditure as a % of GDP, England, 2031, under alternative assumptions about informal care
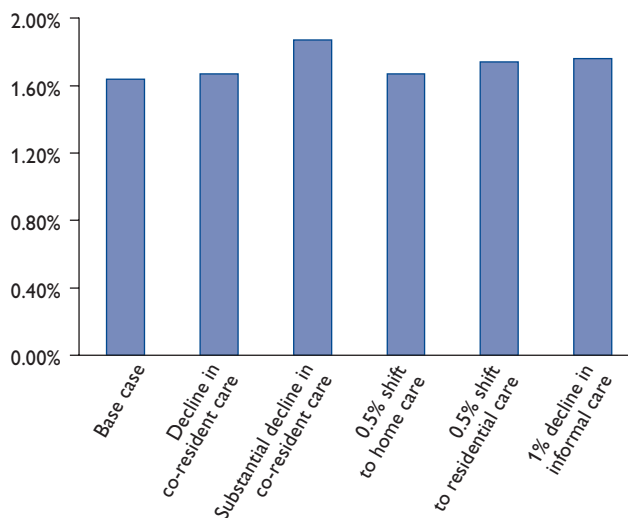
Assumptions about future patterns of care

The model can also be used as to explore the impact on projected long-term care expenditure of changes in the patterns of services. The assumptions explored here assume a shift in the balance of care from institutional to domiciliary care, a change in eligibility criteria for home care and an increase in support for informal carers.

Shift in the balance of care

The first assumption investigated replicates the assumptions used in the National Beds Inquiry (NBI) for England. The NBI assumed that the number of people in residential and nursing homes would rise in line with demographic pressures but that by 2019 there would be a shift of between 5% and 15% to non-residential care (Department of Health, 2000b). The NBI further assumed that those 'shifted' from residential or nursing homes would receive between 6 and 10 hours home care per week (central assumption 8 hours) and that those 'shifted' from nursing homes would receive 1 to 2 community nursing visits per week (central assumption of 1.5 visits).

The assumption considered here assumes that the projected numbers in residential and nursing care in 2031 would be 10% lower than under the base case. An equivalent number of people have been added to the projected number of home care recipients. Also, a number equivalent to a 10% reduction in nursing home residents has been added to the projected number of community nurse recipients. It is assumed that those 'diverted' from residential care homes receive 8 hours home care per week and that those 'diverted' from nursing homes receive 8 hours home care and 1.5 community nurse visits per week on average.

Entitlement to long-term care

The next assumption was developed in the context of the European study of long-term care expenditure (Pickard, 2003). It investigates the potential impact of the provision of a national entitlement to formal care without means test for all older people with moderate to severe dependency (two or more ADLs), independently of whether or not they receive informal care. This assumption aim to illustrate the effect of a policy under which all older people with a certain level of dependency are entitled to long-term care, as is the case under the German social insurance scheme.[4] It is assumed that all people with moderate/severe dependency would receive the average number of hours of home care received by formal care recipients living in the community (5.75 hours per week). The assumption assumes one hundred percent take-up.

Increasing support for carers

The results of the PSSRU model, using the GAD marital status and cohabitation projections, suggested that there is likely to be an increase in spouse carers of dependent older people in the future (Pickard *et al* 2000). Many spouse carers are themselves elderly, many are in poor health and, as carers, many are themselves in need of support from formal services. An increase in spouse carers, therefore, raises issues about the need for support for carers. Current policies, in particular the National Strategy for Carers (1999), are intended to increase the amount of service support received by carers. A scenario has, therefore, been developed which looks at the implications of increasing support for carers. The scenario focuses on providing more support to the most heavily burdened carers. These have been identified as carers providing personal care to older people living in the same household (Parker 1992). The scenario looks at the implications of increasing domiciliary services to older people with substantial dependency needs (those with two or more ADL problems) who share a household with others. The majority of carers included in the scenario are spouse carers.

The way in which support to carers is increased in the scenario is by looking at the consequences if services were to become more 'carer-blind' in the future. The term 'carer-blind' was originally used by Twigg and Atkin in 1994 to describe a policy which involved 'treating a disabled person with a carer in exactly the same way as a disabled person without' (Twigg and Atkin 1994: 150). The scenario

4 In the German case the level of dependency required to be entitled to care is more severe than the two ore more ADLs used in this scenario. See, for example, Rothgang (2003).

explores the implications of making services more 'carer-blind' by allowing those living with others to receive the same level of domiciliary services as those living alone. The probability of receipt of each domiciliary service among the most dependent older people living with others rises linearly under this scenario to match by 2031 the probability for those living alone.

Results

Under the NBI-style assumption about a change in the balance between institutional and domiciliary care, long-term care expenditure would rise by 111% between 2001 and 2031 compared to 118% under the base case. Projected future expenditure is lower under this scenario than under the base case, as the alternative packages of domiciliary care provided to those who would otherwise be in institutions are relatively modest and thus cheaper than residential care.

Introducing a national entitlement to an average package of home care without means test for all older people who have problems with at least two ADLs would have substantial expenditure implications. There would be around 1,570 thousand home help users in 2031, compared to 586 thousand under the base case. Long-term care expenditure in England would need to rise by 167% between 2001 and 2031, compared to 118% under the base case.

Under the 'carer-blind' scenario, there would be nearly 900 thousand recipients of home help services in 2031, compared to 586 thousand under the base case. Overall, expenditure on long-term care would rise by 141% under the 'carer blind' scenario between 2001 and 2031, compared to 118% under the base case. Overall expenditure on long-term care would represent around 1.80% of GDP in 2031 under the 'carer-blind' scenario, compared with 1.64% under the central base case (table 2 and figure 5).

Figure 5: Projected expenditure as a % of GDP, England, 2031, under alternative assumptions about patterns of care
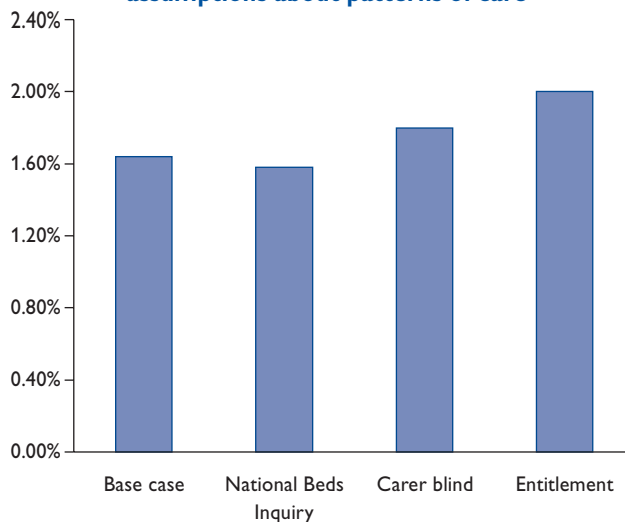
Assumptions about unit costs and economic growth

Previous reports have highlighted the sensitivity of future long-term care expenditure to relatively small changes in the future unit costs of long term care (Wittenberg et al, 1998, 2001 and 2002). The base case of the model assumes that the real unit costs of care, such as the cost of an hour's home care, will rise in line with historical trends in input pay and prices (1% per year for social care and

Table 2: Summary of sensitivity analysis

This table presents in summary form the projections obtained varying in turn some of the key base case assumptions. The figures relate to the projected numbers of older people, dependent older people and service recipients (in thousands) and to projected expenditure (in billions of pounds and % of GDP). The figures in brackets are the projected percentage increase between 2001 and 2031. Cells are left empty where the projections are the same as the base case.

	Projected numbers of elderly people	Projected numbers with dependency	Projected number of recipients of home care	Projected numbers of people in institutional care	Projected total expenditure (£billion)	Projected total expenditure (% of GDP)
2001 estimates	7,821	2,567	372	397	11.6	1.46
Base case projection for 2031	12,049 (54.1%)	4,020 (56.6%)	586 (57.8%)	627 (57.8%)	25.3 (118.4%)	1.64
Life expectancy assumptions						
2000-based population projections	12,510 (60.4%)	4,114 (60.3%)	594 (60.0%)	635 (58.5%)	25.7 (120.8%)	1.66
Low life expectancy population projection	12,013 (54.4%)	3,893 (52.3%)	554 (49.9%)	591 (48.3%)	24.0 (107.8%)	1.56
High life expectancy population projection	12,836 (64.6%)	4,275 (66.4%)	625 (68.0%)	672 (67.5%)	27.0 (131.8%)	1.75
85+ group grow 1% faster than base case	12,625 (61.8%)	4,425 (72.4%)	671 (80.7%)	740 (86.4%)	29.0 (151.1%)	1.88
Dependency assumptions						
1% per year decrease in dependency rates		2,878 (15.8%)	494 (35.5%)	445 (16.7%)	19.3 (72.1%)	1.25
1% per year increase in dependency rates		5,568 (111.1%)	711 (88.3%)	861 (112.7%)	33.0 (181.0%)	2.14
Brookings compression of morbidity assumption		3,324 (29.5%)	528 (42.2%)	493 (24.0%)	21.0 (81.8%)	1.36
Informal care assumptions						
Decline in care by co-resident children			583 (56.7%)	653 (64.5%)	25.8 (123.3%)	1.67
Substantial reduction in informal care			568 (52.9%)	780 (96.3%)	28.8 (149.1%)	1.87
0.5% p.a. decline in informal care: shift to home care			665 (79.0%)		25.7 (122.3%)	1.67
0.5% p.a. decline in informal care: shift to residential care				666 (67.8%)	26.9 (132.3%)	1.74
1.0% p.a. decline in informal care			660 (77.6%)	661 (66.4%)	27.2 (134.9%)	1.76
Patterns of care assumptions						
National Beds Inquiry			645 (73.6%)	568 (43.0%)	24.4 (110.9%)	1.58
Carer blind			897 (141.6%)		27.8 (140.6%)	1.80
Entitlement			1,571 (32.2.8%)		30.8 (166.5%)	2.00
Unit costs assumptions						
Treasury long-term economic assumptions					30.9 (167.6%)	2.23

1.5% per year for health care). Gross Domestic Product (GDP) is assumed to rise by 2.25% per year, broadly in line with the Treasury's medium term projection.

The key driver of rises in the unit costs of care is rises in the earnings of staff providing long-term care. Home care and day care are clearly highly labour-intensive. Residential care is also labour intensive, with staff costs accounting for the majority of overall costs. For example, data from a UK study shows that, in public sector homes, staff costs accounted for 85% of the total unit cost (Netten et al., 1998). This suggests that it would be plausible to assume that the real unit costs of care will rise broadly in line with average earnings of care staff, or perhaps by somewhat less allowing for non-staff costs (Wittenberg and Comas-Herrera, 2003).

An alternative assumption about unit costs and economic growth investigates the impact of assuming that future unit costs of care will rise in line with projected rises in earnings, instead of line with past trends in input pay and prices. This assumption is based on the Treasury's long-term economic assumptions, published in the 2003 Budget, for growth in productivity as an indicator of possible future rises in the earnings of care staff and for growth in GDP (HM Treasury, 2003). These assumptions are an increase in productivity of 2% per year

5 The years in which change
occurs have been altered slightly
to match the years used in the
model: 2010 instead of 2012/13,
and 2020 instead of 2022/23.

to 2010 and of 1.75% between 2010 and 2031 and an increase of GDP of 2.25% per year to 2010, of 2% between 2010 and 2020 and of 1.50% between 2020 and 2031.[5]

Under this assumption, long-term care expenditure would rise by 168% between 2001 and 2031, to nearly £31 billion, compared to £25 billion under the base case. Overall long-term care expenditure would represent 2.23% of GDP in 2031 under this variant assumption, compared to 1.64% under the base case (figure 6). This illustrates how sensitive projections of long-term care expenditure are to assumptions about rises in the real unit costs of care.

Figure 6: Projected expenditure as a % of GDP, England, 2031, under alternative assumptions about the unit costs of care and economic growth

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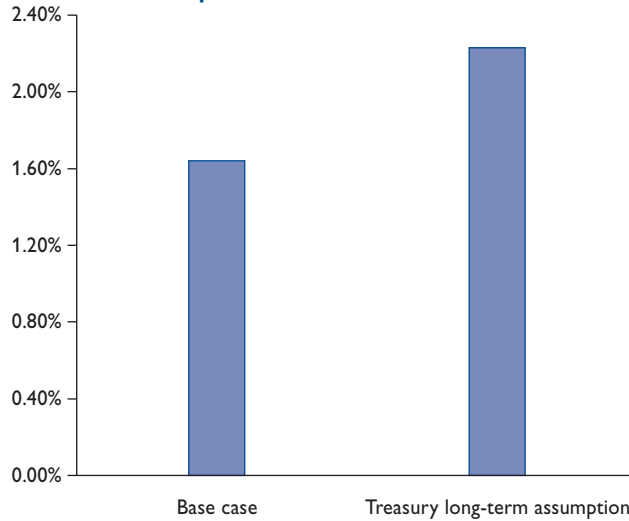
5 Findings and future developments of the model

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Box 3: Main findings

- The numbers of dependent older people in England are projected to grow from approximately 2.5 million in 2001 to just over 4 million in 2031, an increase of 57%.

- To keep pace with demographic pressures over the next thirty years, residential and nursing home places would need to expand by around 58% and numbers of hours of home care by around 57%, assuming unchanged dependency rates.

- Long-term care expenditure would need to rise by around 118% in real terms between 2001 and 2031 to meet demographic pressures and allow for real rises in care costs of 1% per year for social care and 1.5% per year for health care.

- Long-term care expenditure would need to increase from about 1.46% of GDP in 2001 to around 1.64% of GDP in 2031 to meet demographic pressures, assuming a real increase of 2.25% a year in GDP.

- Future long-term care demand is sensitive to the projected numbers of older people: under variant GAD population projections projected expenditure would be around 0.1% of GDP above or below the base case projection for 2031.

- Future demand is also sensitive to trends in dependency rates: under a compression of morbidity scenario projected expenditure would be 1.36% of GDP in 2031, compared with 1.64% under constant dependency rates.

- Future long-term care expenditure is highly sensitive to assumed rises in unit costs of care: under a variant based on Treasury's long-term assumptions on rises in productivity and GDP, projected expenditure would be 2.23% of GDP in 2031.

- GAD marital status projections to 2020 suggest that there is likely to be an increase in 'spouse carers' of dependent older people in future years.

- A decline in the availability of informal care could have a substantial impact on demand for formal services depending on the size of the decline and the extent to which residential care was required to substitute for informal care.

- A policy of increasing support to the most heavily burdened carers by providing domiciliary services on a 'carer-blind' basis would have substantial financial consequences.

- A policy of providing an entitlement to a non-means-tested average package of home care to all severely dependent older people would also have substantial financial consequences.

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Future developments

The PSSRU long-term care study will continue to update and improve the projections model. The information from the 2001/2 General Household Survey will be incorporated. This will update the sections on dependency, household type, housing tenure, receipt of informal care and receipt of domiciliary services. GAD 2002-based population projections and marital status projections will also be incorporated when available.

Further work is planned on trends in dependency rates, to widen the range of scenarios investigated in sensitivity analysis. This will cover, as far as possible, consideration of cognitive impairment as well as functional dependency in the dependency categorisation.

Further research is currently in progress on the supply of informal care and on patterns of formal care. Work on informal care will concentrate on care by children. Work on patterns of services will concentrate on changes in the balance between residential and home-based care. The implications of more cost-effective packages of care will be investigated, drawing on analyses conducted for the PSSRU evaluation of community care for older people programme.

Finally, the implications of the PSSRU model's projections for the future workforce required will be investigated. A module on workforce requirements will be added to the model so that it produces not only projections of services demanded and expenditures, but also projections of the workforce required by type of staff. This will give an indication of the potential demand for staff to provide long-term care services and of the impact in terms of workforce requirements of alternative future scenarios concerning numbers of dependent older people or alternative patterns of care.

6 Conclusions

The model produces projections of future long-term care expenditure based on a specified set of base case assumptions. This set of assumptions seems plausible but is clearly not the only possible set. As the sensitivity analysis demonstrates, the projections are sensitive to changes in those assumptions. This means that the projections should not be regarded as forecasts of the future.

The sensitivity analysis shows that projected future demand for long-term care services for older people is sensitive to assumptions about future numbers of older people and about future prevalence rates of dependency. It is also sensitive to assumptions about the future availability of informal care. Projected future expenditure on long-term care for older people is also sensitive to assumptions about future rises in the real unit costs of services, such as the cost of an hour's home care.

The expenditure projections do not constitute the total costs of long-term care to society. That would require inclusion of the costs of a wider range of services to a wider range of public agencies and service users and the opportunity costs of informal care. It should also be stressed that no allowance has been made here for changes in public expectations about the quality, range or level of care.

Notwithstanding these limitations, the projections have some clear implications for policy. The key implication is that policy-makers need to plan for uncertainty in future demand for long-term care for dependent older people. Future mortality and prevalence rates and rises in unit care costs, which are inevitably uncertain, have substantial implications for future demand for long-term care and associated expenditure. As there is no certainty about future trends in these variables, there is inevitable uncertainty about future long-term care expenditures, even under current policies and patterns of care.

The model projections show that, unless prevalence rates of dependency decline, the numbers of dependent older people requiring long-term care will rise significantly over the next decades. They also show that, if improved health care or other measures were to have the effect of reducing dependency rates, this would at least partially offset expected demographic pressures from rising numbers of older people. The implication is that there is a need to promote measures that are likely to reduce dependency in old age and to promote healthy ageing.

Families and other informal carers provide much of the care for dependent older people living at home. Projections suggest that a decline in the supply of informal care provided to older people, resulting in increased admissions to residential care, could have considerable financial consequences. This highlights the importance of services to support informal carers.

The projections show that substantial rises in formal services will be required to keep pace with demographic pressures, even before consideration of potentially rising expectations. The development of non-residential services, such as home care and day care, will be especially important. Older people generally prefer to remain in their own homes as long as possible. If this preference is to be recognised, a substantial expansion of non-residential services will be required.

The model projects that the proportion of GDP required to fund long-term care services will rise significantly over the next decades under base case assumptions. This is not to suggest that there is a looming demographic 'time-bomb' or crisis of sustainability of long-term care expenditure. It does suggest, however, that the promotion of efficiency will be important to limit to some extent real rises in unit costs, though the scope for this may be limited. It also suggests that the achievement of improved cost-effectiveness will be important, such that better outcomes are achieved from long-term care for similar service inputs.

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