Projections of Adult Social Care Demand and Expenditure 2018 to 2038

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DISCLAIMER

CONTENTS

I   ABSTRACT

This paper presents updated projections prepared for the Department of Health and Social Care of demand for long-term care for older people and younger adults in England to 2038 and associated future expenditure. The projections were produced using updated versions of the Care Policy and Evaluation Centre's (CPEC) aggregate long-term care projections models and the CARESIM microsimulation model developed by Ruth Hancock at the University of East Anglia. The projections cover publicly funded social care for older people and younger adults and for older people only privately funded social care.

The key findings of the research are:

- Public expenditure on social services for older people is projected to rise under the current funding system from £8.4 billion in 2018 to £16.5 billion in 2038 at constant 2018 prices and under a set of base case assumptions about trends in the drivers of long-term care demand and in the unit costs of care services;

- Public expenditure on social services for younger adults is projected to rise under the current funding system from £9.6 billion in 2018 to £18.1 billion in 2038 at constant 2018 prices and under a set of base case assumptions about trends in the drivers of long-term care demand and in the unit costs of care services;

- These base case projections are sensitive to assumptions about future trends in mortality and disability rates and in the real unit costs of care.

These findings need to be treated with some caution. They are based on a set of assumptions about future socioeconomic and demographic trends. They relate to current patterns of care and the current funding system and do not take account of any of the funding reforms which have been proposed in recent years. They do not allow for the potential impact of rising expectations or other behavioural changes. Moreover, the findings are based on numbers of service users prior to the COVID-19 pandemic. They do not take account of the, as yet unknown, impacts of the COVID-19 pandemic on excess deaths, numbers of service users, or social care expenditure.

2 PROJECTIONS OF ADULT SOCIAL CARE DEMAND AND EXPENDITURE 2018 TO 2038

INTRODUCTION

This paper presents updated projections of demand for social care for older people (aged 65 and over) and younger adults (aged 18 to 64) in England to 2038 and associated future expenditure. They cover publicly funded social care for both age groups and privately funded social care for older people. They cover both community-based services and residential care.

The projections were produced using updated versions of the Care Policy and Evaluation Centre's (CPEC)[1] aggregate long-term care projections models and of the CARESIM microsimulation model

developed by Ruth Hancock at the University of East Anglia. The versions of the models used here have a base year of 2018 and incorporate the latest Office for National Statistics (ONS 2019) official population projections, data on the number of service users and on local authority expenditure on social care (NHS Digital 2019) and Office for Budget Responsibility (OBR 2020) economic assumptions that were available in April 2020. They do not take account of the unknown impact of the COVID-19 pandemic on numbers of service users or social care expenditures.

DESCRIPTION OF MODELS

THE CPEC LONG-TERM CARE PROJECTIONS MODEL

The CPEC long-term care projections models aim to make projections of four key variables: the future numbers of disabled older people and younger adults, the likely level of demand for long-term care services and disability benefits, the costs associated with meeting this demand and the social care workforce required[2]. The models — one for older people and one for younger adult groups — are cell-based (macro-simulation models) and take the form of Excel spread-sheets.

The models do not make forecasts about the future. They make projections on the basis of specific assumptions about trends in such variables as future mortality rates, disability rates and unit costs of care. The approach involves simulating the impact on demand for care and support of specified changes in demand drivers or specified changes in policy. It does not involve

forecasting future policies or future patterns of care. This means that the projections reported in this paper should be treated as indications of likely future expenditures on care and support if policies are unchanged and drivers of demand follow the specified trends. In practice not only may drivers of demand not follow the assumptions, but also policies may change. Since the purpose of the projections is to inform policy development it would not be helpful to take account of views about possible policy changes.

The models are updated regularly as new data become available, in particular population projections, data on numbers of people in care homes and numbers of users of home care services, data on social care expenditure and estimates of the unit costs of care. The version of the models that have been used to make the

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1. Formerly the Personal Social Services Research Unit (PSSRU)

2. Workforce projections are not presented in this report

projections in this paper utilises official 2018-based population (ONS 2019) and indicative 2011-based marital status and living arrangements projections (ONS 2018), data from the Health Survey for England for 2011 to 2017, the 2005 PSSRU survey of older care home admissions (Darton et al. 2006), the Laing & Buisson survey of care home market (Laing 2018), March 2019 data on residential care and home-based care, expenditure data for 2018/19 and unit costs adjusted to 2018/19 prices (NHS Digital 2019). Data and methods are discussed further in the Annex.

THE CARESIM LONG-TERM CARE MODEL

CARESIM is a microsimulation model which uses a sample of people aged 65+ living in England from the UK Family Resources Survey (FRS) to simulate how much sample members would need to contribute to the costs of their care, should they need care, under the current or variant funding systems. A description of the CARESIM model is presented in Adams et al. (2016).

The CARESIM model produces projected trends in:

• The proportion of older people by age group, gender and household composition who own their home,

• The proportion of older service users, by type of care package, who are required to fund their own care privately under the provisions of the current means test,

• The proportion of the gross weekly costs of publicly funded care, by type of care package, which older service users are required to meet in user charges.

To produce these last two sets of proportions, projections of the number and characteristics (age, gender, marital status, home-ownership and educational level) of older service users from the CPEC model are used as weights so that the CARESIM sample of people aged 65+ is rendered representative of the projected population of older service users. The weights are applied to the sample drawn from the Family Resources Survey (FRS) in the base year. For future years, CARESIM 'ages' individual members of the FRS sample and then applies the weights from the CPEC model.

BASE CASE ASSUMPTIONS

The models produce 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 are summarised in Box 1 below. The base case projections take account of changes in factors exogenous to long-term care policy, such as demographic trends. They 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.

There is ample scope to debate these base case assumptions. It could be argued for example that mortality rates in old age will fall more rapidly than official projections, disability rates may rise (or fall), the supply of unpaid care by adult children may not rise in line with needs, the supply of residential care may not rise in line with severe disability and/or average earnings in the care sector may rise by more than 1.5% per year in real terms. We have conducted a wide range of sensitivity analyses on these issues in this and previous studies (for example Wittenberg et al. 2006, 2011, 2018). The Department of Health and Social Care requested sensitivity analyses specifically on trends in the real unit costs of care as reported below.

BOX 1: KEY ASSUMPTIONS OF THE BASE CASE OF THE CEPC MODEL

- The number of people by age and gender changes in line with the Office for National Statistics (ONS) 2018-based principal population projections.

- Marital status rates change in line with the ONS (2018) ad hoc 2011-based marital status and living arrangements projections but remain constant for people with learning disability.

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

- Prevalence rates of disability in old age by age group (65-69, 70-74, 75-79, 80-84, 85+) and gender remain unchanged, as reported in the Health Survey for England 2011 to 2017.

- Prevalence rates of learning disability by age and gender and of physical disability at ages 18 to 30 change in line with projections to 2030 by Emerson et al. (2012); prevalence rates of physical disability at ages 31 to 64 and of mental illness remain constant by age and gender.

- Home-ownership rates for older people, as reported in the 2010/11 Family Resources Survey (FRS), change in line with projections produced by the CARESIM model.

- The proportions of people receiving unpaid care, formal community care services, residential care services and disability benefits remain constant for each sub-group by age, disability and other needs-related characteristics.

- The proportion of older care recipients whose care is privately funded varies in line with projections from the CARESIM model.

- The proportion of the costs of publicly funded care met by older service users through user charges also changes in line with projections from the CARESIM model.

- The income thresholds for publicly funded care rise in line with price inflation from 2020 onwards.

- Health and social care unit costs rise in real terms in line with Office for Budget Responsibility (OBR 2020) assumptions for future trends in productivity, except that non-labour non-capital costs (assumed £135 per week in care homes) remain constant in real terms and an uplift in unit costs is included for the years to 2024 to take account of the planned rises in the national living wage (NLW), which is assumed to affect 62.5% of the care bill.

- Real Gross Domestic Product rises in line with Office for Budgetary Responsibility projections published in March 2020 (OBR 2020). Those projections do not account for the impacts of the COVID-19 pandemic.

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

PROJECTIONS UNDER BASE CASE ASSUMPTIONS

PROJECTIONS FOR OLDER PEOPLE

The ONS 2018-based principal population projections for England project that the overall older population of England aged 65 and over will rise from 10.1 million in 2018 to 14.3 million 2038 (rise of 41%). The population aged 85 and over is projected to rise much more rapidly, from 1.4 million in 2018 to 2.3 million in 2038 (rise of 72%).

Under the base case assumptions, the numbers of disabled older people, defined as those unable to perform at least one instrumental activity of daily living (IADL) or having difficulty with performing or inability to perform without help at least one activity of daily living (ADL), would rise by 48% between 2018 and 2038, from 3.5 million in 2018 to 5.2 million in 2038. The number of older people with more severe disability, that is, unable to perform without help (or at all) one or more ADL tasks, would increase by 49% between 2018 and 2038 (Figure 1), from 1.7 million to 2.5 million.

The numbers of disabled older people receiving care from a spouse or partner are projected to increase slightly faster than the numbers receiving care from an adult child, under base case assumptions. This is because the projected improvement in male mortality will lead to a fall in the proportion of the oldest-old females aged 85+ who are widowed, which in turn will result in an increase in the availability of spouse care (Pattison et al. 2012). Yet care by children will still need to increase by 46% over the next 20 years, if the proportion of disabled older people (by age, gender and marital status) receiving care from their children is to remain the same as it is today. Whether the supply of care by children will actually rise in line with need is very uncertain (Pickard et al. 2007, 2012).

The number of older users of local authority funded home care services or direct payments is projected to rise from 231,500 in 2018 to 371,800 in 2038 (an increase of 61%), to keep pace with demographic pressures (Table 1). The number of users of privately funded home care is projected to rise less rapidly, by 56% between 2018 and 2038. The reason that the proportion of home care users who are publicly funded is projected to rise is that under our base case assumptions the cost of home care rises faster than the incomes of older people.

FIGURE 1: PROJECTED NUMBER OF DISABLED OLDER PEOPLE (MILLIONS) IN ENGLAND 2018–2038
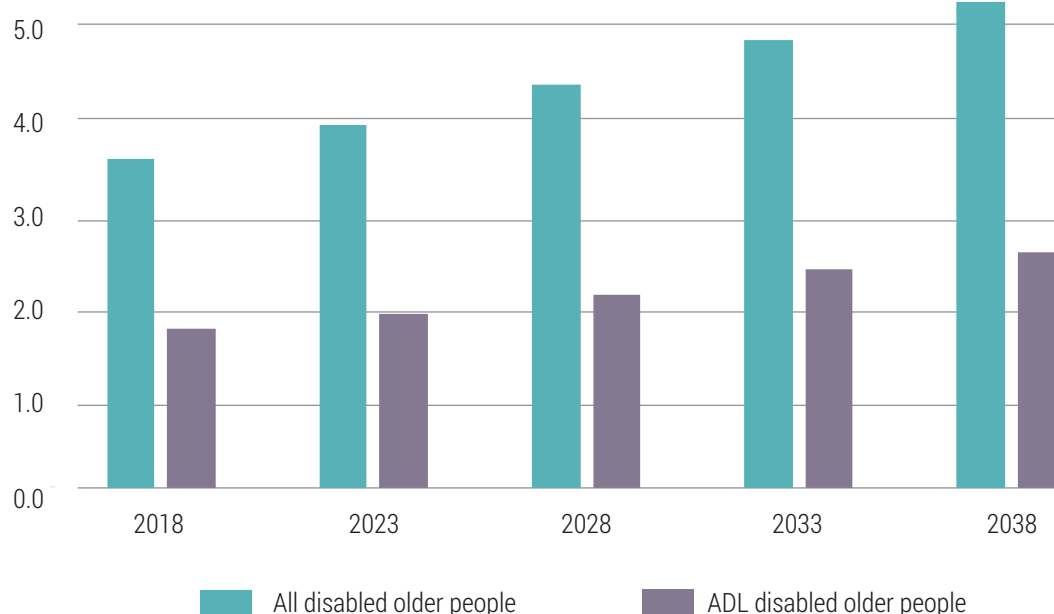
TABLE 1: PROJECTED NUMBER OF OLDER SERVICE USERS (THOUSANDS) IN ENGLAND 2018–2038

	2018	2023	2028	2033	2038	Change %
Community care						
Direct payments	41	44	50	57	63	55%
Publicly funded care	191	215	235	275	309	62%
Privately funded care	114	121	144	164	178	56%
Residential care						
Publicly funded residents	150	157	174	192	211	41%
Privately funded residents	168	189	211	253	281	67%
Total	664	719	791	920	1028	55%

Note: Figures may not add exactly due to rounding.

The number of older people in local authority funded residential care will need to rise by 41%, from 149,900 in 2018 to 211,000 in 2038 to keep pace with demographic changes. The number of privately funded residents is projected to rise by 67% over this period (Table 1). The main reason for this difference is the projected rise in the proportion of older people who own their own home and so are generally not eligible for local authority support.

Public expenditure on social services for older people (net of user charges) is projected to almost double (an increase of 98%) under the current funding system from around £8.4 billion (0.45% of GDP) in 2018 to £16.5 billion (0.65% of GDP) in 2038 at constant 2018 prices (Tables 2 and 3). Public expenditure on community-based care (including expenditure of direct payment) is projected to rise more rapidly than public expenditure on residential care (121% as against 82%) over the period 2018 to 2038 (Table 3).

Private expenditure is projected to rise from £7.8 billion in 2018 to £17.2 billion in 2038, an increase of 119%. Total expenditure on social services for older people is projected to rise by 106%, from £18.3 billion (0.87% of GDP) in 2018 to £37.7 billion (1.33% of GDP) in 2038 at constant 2018 prices (Table 2). It should be noted that the figures for base year private expenditure are

TABLE 2: PROJECTED EXPENDITURE ON SOCIAL CARE FOR OLDER PEOPLE, 2018–2038, £BILLION AT 2018 PRICES

	2018	2023	2028	2033	2038	Change %
Social services net expenditure	8.4	10.0	11.7	14.0	16.5	98%
User charges	2.1	2.4	2.9	3.4	4.0	90%
Private expenditure	7.8	9.7	11.5	14.5	17.2	119%
Total	18.3	22.1	26.2	32.0	37.7	106%
Total as % GDP	0.9%	1.0%	1.1%	1.2%	1.3%	52%

Note: Figures may not add exactly due to rounding.

estimates drawn from various sources on the numbers of privately funded care home residents, the numbers of privately funded home care users and the weekly costs of privately funded care. This means that the projections for private expenditure should be treated with caution.

TABLE 3: PROJECTED LOCAL AUTHORITY NET EXPENDITURE ON SOCIAL CARE FOR OLDER PEOPLE, 2018–2038, £BILLION AT 2018 PRICES

	2018	2023	2028	2033	2038	Change %
Community care	3.0	3.7	4.3	5.4	6.5	121%
Residential care	4.4	5.2	6.0	7.0	8.0	82%
Other expenditure	1.0	1.2	1.4	1.7	2.0	100%
Total	8.4	10.0	11.7	14.0	16.5	98%
Total as % GDP	0.4%	0.5%	0.5%	0.6%	0.7%	45%

Notes: Community care expenditure includes expenditure on direct payment; figures may not add exactly due to rounding.

PROJECTIONS FOR YOUNGER ADULTS

According to ONS 2018-based principal population projections for England, the number of people aged 18 to 64 will rise by 2.6% between 2018 and 2038, from 33.8 million in 2018 to 34.7 million in 2038. However, an assumption that the numbers of service users will increase in line with this projection for the younger adult population would ignore any expected change in the incidence of disability.

Emerson et al. (2012) have produced projections of the numbers of people with learning disability aged 18 to 64 or with physical disability aged 18 to 30 that reflect changed incidence of these conditions by examining data on children with the conditions. The numbers of social care services users with learning disability aged 18 to 64 or with physical disability aged 18 to 30 are therefore projected to change in line with the trends in the central scenario reported by Emerson et al. (2012). This scenario assumes that, for younger adults with learning disability or physical disability, all of those with critical need or substantial need and 50% of those with moderate need use social care services. There is insufficient information to accurately predict the age-specific incidence of onset of physical disability for older ages (Emerson et al. 2012, p.12) or for mental health conditions. In the absence of such

information, the numbers of service recipients with physical disabilities aged 31 to 64 and the numbers with mental health difficulties aged 18 to 64 are projected to change in line with changes in the population in these age groups, which is a limitation of this study.

The numbers of learning disabled users of local authority home care services or direct payments are projected to rise by 47.3% between 2018 and 2038, from 100,800 in 2018 to 148,600 in 2038 (Table 4). This is in line with trends in the central scenario in Emerson et al. (2012). The numbers of physically disabled users of local authority home care services or direct payment would need to rise by 13.5% between 2018 and 2038, from 67,600 in 2018 to 76,800 in 2038. The numbers of users of home care services and direct payment with mental health difficulties would need to rise by 2.1% between 2018 and 2038, from 39,700 in 2018 to 40,500 in 2038.

The number of learning disabled younger adults in local authority funded residential care is projected to rise by 56% between 2018 and 2038, from 23,500 in 2018 to 36,600 in 2038 (Table 4). This is in line with trends projected by Emerson et al. (2012). The number of physically disabled younger adults in local authority funded residential

care would need to rise by 7.6% between 2018 and 2038, from 8,000 in 2018 to 8,600 in 2038. The number of younger adults with mental health needs in supported residential and nursing care is projected to increase by 3.2% between 2018 and 2038, from 9,700 in 2018 to 10,000 in 2038.

Public expenditure on social care services for younger adults (net of user charges) is projected to rise by 90%, from £9.6 billion (0.51% of GDP) in 2018 to £18.1 billion (0.71% of GDP) in 2038 at constant 2018 prices (Table 5). Public expenditure on community-based care is projected to rise by 89%, from £5.5 billion in 2018 to £10.5 billion in 2038. Public expenditure on residential care is projected to rise by 91%, from £3.2 billion in 2018 to £6.2 billion in 2038 (Table 5).

TABLE 4: PROJECTED NUMBER OF YOUNGER ADULTS RECEIVING SOCIAL CARE SERVICES (THOUSANDS) BROKEN DOWN BY CLIENT GROUPS IN ENGLAND, 2018–2038

	2018	2023	2028	2033	2038	Change %
Learning Disability support						
Publicly funded home care	60.8	65.0	72.7	81.6	90.2	48%
Direct payment	40.0	42.0	47.0	52.7	58.3	46%
Residential care	23.5	26.3	29.5	33.0	36.6	56%
Physical support (including sensory support)						
Publicly funded home care	33.2	35.3	37.1	36.9	36.7	11%
Direct payment	34.4	36.5	39.4	39.8	40.0	16%
Residential care	8.0	8.5	8.8	8.7	8.6	8%
Mental health support						
Publicly funded home care	31.3	32.3	32.5	32.1	31.9	2%
Direct payment	8.4	8.6	8.7	8.6	8.6	2%
Residential care	9.7	10.2	10.3	10.1	10.0	3%

Note: Figures may not add exactly due to rounding.

TABLE 5: PROJECTED LOCAL AUTHORITY NET EXPENDITURE ON SOCIAL CARE FOR YOUNGER ADULTS IN ENGLAND, 2018–2038, £BILLION AT 2018 PRICES

	2018	2023	2028	2033	2038	Change %
Community care	5.5	6.6	7.8	9.0	10.5	89%
Residential care	3.2	4.0	4.6	5.4	6.2	91%
Other expenditure	0.8	1.0	1.1	1.3	1.5	89%
Total	9.6	11.5	13.5	15.7	18.1	90%
Total as % GDP	0.5%	0.6%	0.6%	0.7%	0.7%	39%

Notes: Community care expenditure includes expenditure on direct payment; figures may not add exactly due to rounding.

SENSITIVITY TO ASSUMPTIONS ABOUT TRENDS

FUNCTIONAL DISABILITY IN OLD AGE

There are different views about whether age-specific disability rates can be expected to rise, fall or remain broadly constant in the future (Wittenberg et al. 2018). Constant age-specific disability rates may be regarded as a neutral assumption and this is our base case. Yet, if age-specific disability rates remain constant while life expectancy rises, the number of years with disability will rise as well as the number of years without disability (Wittenberg et al. 2020). The numbers of disabled older people in the future will depend on the disabling diseases they suffer from and whether optimal treatments to alleviate or postpone the disablement are both available and widely diffused throughout the population in need.

REAL UNIT COSTS OF CARE

Since social care is highly labour intensive, the unit costs of care, such as the cost of an hour's home care, are likely to rise in line with earnings in the sector. There is scope for debate about whether earnings in the care sector will rise in line with average earnings in the economy (Wittenberg et al. 2018). In view of the projected increase in demand for social care, wages in the sector may need to rise faster than average earnings to recruit and retain sufficient carers to enable supply to meet demand.

We assume in the base case that 62.5% of the care bill will be affected by the rises in the NLW up to 2024 (see Box 1). In the sensitivity analyses, we first examine a scenario which assumes no real rise in the NLW. This is to illustrate the impact on our projections of the proposed real increases in the NLW. As shown in Table 6, the public social care expenditure is projected to rise to £32.3 billion in 2038 in the scenario of no NLW effect (an increase of 80%). To illustrate the substantial cumulative effect

TABLE 6: PROJECTED PUBLIC EXPENDITURE ON SOCIAL CARE FOR OLDER PEOPLE AND YOUNGER ADULTS, 2018–2038, ENGLAND, BASE CASE AND ALTERNATIVE UNIT COSTS SCENARIOS, IN £BILLION AT CONSTANT 2018 PRICES

	2018	2023	2028	2033	2038	Change %
Older people						
No real rise in the NLW	8.4	9.3	10.9	13.0	15.3	83%
No real increase in unit costs	8.4	8.9	9.7	10.7	11.8	41%
With NLW effect (base case)	8.4	10.0	11.7	14.0	16.5	98%
Younger adults						
No real rise in the NLW	9.6	10.8	12.6	14.7	17.0	77%
No real increase in unit costs	9.6	10.3	11.3	12.2	13.2	38%
With NLW effect (base case)	9.6	11.5	13.5	15.7	18.1	90%
Older people and younger adults						
No real rise in the NLW	17.9	20.1	23.5	27.6	32.3	80%
No real increase in unit costs	17.9	19.2	20.9	23.0	25.0	39%
With NLW effect (base case)	17.9	21.5	25.2	29.7	34.7	93%

Note: Figures may not add exactly due to rounding.

of rises in real costs, we also show projections of public social care expenditure if there was no real increase in unit costs. In this scenario, public expenditure on social care is projected to grow by less than half the rate it is

projected to grow under the base case. As in the base case, these two scenarios do not account for any impact of the COVID-19 pandemic on wages in the social care sector.

CONCLUSIONS

Public expenditure on social services for older people, net of user charges, is projected to rise by 98% under the current funding system from around 8.4 billion (0.45% of GDP) in 2018 to £16.5 billion (0.65% of GDP) in 2038 at constant 2018 prices and under a set of base case assumptions about trends in the drivers of long-term care demand and in the unit costs of care services. The equivalent for social services for younger adults is a projected rise by 90%, from £9.6 billion (0.51% of GDP) in 2018 to £18.1 billion (0.71% of GDP) in 2038 at constant 2018 prices. Total public expenditure on social services for older people and younger adults is projected to rise by 93% under the current funding system from around £17.9 billion (0.96% of GDP) in 2018 to £34.7 billion (1.36% of GDP) in 2038 at constant 2018 prices.

Due to population ageing, social care expenditure will continue to rise rapidly in the following decades. The findings in this report illustrate the importance of promoting healthy ageing and other measures which seek to ensure that the prevalence rates of diseases do not follow recent trends or at least that their disabling effects are mitigated (Kingston et al. 2017, World Health Organization 2017). The existing literature stresses that the prevention of chronic illness, disability and dependency plays a crucial role in the improvement of older people's quality of life and subjective well-being (Gobbens and Van Assen 2014). Our analyses show that there is also a strong economic case for the prevention of disability and dependency: a reduction in the future prevalence of disability leads to a parallel decrease in care needs, which helps to address the financial challenges in the social care sector.

The analysis shows that the number of disabled older people receiving unpaid care

is projected to rise by more than 45% over the next 20 years if the probability of receiving unpaid care remains constant. It is not clear however that the supply of unpaid care will rise to meet this demand (Pickard et al. 2007, 2012). Unpaid care, particularly by the adult children of disabled older people, may not increase so rapidly in future, as a result of such factors as women's rising participation in the labour market (Brimblecombe et al. 2018). If the supply of unpaid care does not increase to meet demand, the demand for formal services would rise faster than under the base case.

The analysis assumes that (1) the unit costs of care, such as the labour and capital costs of an hour's home care, will rise in line with OBR projections for rises in average earnings, and (2) 62.5% of the care bill will be affected by the rises in the NLW to 2024. There is scope for debate about whether wages in the care sector will rise in line with average earnings, and we have conducted sensitivity analyses on this assumption in a previous study (Wittenberg et al. 2018). It is also useful to consider the cost implications of the assumption about the NLW effect. In comparison to the base case projections, social care expenditure in 2038 is projected to be £2.39 billion lower if the NLW effect is ignored. Since there is inevitable uncertainty about the exact impact of the increase in the NLW on wages in the sector, the NLW increase adds to uncertainty about future unit costs of care and projected future expenditure.

The social care sector is closely linked to the rest of the economy. Changes in economic and social policies may have profound consequences for the sector, which amplifies the uncertainties relating to future care costs. Therefore, it is crucially important to regularly and closely monitor the changes in the demographic and economic contexts and evaluate their

consequences for the social care sector so that policy makers will be better prepared to address the economic implications of population ageing and rising demand for long-term care.

These findings need to be treated with some caution. First, the models produce projections of future public expenditure on social care for older people and younger adults based on a specified set of base case assumptions. This set of assumptions seems plausible but is clearly not the only possible set. This means that the projections should not be regarded as forecasts of the future. Second, they do not constitute the total costs to society of long-term care. That would require the 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 unpaid care. Finally, 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, or for the impact of the COVID-19 pandemic.

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4   ANNEX

The CPEC long-term care projections model aims to make projections of four key variables: the future numbers of disabled older people, the likely level of demand for long-term care services and disability benefits for older people, the costs associated with meeting this demand and the social care workforce required.

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 a lifetime cap on care costs. It does not involve forecasting future policies or future patterns of care.

The model is cell-based (a macro-simulation model) and takes the form of an Excel spreadsheet. It consists of five main parts. The first part estimates the numbers of older people with different levels of disability by age group, gender, household type, education 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, in the fourth part, total expenditure is allocated to the various sources of funding. Finally, a fifth part relates to the social care workforce.

The first part of the model divides the older population according to a number of characteristics relevant to the use of services, such as the level of functional disability, marital status, whether living alone, with a partner or children, education and housing tenure. The model uses the Office for National Statistics 2018-based population projections as the basis for the

numbers of people by age band and gender in each year under consideration until 2038.

The projected older population by age band and gender are separated into disability groups. Disability is a crucial factor in considering need for long-term care, as it is disability rather than age which influences need for care. The model uses as a measure of disability the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). The section on disability in the model uses data from the Health Survey for England (HSE) 2011 to 2017. It includes six categories of functional disability, ranging from no disability to inability to perform three or more activities of daily living (ADL) without help.

The older population by age, gender and disability is then further broken down by marital status and household composition. The marital status classification in the model is based, in the first instance, on de facto marital status. Older people who are married or cohabiting are distinguished from those who are single, separated, divorced or widowed. Married older people are further broken down into couples living alone or couples living with others. For older people who are single, separated, divorced or widowed, they are broken down into those living alone, living with children, or living with other people. The section on marital status and household composition uses data from the indicative 2011-based marital status and living arrangements projections published by the Office for National Statistics (2018).

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 groups. 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. The current means test for public support in care homes 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 homeowners who live alone generally need to fund their residential care privately, while older tenants and older homeowners living with their spouse are often eligible for public funding.

The model also includes a breakdown by education, between those with less than 15 years of education and those with more than 16 years of education, as a further simple proxy for socio-economic groups. The rates of homeownership, by age, gender and marital status, and of education by age and gender are from the HSE 2011−2017 for the base year of 2018 and from the Family Resources Survey with projected rates for future years produced by the University of East Anglia CARESIM model.

The second part of the model divides the older population between people receiving no care, unpaid care, formal community-based care, unpaid and formal community-based care and residential care. The overall population with severe disability (three or more ADL limitations) is first divided between people living in the community and those living in care homes or (long-stay) hospitals. Data on the numbers of local authority funded care home residents are derived from NHS Digital statistics (NHS Digital 2019); data on the number of privately funded and NHS funded care home residents are estimated from Laing & Buisson market survey estimates (Laing 2018) and data on

hospital residents by age and gender and on the breakdown of the care home population by age and gender are derived from the Census 2011 (ONS 2011); and data on the proportion of care home residents who lived alone and on the proportion who owned their home before admission are derived from the PSSRU survey of care home admission.

The population living in the community are divided between the four categories – no care, unpaid care, formal community-based care, unpaid and formal community-based care - on the basis of analyses of data from the HSE 2011−2017. Demand for non-residential services was calculated by using the fitted values from the bivariate probit regression models as the estimated probabilities of receipt of care by age band, disability and the other factors described above[3].

The bivariate probit regression models account for the joint determination of formal community care and unpaid care. The fitted values derived from these models are the joint probability of the two types of care. 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 care recipients. The estimated numbers of recipients of local authority home care were grossed to match official NHS Digital data.

Three principal sources of unpaid care are identified: care from children, from spouses and from others (other family members, friends or neighbours). The propensity to receive unpaid care from each of the three sources is the fitted values of multinomial or binary logit regression models calculated using the HSE 2011−2017 data. The projections assume a steady state regarding the propensity, within household type/unpaid care groups, to receive care

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3. The bivariate probit regression models are specified as follows:

$$Y_{1i} = I(\Sigma_k(\beta_k \times X_{ki}) + \alpha \times Y_{2i} + e_{1i} > 0) \qquad (1)$$

$$Y_{2i} = I(\Sigma_k(\beta_k \times X_{ki}) + \Sigma_j(\gamma_j \times Z_{ji}) + e_{2i} > 0) \qquad (2)$$

where I(.) is an index function, with I(.)=1, if the event in the bracket is true, and I(.)=0, if otherwise. Y_{1i} denotes the dependent variable, Y_{2i} denotes the endogenous regressor, X_{ki} denotes the exogenous regressors that appear in both equations, and Z_{ji} denotes the exogenous regressors that only appear in the second equation. α, β_k and γ_j are the coefficients on the respective independent variables. e_1 and e_2 are latent error terms and are assumed to be jointly normal.

from a spouse, child, spouse and child, or others.

Community care users are divided into three groups according to hours of care: low intensity (1−5 hours), medium intensity (6−10 hours), and high intensity (10+ hours) of care. The proportions in each of the three categories were calculated using the HSE 2011−2017 data and were assumed to remain the same in the projection years. For care users in each intensity group, they are further divided into publicly-funded and privately-funded users of care. The proportions that were used to divide the care users in the base year were calculated using HSE 2011−2014 data. The model does not use data from HSE 2015−2017 because the questions regarding public and privately funded care in HSE 2015−2017 are different from those asked in HSE 2011−2014. The proportions in the projection years were informed by the analysis results from CARESIM model.

The third part of the model projects total expenditure on the formal services demanded, applying unit costs of formal care to the volume of services projected in the second part of the model. The unit costs are derived from local authority data. The fourth part of the model breaks down projected aggregate expenditure on services by sources of funding: NHS, social services and service users. The costs of the health services included are assigned to the NHS. The costs of 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 and home care users are divided into privately and publicly funded residents through analyses using the CARESIM model. The breakdown for 2018 is based on the official data. Privately funded residents are assumed to meet their care home fees from their own funds (including disability benefits), except that the NHS meets nursing costs in nursing homes. Expenditure on local authority funded residential care and home care is divided between local authority social services and users on the basis of CARESIM modelling. 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.

Estimated net and gross expenditure of local authority funded services is grossed to match local authority expenditure data from the Adult Social Care Finance Return (ASC-FR) for 2018. The grossing factors estimated for 2018 are applied to all projection years. Expenditure on disability benefits is estimated separately, by multiplying the numbers of recipients by the weekly average amounts. This expenditure is split between sums used to fund care and sums not so used through CARESIM modelling.

A fifth part of the model makes projections of the numbers of social care (but not NHS) staff required to provide the projected volume of social services, for different groups of social care staff. For care staff, it is assumed that the ratio of staff to volumes of care such as home care hours remains constant over time. For administrative and managerial staff, it is assumed that the ratio of such staff to care staff remains constant over time.