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Future Trends in Disability in Old Age

Raphael Wittenberg, Andrew Kingston, Bo Hu, Louise Robinson, Carol Jagger

Full Report

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Contents

Background

In this report we produce updated projections of trends in disability, and disability-free life expectancy (DFLE), at older ages and associated social care expenditure. Previous estimates of future people requiring care, and the costs, for England have been developed using two linked projections models: the Population Ageing and Care Simulation (PACSim) model and the Care Policy and Evaluation Centre (CPEC) long-term care projections.[1-3] However these estimates were based on the 2014-based population projections for England. More recently life expectancy at birth and age 65 has stalled in England, and these trends and potential future mortality rates are reflected in the latest 2018 population projections. Higher mortality rates, especially at very old ages, are likely to reduce the numbers requiring care and potentially costs.

In producing updated projections of trends in disability, and disability-free life expectancy (DFLE), we explored a range of variant projections including scenarios for trends in disability. The variant projections are produced in two ways: firstly, by using the published low and high life expectancy variant population projections; and secondly by applying scenarios of changing transitions to dependence, for example a 10% reduction in the incidence of low dependency (needs help less than daily). Additionally, in this report, we assess changes in DFLE at age 65 against the UK government's Ageing Society Grand Challenge,[4] of increasing healthy, independent life years at birth by five years by 2035, the latter amounting to an increase of 8% for both male and female DFLE. It is important to note that the projections presented in this report should not be treated as forecasts.

Methods

PACSim

The first model being used for the projects is PACSim; full details of the architecture of PACSim have been published previously.[1,5] In brief, PACSim is a discrete time dynamic microsimulation model that simulates characteristics (sociodemographic, health behaviours, chronic diseases, geriatric conditions and dependency) of individuals. The base population for PACSim is individuals aged 35 and over from three longitudinal studies: Understanding Society (US) wave 1, the English Longitudinal Study of Ageing (ELSA) wave 5, and the Cognitive Function and Ageing Study II (CFAS II), weighted up to the English population in 2014.

With the exception of dementia, chronic diseases (coronary heart disease, stroke, hypertension, diabetes, arthritis, cancer, respiratory disease, depression) were self-reported of doctor-diagnoses. Vision and hearing impairments were self-report of current condition and cognition status was defined by the Mini-Mental State Examination (MMSE) score,[6] categorised as 0-9 (severe cognitive impairment (CI)), 10-20 (moderate CI), 21-26 (mild CI), 27-30 (normal cognition). Dementia status was only available in CFAS participants. For participants in ELSA and US we allocated dementia status probabilistically at the end of the simulation based on age group, MMSE category and community/care home residence. Fuller details of data harmonisation and imputation of missing values are given online.[7]

Dependency was measured by the 'interval of need' (IoN) developed by Isaacs and Neville,[8] which categorises individuals according to the frequency with which they need care: high dependency (needs 24-hour care), medium dependency (needs help at regular times daily), low dependency (needs help less than daily), independent (free from care). Further details of the IoN classification, and how it was operationalised in the surveys, are available online.[7] PACSim produces projections of the prevalence of cognitive impairment by severity and

level of need for care, separately by age group, gender and years of education, which then form inputs to the CPEC long-term care projections model.

For the current estimates we retained the base population for the simulations as 2014 but updated the survival probabilities after 2017 to be those underlying the 2018-based England principal population projections.[9] Given the higher mortality rates in the 2018-based population projections than the 2016-based ones we approximated the mortality rate for age 90+ as the mortality rate for age 94 for men and for age 95 for women (previous version of PACSim used age 95 for both). These approximations are necessary because, although ELSA includes people over age 90, for identifiability reasons it gives their age as 90+.

Validation of PACSim against external data sources is difficult because the base population includes all the major national longitudinal studies. However PACSim reproduced well the time trends in the numbers of older people within five year age groups (65–69 years, 70-74 years, 75–79 years, 80-84 years, 85-89 years, ≥90 years) from the 2018-based zero migration England population projections,[10] with only a slight overestimation of numbers aged 85-89 (<=3.6% difference) and 90+ (<=4.4% difference) (Appendix Figure 1). Similarly life expectancy at age 65 between 2018 and 2041 from PACSim was within 2% for men and 2.5% for women compared to the ONS estimates.[11]

To assess changes in DFLE against the UK government's Ageing Society Grand Challenge,[4] of increasing healthy, independent life years by five years by 2035, we convert the five year increase on DFLE at birth to a percentage increase of DFLE at age 65. The latest estimates of DFLE at birth for England (2016-18) are 62.9 years (males) and 61.9 years (females).[12] An increase of five healthy years at birth therefore corresponds to an increase of 8% for both male and female DFLE at age 65. For simplicity within this report we report the percentage increase in years independent at age 65 between 2018 and 2038, approximating the 2035 endpoint for the challenge.

CPEC long-term care model

The second model used, CPEC long-term care projections model, makes projections of five key variables: the future numbers of disabled older people; the likely level of demand for unpaid care; long-term care services and disability benefits; the public and private costs associated with meeting this demand; and the social care workforce required. It is a cell-based model comprising a series of modules. It draws on a number of data sources including ONS 2018-based population projections, Health Survey for England data for 2015 to 2017 and NHS Digital data on numbers of local authority funded older users of adult social care and expenditure on social care for older people in 2018/9. More information about the model is available.[3]

The CPEC model projections presented in this paper are based on a number of assumptions discussed in Wittenberg et al. (2020).[13] We assume that patterns of care and the social care funding system remain unchanged, in order to focus on the impact of trends in disability which is the focus of this report. Our main assumptions are that:

- The number of people by age and gender changes in line with the Office for National Statistics (ONS) 2018-based population projections;
- Prevalence rates of disability by age group (65-69, 70-74, 75-79, 80-84, 85+) and gender follow the trend in the output of the PACSim model;
- The proportions of people receiving unpaid care, formal community care services and residential care services remain constant for each population sub-group by age, disability and other needs-related characteristics;

- Unit costs of care rise in real terms in line with Office for Budget Responsibility (OBR) assumptions for future trends in productivity, with an uplift to 2024 for planned rises in the national living wage (except that non-labour non-capital costs remain constant in real terms);
- 62.5% of the social care pay bill is affected by planned rises in the national living wage; and
- 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.

The model makes projections based on specific assumptions about trends in variables, such as future mortality rates and disability rates. 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.

Variant projections

We examined two sets of variant projections. The first set used the high and low life expectancy variants from ONS rather than the principal projections,[1] the underlying mortality rates (qx) for the high and low life expectancy variants being obtained as user requested data from the Lifetables team at the ONS. The second set of scenarios explored transitions to different levels of dependency, implemented in PACSim as follows:

- Scenario A: reductions in transitions from independent to mild dependency;
- Scenario B: reductions in transitions from mild to moderate dependency and increases in transitions from mild dependency to independence;
- Scenario C: reductions in all worsening transitions (independent to mild, mild to moderate, moderate to high) and increases in recovering transitions (mild to independent, moderate to mild) (it is assumed that recovery from high dependency to moderate dependency is negligible);
- Scenario D: the opposite of scenario C with increases in all worsening transitions and reductions in all recovery transitions (apart from recovery from high dependency);
- Scenario E: Scenario D but under the assumption of mortality rates as per the low life expectancy variant.

For scenarios A and B we examine 'optimistic' changes in transition probabilities of 10% and 20% per year, that is decreases of 10% and 20% in transition probabilities to more severe states and increases of 10% and 20% to less severe states; for scenario C and the 'pessimistic' scenarios D and E we examine changes of 10% only. We assumed the reductions/increases began in 2020 and in age group 65 and over only. Two studies examining the effect of obesity and physical activity on the risk of disability informed the magnitude of change in transition probabilities of 10% and 20% per year.[14,15] Al Snih et al. reported that the Hazard Ratio of ADL disability was increased by 31% for individuals with class II obesity (BMI 30 to <35), and 94% for individuals with class I obesity (BMI 35 to <40) over a seven year period. These equate to annual increases of 5% and 33% respectively; PACSim does not differentiate between class I and II obesity but models BMI of 30 or over. For physical activity Shah et al. found a reduction of 25% in incident disability over a 3.4 year

[1] Full details of the mortality assumptions underlying the variant projections are available at https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/methodologies/nationalpopulationprojectionsmortalityassumptions2018based#assumptions-for-mortality-variants

period for each 10^5 counts/day additional total daily physical activity, which equates to a reduction of approximately 9% per year.[15] It should be noted that other interventions might have greater or lesser effects on transition probabilities

Results

1. Impact of stalling life expectancy in England on levels and costs of care need

The limited growth in life expectancy from 2016 resulted in a smaller mid-2018 population than assumed in the 2014-based and 2016-based projections and a reduced future population growth. The latter is also evident from a comparison of the original PACSim estimates of numbers with care needs,[1] and new estimates using the 2018-based mortality rates (Table 1). By 2038 estimates of the number of people aged ≥65 years are 6.0% less from the 2018-based projections, with numbers independent being 1.8% less but those with low, moderate and high dependency 12-15% less (Table 1). Reductions in the numbers with any level of care need in 2025 and 2035 from the 2018-based projections were outside the range of simulations from the 2014-based projections (Appendix Table 1).

Table 1: numbers with care needs (thousands) in 2018, 2023, 2028, 2033, 2038 from PACSim with 2014-based principal projections and 2018-based principal projections

	2018	**2023**	**2028**	**2033**	**2035**
2014-based principal projection					
Independent	6374	7111	7873	8686	9176
Low dependency	2543	2766	3206	3710	4113
Medium dependency	533	497	525	549	602
High dependency	782	847	938	1025	1142
Total	10232	11220	12542	13971	15034
2018-based principal projection					
Independent	6392	7085	7811	8596	9012
Low dependency	2472	2622	2949	3271	3619
Medium dependency	530	482	481	494	512
High dependency	788	813	862	919	990
Total	10182	11002	12103	13280	14132
Change from 2014-based to 2018-based (N)					
Independent	17.6	-26.6	-62.3	-90.1	-164.3
Low dependency	-70.8	-143.3	-256.9	-439	-494.3
Medium dependency	-2.9	-15.1	-44.1	-55.2	-90.8
High dependency	5.8	-33.2	-75.5	-106.3	-152.3
Total	-50.3	-218.2	-438.8	-690.6	-901.7
Change from 2014-based to 2018-based (%)					
Independent	0.3	-0.4	-0.8	-1.0	-1.8
Low dependency	-2.8	-5.2	-8.0	-11.8	-12.0
Medium dependency	-0.5	-3.0	-8.4	-10.1	-15.1

High dependency	0.7	-3.9	-8.0	-10.4	-13.3
Total	-0.5	-1.9	-3.5	-4.9	-6.0

Estimates of overall life expectancy from the 2018-based projections were around 1.5 years less for 2028 and 1.9 years less for 2038 compared to those from the 2014-based ones (Figures 1 and 2). Generally these were reflected in fewer years with all levels of care needs but differences were greatest for years independent and with low dependency for men and years with low dependency for women.

Between 2018 and 2038, PACSim indicates an increase in life expectancy at age 65 for men of 2.0 years (from 18.6 to 20.6 years) and for women of 1.2 years (from 21.1 to 22.5 years). Over the same period years independent will increase by 1.9 years (from 13.0 to 14.9 years) for men and 0.5 years (from 11.1 to 11.6 years) for women. These correspond to percentage increases of 14.7% for men and 4.7% for women. Thus independent life expectancy increases for men are likely to exceed the government target of 8% at age 65, but this is not true for women.

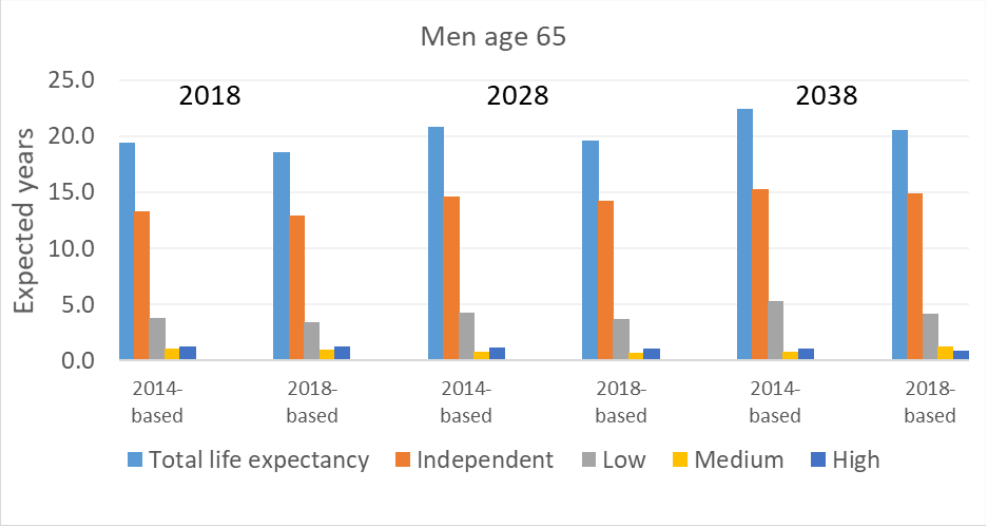

Figure 1: Years spent with each level of dependency in 2018, 2028 and 2038 for men age 65 from PACSim with 2014-based principal projections and 2018-based principal projections

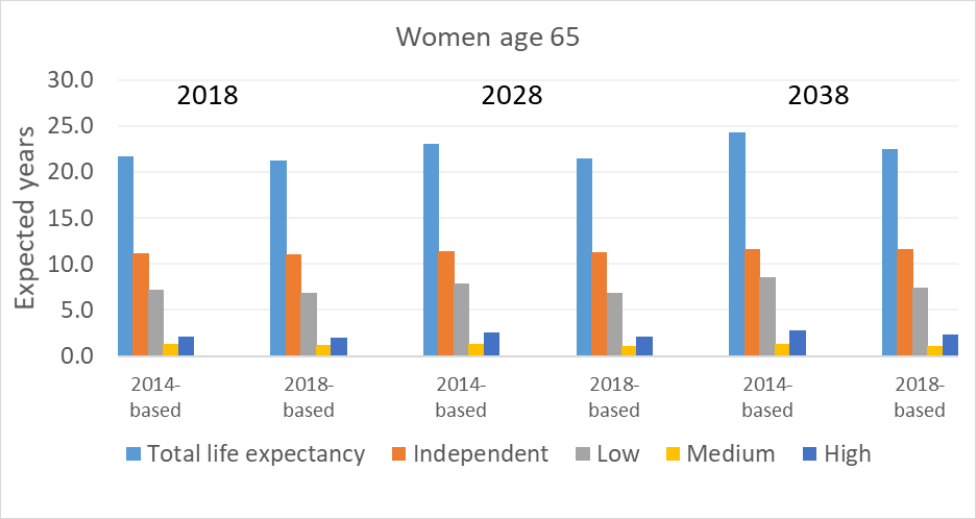

Figure 2: Years spent with each level of dependency in 2018, 2028 and 2038 for women age 65 from PACSim with 2014-based principal projections and 2018-based principal projections

The 2018-based ONS principal population projections show that the number of older people aged over 65 will rise by 40.8%, from 10.1 million in 2018 to 14.3 million 2038. Based on these ONS population projections and the PACSim projections, we project using the CPEC model that the number of older people with functional limitations in activities of daily living (ADLs) such as dressing, eating, washing, toileting, and mobility – that is, people unable to perform one or more ADLs without help - will increase by 19.3% over the 20-year period from 1.7 million in 2018 to 2.0 million in 2038. The number of users of community-based care is projected to increase by 44.9% over the same period, from 346,000 in 2018 to 501,000 in 2038, and the number of older people living in care homes to increase from 318,000 in 2018 to 470,000 in 2038, a rise of 47.8% (Table 2).

Public expenditure on social services (net of user charges) is projected using the CPEC model to increase from £8.4 billion in 2018 to £15.4 billion in 2038 at constant 2018 prices, a rise of 84.2% (Table 3). These figures relate to local authority net current expenditure and do not include expenditure met by income from user charges or NHS expenditure. We project that private expenditure on social care will increase by 108.4% over the 20-year period, from £7.8 billion in 2018 to £16.3 billion in 2038. Total expenditure is projected to increase by 94.1% over the same period, from £18.3 billion in 2018 (0.87% of GDP) to £35.5 billion in 2038 (1.25% of GDP) at constant 2018 prices.

Table 2: Projected number of older people with ADL limitations and number receiving community and residential care in England, 2018-2038, principal population projection (thousand persons)

	2018	2023	2028	2033	2038
Principal LE projections (Base case)					
ADL disabled older people	1,693	1,709	1,775	1,877	2,019
Community care	346	363	399	450	501
Residential care	318	351	374	420	470

Table 3: Projected expenditure on social care for older people in England, 2018-2038, principal population projection (£billion, 2018 prices)

	2018	2023	2028	2033	2038
Principal LE projections (Base case)					
Social care net expenditure	8.4	9.9	11.3	13.0	15.4
User charges	2.1	2.5	2.9	3.2	3.8
Private expenditure	7.8	9.6	10.9	13.7	16.3
Total expenditure	18.3	22.0	25.1	29.9	35.5
Total expenditure as % GDP	0.87%	0.98%	1.02%	1.14%	1.25%

2. Effect of low and high life expectancy (LE) variants

Estimates of the numbers independent or with low dependency showed the greatest change under the low and high LE variants. By 2028 the low LE variant estimated 23,000 fewer independent older people and 24,000 fewer with low dependency, whilst the high LE variant estimated 33,000 more independent older people and 38,000 more with low dependency (Table 4). By 2038 these estimates diverged further to 130,000 fewer independent and 96,000 fewer with low dependency under the low LE variant, and 68,000 more independent and 104,000 more with low dependency under the high LE variant (Table 4).

Similar differences were evident for the expected years spent at age 65 with different care needs (Table 5). For men's LE at age 65 overall the high LE variant resulted in an increase of 0.6 years by 2038, most of which were increases in years independent (0.4 years). For women the overall increase in LE of 0.5 years were more equally distributed across dependency levels. For men both low and high LE variants resulted in increases between 2018 and 2038 in years independent of over eight percentage points (low LE increase 10.9%; high LE increase 15.6%). However for women neither variant resulted in increases that reached eight percentage points (low LE increase 3.9%; high LE increase 5.4%).

Table 4: numbers with care needs (thousands) in 2018, 2023, 2028, 2033, 2038 from PACSim with 2018-based principal, low life expectancy and high life expectancy projections

	2018	2023	2028	2033	2038
Principal LE projection					
Independent	6392	7085	7811	8596	9012
Low dependency	2472	2622	2949	3271	3619
Medium dependency	530	482	481	494	512
High dependency	788	813	862	919	990
Low LE Projection					
Independent	6389	7085	7788	8509	8881
Low dependency	2449	2612	2925	3268	3523
Medium dependency	524	471	485	489	494
High dependency	801	814	843	891	968
High LE Projection					
Independent	6405	7119	7844	8643	9080
Low dependency	2458	2633	2987	3347	3723

Medium dependency	521	480	489	488	527
High dependency	793	811	871	937	1020

Table 5: Total life expectancy (LE) at age 65 and years spent with each level of dependency in 2018, 2028 and 2038 for 2018-based principal projections and low and high LE variants

	2018			2028			2038		
Age 65	Principal	Low LE	High LE	Principal	Low LE	High LE	Principal	Low LE	High LE
Men									
Total LE	18.6	18.7	18.8	19.6	19.6	19.7	20.6	19.6	21.2
Independent	13.0	13.0	13.0	14.2	14.2	14.3	14.9	14.4	15.0
Low	3.4	3.5	3.5	3.7	3.7	3.8	4.2	3.8	4.6
Medium	1.0	1.0	1.0	0.7	0.7	0.7	0.6	0.5	0.7
High	1.3	1.3	1.3	1.0	1.0	1.0	0.9	0.8	1.0
Women									
Total LE	21.2	21.1	21.2	21.4	21.2	21.8	22.5	21.8	23.0
Independent	11.1	11.0	11.1	11.3	11.2	11.4	11.6	11.5	11.7
Low	6.9	6.8	6.8	6.9	6.8	7.1	7.5	7.1	7.7
Medium	1.2	1.2	1.2	1.1	1.1	1.2	1.1	1.0	1.1
High	2.0	2.1	2.0	2.1	2.1	2.2	2.3	2.2	2.4

Under the low LE scenario, the ONS projected that the number of older people aged over 65 will increase by 38.0%, from 10.2 million in 2018 to 14.0 million in 2038. We project that the number of older people with ADL limitations will increase from 1.7 million in 2018 to 1.9 million in 2038, a rise of 14.1%, as opposed to 19.3% under the principal LE projection (Table 6). The projected number of people with ADL limitations is driven by the total number of older people, and the prevalence of ADL limitations in the older population. The projected number of older people with ADL limitations in 2038 is lower under the low LE than under the principal LE scenario because both the projected number of older people and the prevalence of ADL limitations are lower in the low LE scenario.

Under the high LE scenario, the ONS projected that the number of older people aged over 65 will increase by 43.3%, from 10.2 million in 2018 to 14.6 million in 2038. We project that in 2038 the number of older people with ADL limitations will be 2.1 million, a rise of 22.1% over 2018. We project that, while the number of older people will be higher in 2023 under the high LE than under the principal LE projection, the proportion of older people with ADL limitations will be lower in the high LE than in the principal LE scenario. This will result in a slightly lower number of people with ADL limitations under the high LE scenario in 2023 than under the principal projection. In 2038, both the projected number of older people and the projected prevalence of ADL limitations are higher under the high LE than under the principal LE scenario. This results in a higher projected number of older people with ADL limitations under the high LE than under the principal LE scenario in 2038.

Also, under the low LE scenario, we project that the number of community care recipients will increase to 482,000 and the number of older people living in care homes will increase to 440,000 in 2038, which represent increases of care users of 39.4% and 38.2%, respectively, in comparison to 2018 (Table 6). Under the high LE scenario, the number of community care recipients is projected to increase to 519,000 and that of care home residents to 474,000 in 2038, increases of care users of 50.1% and 49.1%, respectively. The most important factor driving the increase in the number of care recipients in different scenarios is the projected increased number of older people with ADL limitation.

Table 6: Projected number of older people with ADL limitations and number receiving community and residential care in England, 2018-2038, principal, low and high life expectancy projections (thousand persons)

	2018	2023	2028	2033	2038
Principal LE projections (Base case)					
ADL disabled older people	1,693	1,709	1,775	1,877	2,019
Community care	346	363	399	450	501
Residential care	318	351	374	420	470
Low LE projections					
ADL disabled older people	1,693	1,676	1,727	1,807	1,931
Community care	346	359	392	440	482
Residential care	318	338	350	391	440
High LE projections					
ADL disabled older people	1,693	1,705	1,780	1,888	2,067
Community care	346	364	403	459	519
Residential care	318	345	366	418	474

Note: Community care includes direct payments, publicly funded home care and privately funded home care. Residential care includes publicly and privately funded care.

Under the low LE scenario, we project that total expenditure on social care (publicly and privately funded) will increase to £33.7 billion in 2038 at 2018 constant prices (1.18% of GDP), which represents a rise of care expenditure of 84.2% in comparison to expenditure in 2018 (Table 7). Under the high LE scenario, total expenditure on social care is projected to increase to £36.0 billion in 2038 at 2018 constant prices (1.26% of GDP), a rise of care expenditure of 96.7% in comparison to expenditure in 2018.

Table 7: Projected expenditure on social care for older people in England, 2018-2038, principal, low and high life expectancy projections (£billion, 2018 prices)

	2018	2023	2028	2033	2038
Total expenditure on social care					
Principal LE projections	18.3	22.0	25.1	29.9	35.5
Low LE projections	18.3	21.4	24.0	28.4	33.7
High LE projections	18.3	21.8	24.8	29.9	36.0
Total expenditure as % GDP					
Principal LE projections	0.87%	0.98%	1.02%	1.14%	1.25%
Low LE projections	0.87%	0.95%	0.98%	1.08%	1.18%
High LE projections	0.87%	0.97%	1.01%	1.14%	1.26%

Note: Total expenditure includes social care net expenditure, user charges and private expenditure.

3. Effect of improving or worsening transitions to dependency

Five main scenarios for changing transitions to dependency were considered, three of these being 'optimistic' (Scenarios A,B and C)[2] with reductions in transitions to higher levels of dependency and increasing transitions to lower levels of dependency i.e. 'recovery'. For scenarios A and B we explored two levels of improvement – by 10% per year and 20% per year; for scenario C we considered only improvements of 10%. In all cases, the improvements/intervention started in 2020 and applied only to those aged 65 years and over.

Figures 3 and 4 show the change from the base case scenario (no reduction) in the estimated numbers at each level of dependency in 2028 (eight years after intervention) and 2038 (18 years after intervention). By 2028, targeting interventions on those already with low dependency (scenario B) produces smaller gains in numbers independent and smaller reductions in numbers with low dependency than targeting interventions at those already independent to slow down further dependency (scenario A). However, Scenario B does produce slight improvements in numbers with medium dependency over scenario A of around 16,000 in 2028 for a 10% reduction, and in 30,000 fewer with medium dependency and 5,000 fewer with high dependency for a 20% reduction (Figure 3). Scenario C, which includes improving recovery from medium to low dependency as well as those improvements in scenarios A and B, results in the greatest reductions in numbers with low, medium and high dependency by 2028 compared to the 10% reductions for scenarios A and B (Figure 3). By 2038 these patterns are even clearer (Figure 4).

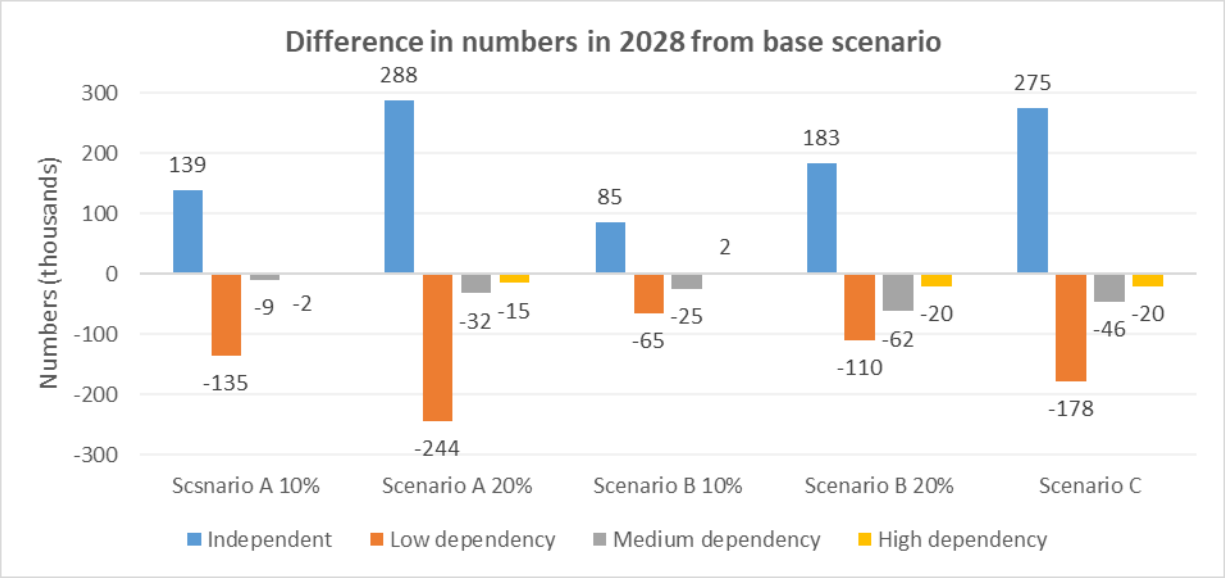

Figure 3: Change in numbers (thousands) with each level of dependency in 2028 from base scenario of no reduction, for optimistic scenarios A, B and C

[2] Scenario A: reductions in transitions from independent to mild dependency of 10% and 20%; Scenario B: reductions in transitions from mild to moderate dependency and increases in transitions from mild dependency to independence, 10% and 20%; Scenario C: reductions in all worsening transitions (independent to mild, mild to moderate, moderate to high) and increases in recovering transitions (mild to independent, moderate to mild) of 10% (it is assumed that recovery from high dependency to moderate dependency is negligible.

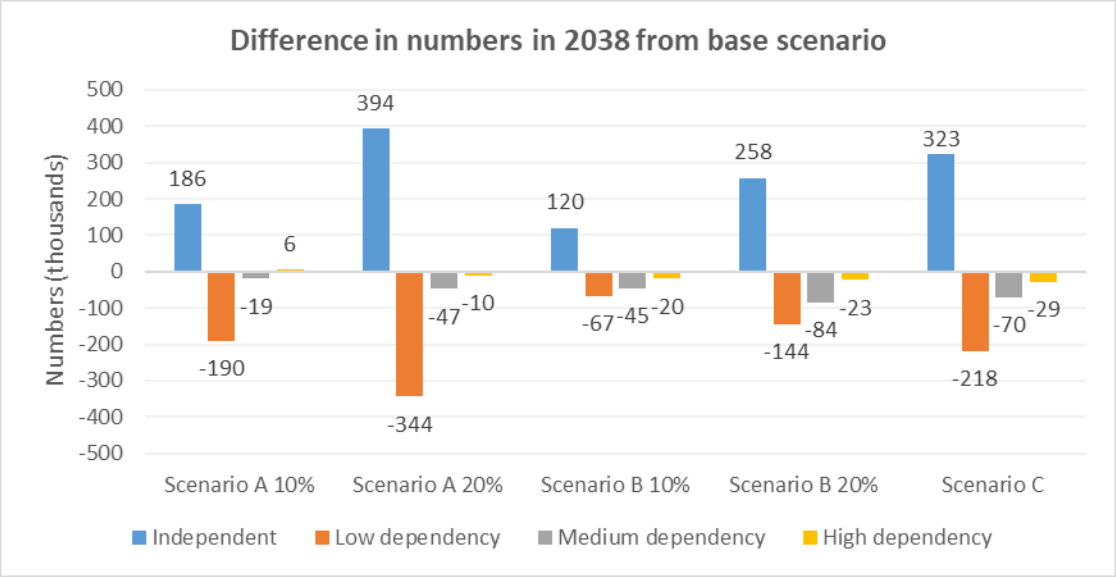

Figure 4: Change in numbers (thousands) with each level of dependency in 2038 from base scenario of no reduction, for optimistic scenarios A, B and C

We also considered two pessimistic scenarios (D and E). These both assumed a 10% increase in transitions to a worse dependency level and a 10% reduction in 'recovery' to a better dependency level, with the latter (Scenario E) also assuming the low LE variant. The change in numbers at each level of dependency from the base scenario, of no reduction at 2028 and 2038, are shown in Figures 5 and 6 respectively. Compared to the optimistic Scenarios (A, B, C), Scenarios D and E resulted in fewer older people independent and more older people with low, medium and high dependency by 2028 (Figure 5) and 2038 (Figure 6). Compared to Scenario D, Scenario E with the extra assumption of the low LE projection, produces 82,000 fewer independent older people by 2038 but also fewer at other levels of dependency.

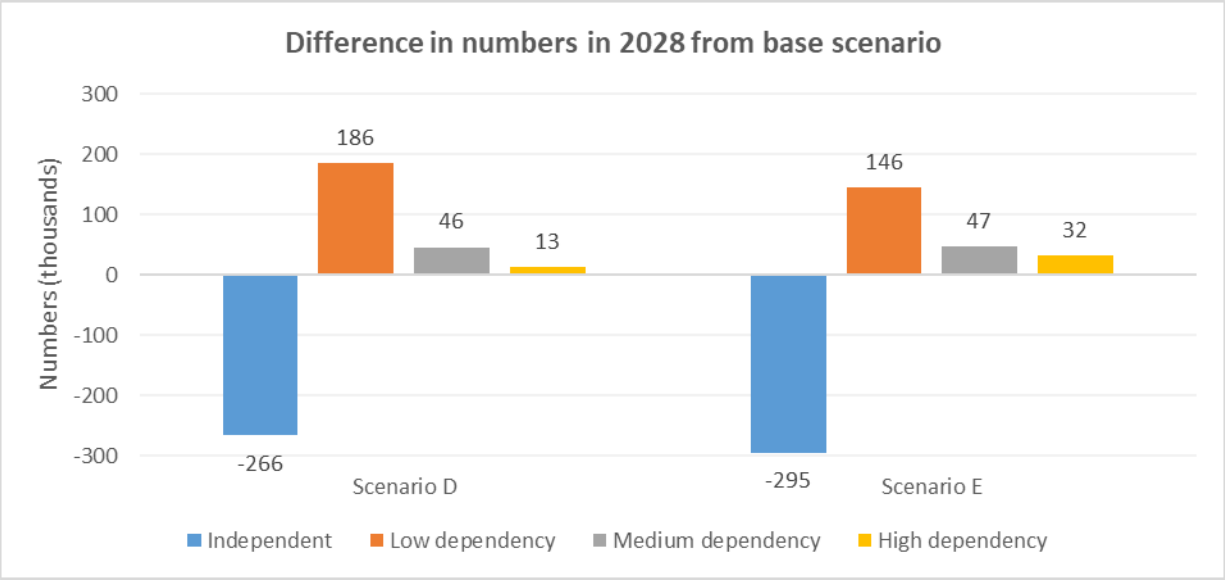

Figure 5: Change in numbers (thousands) with each level of dependency in 2025 from base scenario of no reduction, for pessimistic scenarios D and E

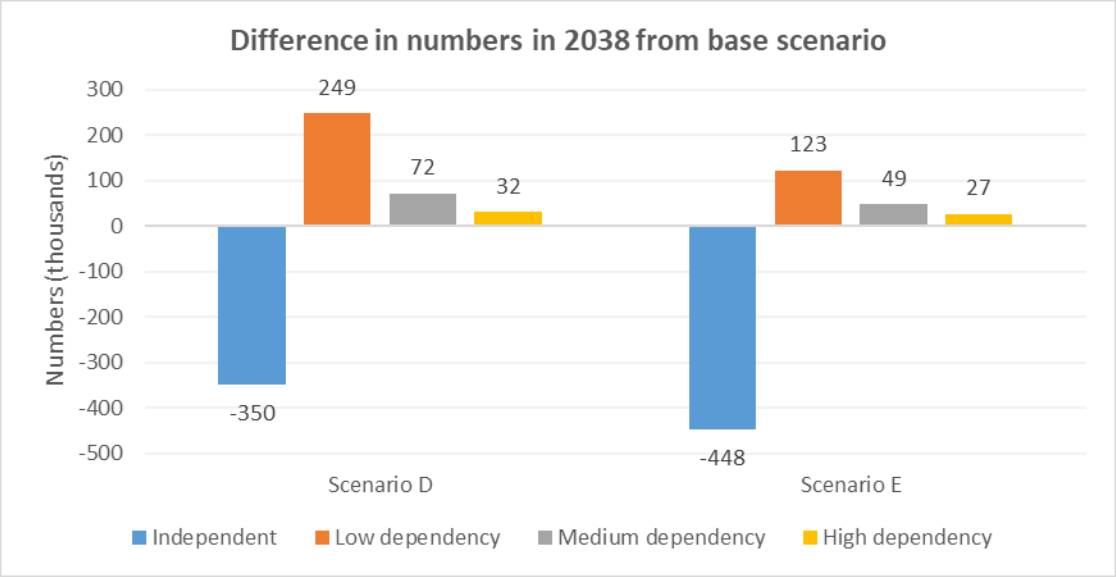

Figure 6: Change in numbers (thousands) with each level of dependency in 2038 from base scenario of no reduction, for pessimistic scenarios D and E

The effect of interventions on estimated years spent from age 65 at each level of dependency in 2028 and 2038 are shown in Figures 7 and 8 respectively. By 2028 the greatest difference from the base scenario of no reduction was an increase of 0.4 years independent for men under Scenarios A and B with 20% reductions and under Scenario C, and approximately 0.7 years independent for women from Scenario A 20% and Scenario C. By 2038 the magnitude of the difference between the base scenario and Scenario A 20% had changed little but slightly smaller improvements in years independent were evident from Scenario B 20% and Scenario C. The effect of the optimistic scenarios (A to C) over the base case on years spent with low, medium and high dependency were small (Figure 7) and had only increased slightly (around 0.2 years) by 2038 (Figure 8). However, in the pessimistic scenarios (D and E) there were reductions over the base case scenario of years independent of around 0.5 years and increases of similar magnitude in years with low dependency. The numbers underlying Figures 3-6 are provided in Appendix Table 2 and for Figures 7 and 8 in Appendix Table 3.

In terms of reaching an eight percentage point increase in years independent, the proportionate increase to five years in independent life expectancy at birth, all the scenarios, even the ‘pessimistic’ ones, achieved the target for men. For women, all the ‘optimistic’ scenarios except Scenario B 10% resulted in percentage increases above eight percentage points.

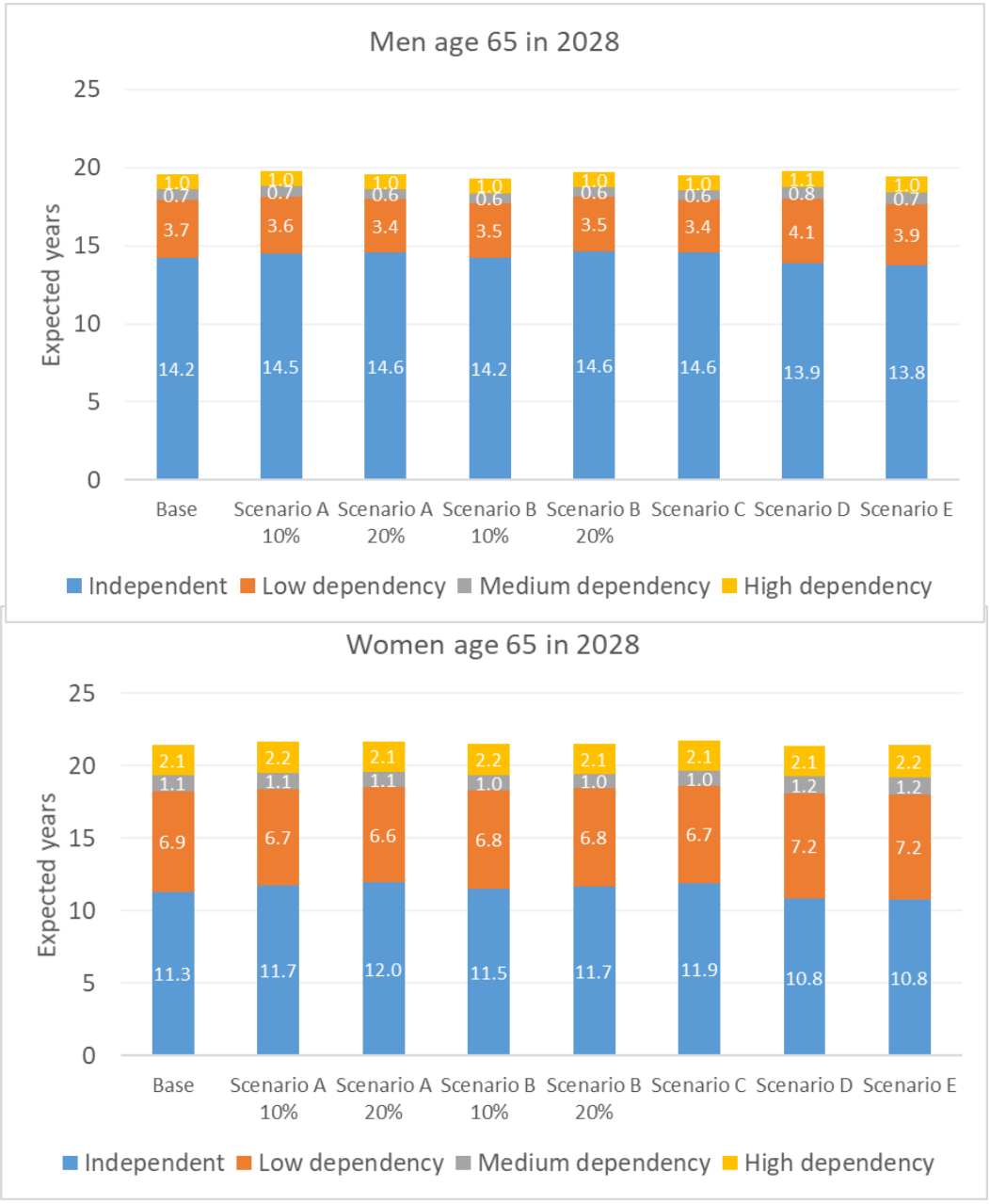

Figure 7: Years spent at age 65 with each level of dependency in 2028 for different scenarios of change in transitions, men and women

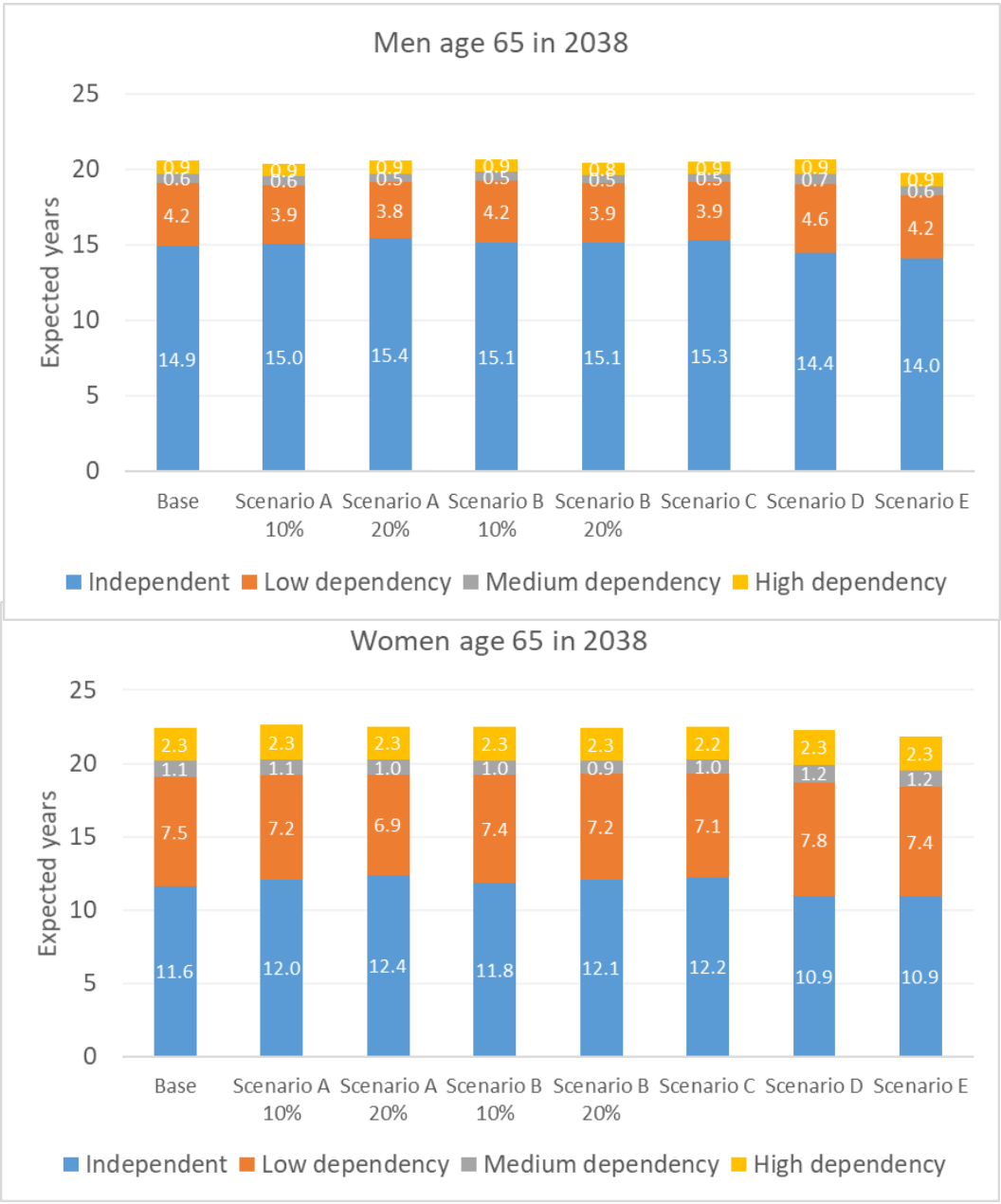

Figure 8: Years spent at age 65 with each level of dependency in 2038 for different scenarios of change in transitions, men and women

Figures 9 and 10 show the projected number of older people with ADL limitations for the different scenarios of change in transitions in 2028 and 2038, respectively. They also include a scenario in which the proportion of older people with ADL limitations remains constant (by age and gender) from 2018. The numbers in the three 'optimistic' scenarios are lower than in the base case. In particular, Scenario C is projected to have the largest reduction in the number of people with ADL limitations in comparison to the base case. For the two pessimistic scenarios, Scenario E has a slightly larger impact. We project that by 2038 there will be 2.16 million older people with ADL limitations in this scenario, in contrast to a projection of 2.02 million people in the base case. However, even under Scenario E there are projected to be substantially fewer older people with ADL limitations in 2038 than the

projected number of 2.52 million if dependency rates remained unchanged between 2018 and 2038.

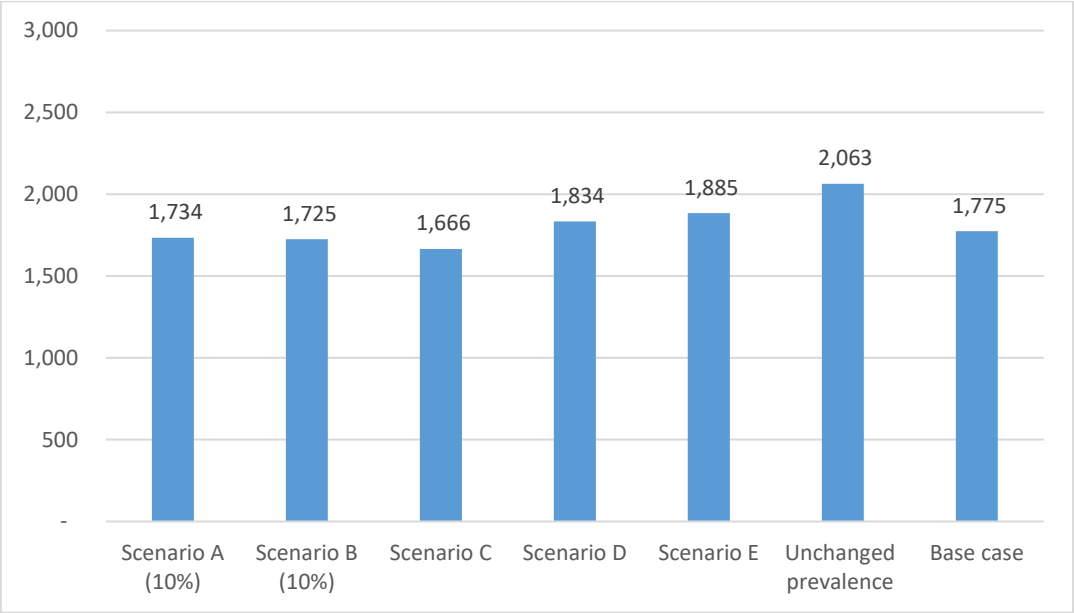

Figure 9: Projected number of older people with ADL limitations in 2028, for different scenarios of change in transitions (thousand persons)

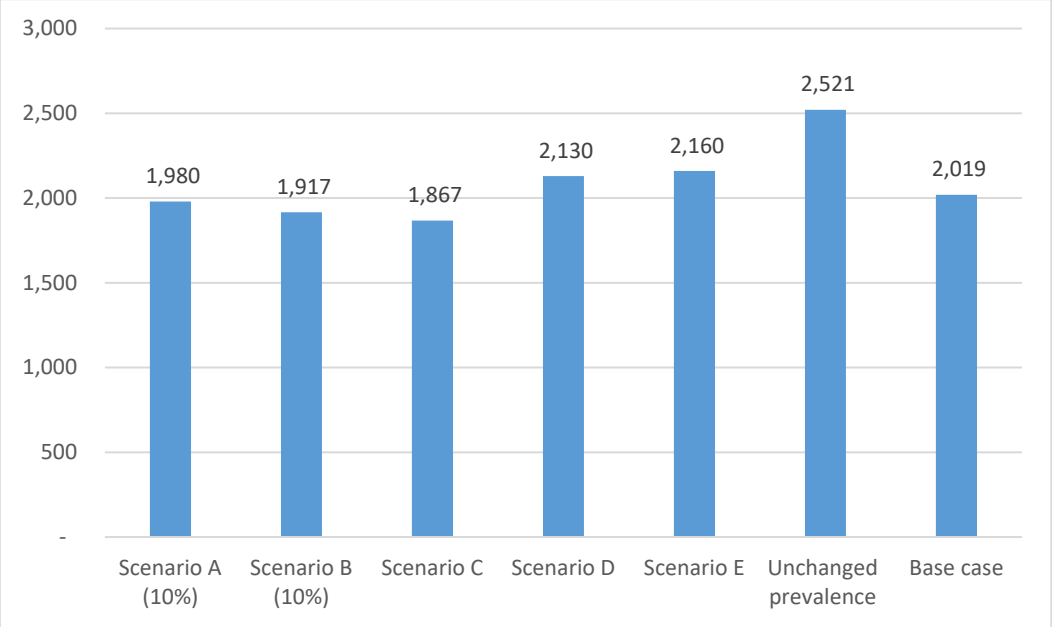

Figure 10: Projected number of older people with ADL limitations in 2038 for different scenarios of change in transitions (thousand persons)

Figures 11 and 12 show the impacts of change in transitions in dependency on the projected number of care users. Consistent with changes in care needs and ADL limitations, Scenario C is projected to have the lowest number of care recipients. We project that in this scenario the number of community care recipients and care home residents will increase to 378,000 and 360,000 respectively in 2028, and to 472,000 and 446,000 respectively in 2038. In comparison, Scenario E is projected to have the highest number of care recipients among the five scenarios of changes in transitions. We project that the number of community care

recipients and care home residents will increase to 420,000 and 387,000 respectively in 2028 and to 530,000 and 490,000 respectively in 2038. The numbers underlying Figures 9-12 are provided in Appendix Table 4.

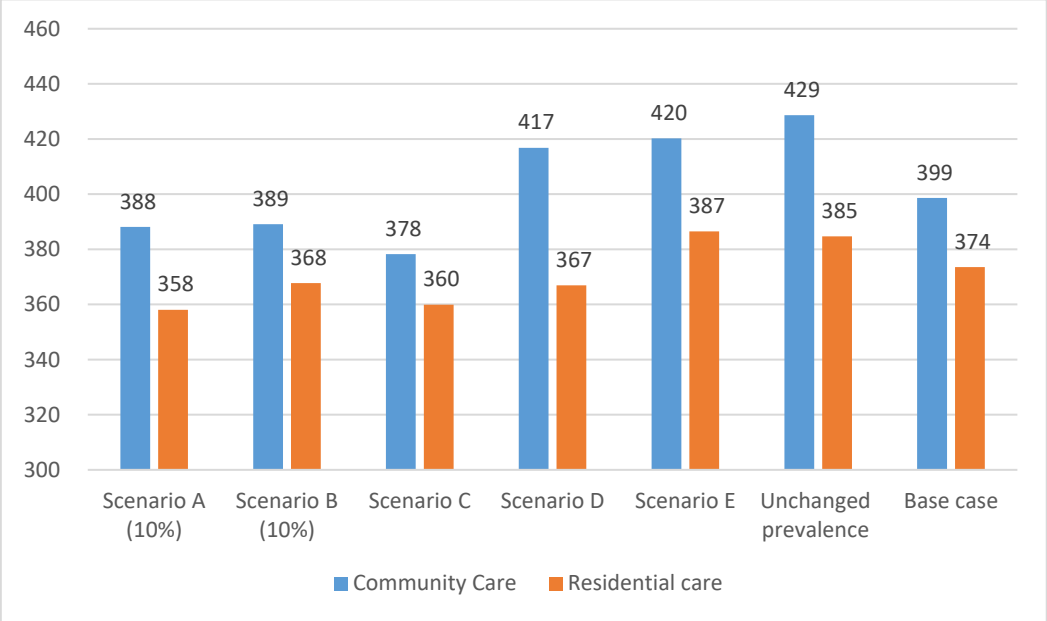

Figure 11: Projected number of older people receiving community care or living in care homes in 2028 for different scenarios of change in transitions (thousand persons)

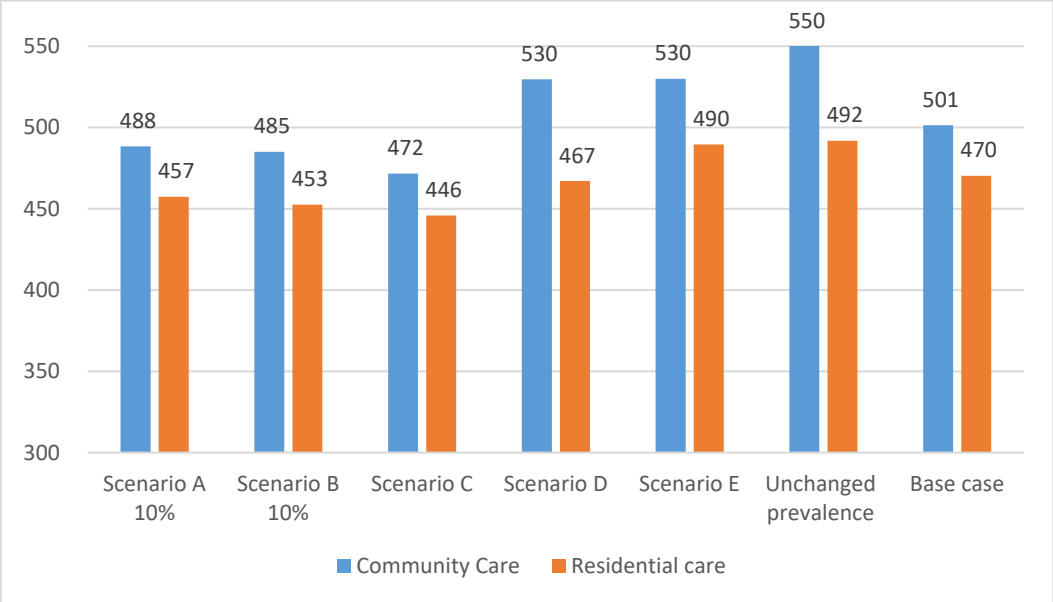

Figure 12: Projected number of older people receiving community care or living in care homes in 2038 for different scenarios of change in transitions (thousand persons)

Figures 13 and 14 show the impacts of change in transitions in dependency on projected total expenditure on social care for older people. Consistent with changes in care needs and care receipt, Scenario C is projected to have the lowest expenditure. We project that in this scenario the total expenditure on social care will increase to £24.2 billion in 2028 (Figure 13) and to £33.8 billion in 2038 (Figure 14), respectively. This will be equivalent to 0.99% of GDP in 2028 and 1.19% of GDP in 2038, respectively. In comparison, Scenario E is

projected to have the highest total expenditure on social care among the five scenarios of changes in transitions. We project that total expenditure will increase to £26.0 billion in 2028 and £37.0 billion in 2038, respectively. This will be equivalent to 1.06% of GDP in 2028 and 1.30% of GDP in2038, respectively. The numbers underlying Figures 13 and 14 are provided in Appendix Table 5.

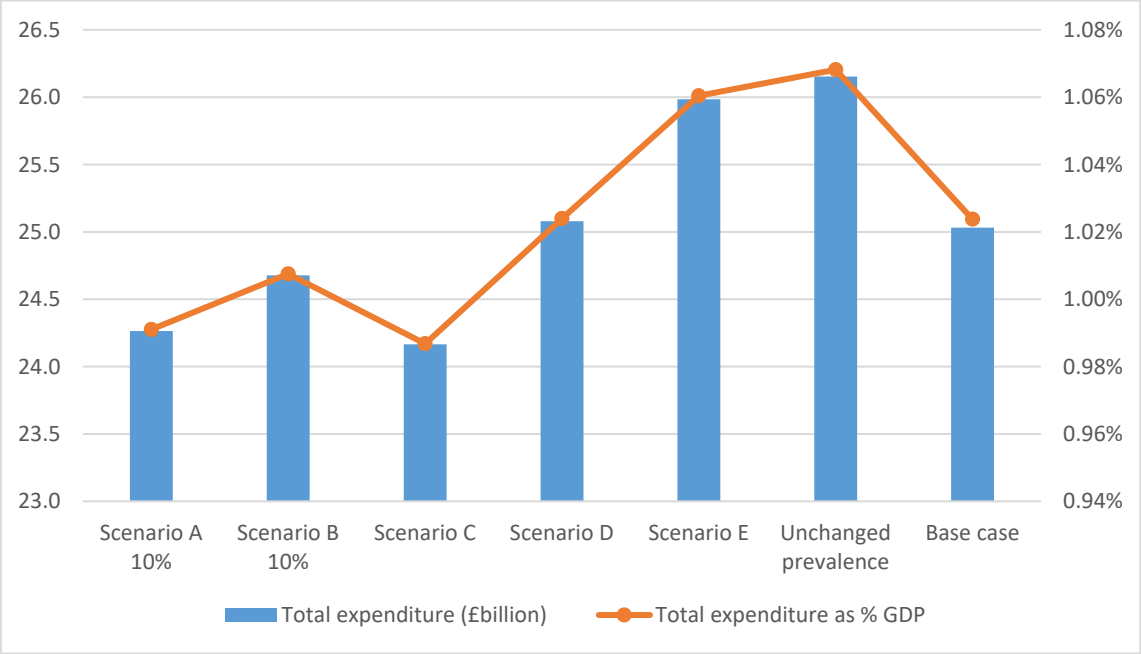

Figure 13: Projected expenditure on social care for older people in England in 2028 for different scenarios of change in transitions (£billion, 2018 prices)

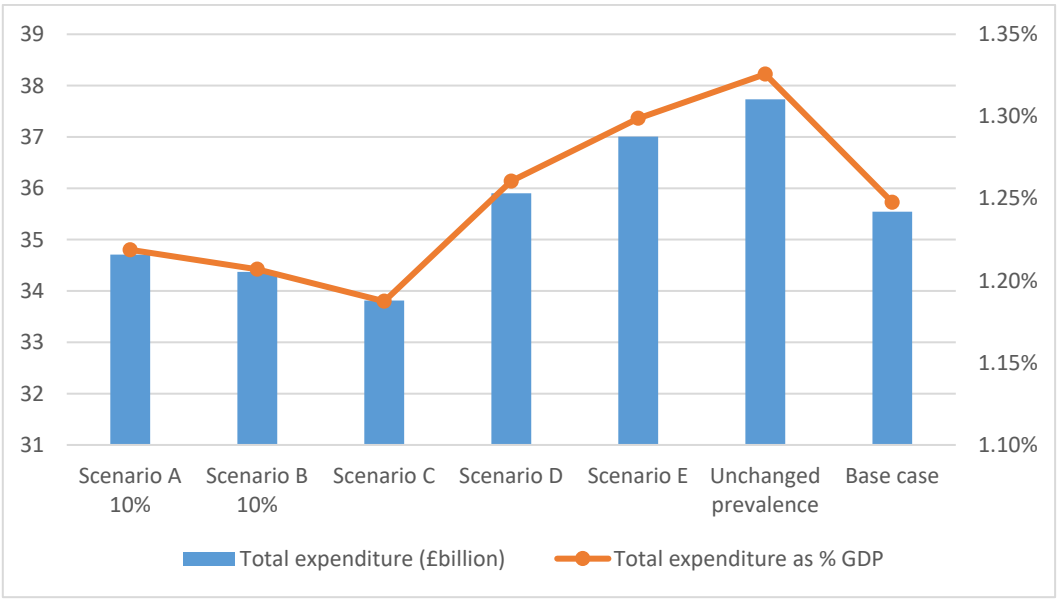

Figure 14: Projected expenditure on social care for older people in England in 2038 for different scenarios of change in transitions (£billion, 2018 prices)

Discussion

The projections presented in this report should not be treated as forecasts. They are projections based on a series of assumptions. In particular, they assume unchanged policy on eligibility criteria for adult social care and the funding system for social care. They also

assume no change in the probability of receiving unpaid care, formal community-based care and residential care for a given set on needs. It is in practice possible that the supply of unpaid care by family and friends will not rise in line with the number of older people needing care or that the balance between community-based and residential care will change.

Despite these caveats our findings provide more realistic estimates of the number of older people with different care needs and the average time spent from age 65 years at different care levels, as well as the number of older people receiving community care or living in care homes, and the total expenditure on social care. Our projections take into account the recent stalling of life expectancy inherent in the 2018 population projections, as well as both the low and high life expectancy variants. In addition, we also explored the effect of various scenarios of slowing down (or increasing) the progression of dependency.

Our base case projections suggest that, for England between 2018 and 2038, the number of older people with ADL limitations will increase by 19.3%, users of community-based care by 44.9%, and older people living in care homes by 47.8%. Based on current spend, related total expenditure on social services will increase by 94.1% (from 0.87% to 1.25% of GDP), with public expenditure increasing by 84.2% and private expenditure by 108.4% in real terms. Moreover, since men's independent life expectancy at age 65 will increase over the same period by 14.7%, this will exceed the 8% equivalent for the UK government's Ageing Society Grand Challenge of five extra years healthy and independent for all. Women's independent life expectancy at age 65 will not reach this challenge as it is projected to increase by just 4.7%.

Basing projections on the low or high LE variant population projections resulted in small changes (1%) in the percentage increase in number of community-based care recipients and care home residents. However there was greater variation in the percentage increase in the number of older people with ADL limitation, from 14.1% (low LE) to 22.1% (high LE), and in total expenditure on social care, which ranged from 84.2% or 1.18% of GDP (low LE) to 96.7% or 1.26% of GDP (high LE). For men both low and high LE variants resulted in percentage increases in independent life expectancy of over eight percentage points, but for women neither variant resulted in increases that reached the eight percentage points target, similar to the base case above.

Although the level of reduction in the progression of disability/dependency explored in the scenarios was informed by evidence on the effect of obesity and physical inactivity on disability progression, it does give some indication of the required effect size for interventions to slow down progression to more severe levels or increase recovery to independence. In comparison with the base case, we found that reducing all worsening transitions (independent to mild, mild to moderate, moderate to high) and increasing transitions to recovery (mild to independent, moderate to mild) by 10% (Scenario C) will have the largest reduction in the number of people with ADL limitations, the lowest number of care recipients, and the lowest total expenditure. This scenario also resulted in increases in both men's and women's independent life expectancy at age 65 exceeding the 8% required to meet the UK government's Ageing Society Grand Challenge.

In contrast, increasing all worsening transitions and reducing transitions to recovery by 10%, along with mortality rates in line with the low LE variant projections (Scenario E), would result in the highest number of care recipients and highest total expenditure in 2038, despite fewer numbers with ADL limitations compared to the base case (of no changes to dependency transitions). In this scenario men's independent life expectancy at age 65 would still increase by over 8% but women's independent life expectancy would reduce slightly between 2018 and 2038.

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, which is the assumption in this report. However, in view of the projected increase in demand for social care, and the general finding that higher demand means higher costs (in this case wages), wages in the sector may need to rise faster than average earnings in order to recruit and retain sufficient carers to enable supply to meet demand. In addition, we assume in this report that 62.5% of the social care pay bill is affected by the planned rises in the national living wage (NLW). This reflects Skills for Care data showing that, while a high proportion of the social care workforce are paid at or only somewhat above the NLW, a proportion are paid significantly above the NLW (Wittenberg et al. 2020). Given the uncertainty around the distribution of wages of care workers, there is also scope for debate about alternative assumptions about this proportion.

The projections do not take account of the impact of the current Covid-19 pandemic. The 2018-based population projections and other data used in the models pre-date the pandemic. It is not yet feasible to estimate reliably the impact of covid-19 on future mortality and disability rates in old age, future availability of unpaid care and formal care services and future wages in the care sector.

Conclusions

Interventions that slow down progression of disability across all levels, as well as improving recovery, could significantly reduce the expected increase in numbers of older people with ADL limitations, care recipients and total expenditure on social care by 2038. Additionally such interventions would result in increases in independent life expectancy exceeding the UK government's Ageing Society Grand Challenge of increasing healthy, independent life years by five years by 2035. In contrast, if disability progression further increases and recovery of independence reduces, there will be substantial increases in the number of care recipients and total expenditure on social care. The more positive projections for men than women reflect the greater levels of disability that women experience compared to men, and that, for future cohorts, a lower proportion of women than men will be independent when they enter the older population.[1]

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Appendix

Appendix Table 1: numbers with each level of dependency (thousands) in 2015, 2025, 2035 from PACSim with 2014-based projections

	2014-based projections		
	2015	**2025**	**2035**
independent	5541 (5535-5567)*	7388 (7370-7419)	8918 (8913-8967)
low	2849 (2840-2882)	2934 (2929-2958)	3904 (3861-3909)
medium	552 (523-552)	509 (491-513)	562 (549-581)
high	783 (778-790)	875 (846-875)	1065 (1040-1065)

*range from ten simulations

*Appendix Table 2: numbers (thousands) with each level of dependency in 2018, 2028 and 2038 for different scenarios**

	2018				2028				2038			
	Independent	Low	Medium	High	Independent	Low	Medium	High	Independent	Low	Medium	H
Base	6392	2472	530	788	7811	2949	481	862	9012	3619	512	9
Scenario A 10%	6406	2448	523	801	7950	2814	472	860	9198	3429	493	9
Scenario A 20%	6423	2446	526	784	8100	2706	450	848	9407	3276	466	9
Scenario B 10%	6397	2457	530	791	7896	2884	456	864	9132	3552	467	9
Scenario B 20%	6426	2427	523	795	7995	2840	420	843	9270	3476	429	9
Scenario C	6381	2450	533	788	8086	2771	435	842	9335	3401	442	9
Scenario D	6396	2457	527	800	7545	3135	527	875	8662	3868	584	1(
Scenario E	6393	2460	527	787	7516	3095	528	894	8564	3742	561	1(

*Scenario A: reductions in transitions from independent to low dependency of 10% and 20%; Scenario B: reductions in transitions from low to moderate dependency and increases in transitions from low dependency to independence, 10% and 20%; Scenario C: reductions in all worsening transitions (independent to low, low to moderate, moderate to high) and increases in recovering transitions (mild to independent, moderate to low) of 10%; Scenario D: increases in all worsening transitions and reductions in recovering transitions of 10%; Scenario E: as Scenario D but with low LE projections.

Appendix Table 3: Years spent at age 65 with each level of dependency, and total life expectancy in 2018, 2028 and 2038 for different scenarios, and for men and women

			Years spent				Total
		Scenario*	Independent	Low	Medium	High	LE
Men	2018	Base	13.0	3.4	1.0	1.3	18.6
		Scenario A 10%	13.1	3.5	1.0	1.3	19.0
		Scenario A 20%	13.1	3.5	1.0	1.3	18.9
		Scenario B 10%	13.1	3.4	1.0	1.3	18.7
		Scenario B 20%	13.0	3.4	1.0	1.2	18.6
		Scenario C	13.0	3.4	1.0	1.3	18.7
		Scenario D	13.0	3.5	1.0	1.3	18.8
		Scenario E	12.9	3.4	1.0	1.3	18.6
	2028	Base	14.2	3.7	0.7	1.0	19.6
		Scenario A 10%	14.5	3.6	0.7	1.0	19.8
		Scenario A 20%	14.6	3.4	0.6	1.0	19.6
		Scenario B 10%	14.2	3.5	0.6	1.0	19.3
		Scenario B 20%	14.6	3.5	0.6	1.0	19.7
		Scenario C	14.6	3.4	0.6	1.0	19.5
		Scenario D	13.9	4.1	0.8	1.1	19.8
		Scenario E	13.8	3.9	0.7	1.0	19.4
	2038	Base	14.9	4.2	0.6	0.9	20.6
		Scenario A 10%	15.0	3.9	0.6	0.9	20.4
		Scenario A 20%	15.4	3.8	0.5	0.9	20.6
		Scenario B 10%	15.1	4.2	0.5	0.9	20.7
		Scenario B 20%	15.1	3.9	0.5	0.8	20.4
		Scenario C	15.3	3.9	0.5	0.9	20.5
		Scenario D	14.4	4.6	0.7	0.9	20.6
		Scenario E	14.0	4.2	0.6	0.9	19.7
Women	2018	Base	11.1	6.9	1.2	2.0	21.2
		Scenario A 10%	11.1	6.7	1.2	2.0	21.1
		Scenario A 20%	11.1	6.8	1.2	2.0	21.1
		Scenario B 10%	11.1	6.8	1.3	2.0	21.2
		Scenario B 20%	11.1	6.8	1.2	2.1	21.2
		Scenario C	11.0	6.7	1.2	1.9	20.8
		Scenario D	11.0	6.7	1.2	2.0	20.9
		Scenario E	11.0	6.8	1.2	2.0	20.9
	2028	Base	11.3	6.9	1.1	2.1	21.4
		Scenario A 10%	11.7	6.7	1.1	2.2	21.6
		Scenario A 20%	12.0	6.6	1.1	2.1	21.7
		Scenario B 10%	11.5	6.8	1.0	2.2	21.5
		Scenario B 20%	11.7	6.8	1.0	2.1	21.5
		Scenario C	11.9	6.7	1.0	2.1	21.7
		Scenario D	10.8	7.2	1.2	2.1	21.4
		Scenario E	10.8	7.2	1.2	2.2	21.4
	2038	Base	11.6	7.5	1.1	2.3	22.5
		Scenario A 10%	12.0	7.2	1.1	2.3	22.6
		Scenario A 20%	12.4	6.9	1.0	2.3	22.5
		Scenario B 10%	11.8	7.4	1.0	2.3	22.5
		Scenario B 20%	12.1	7.2	0.9	2.3	22.4
		Scenario C	12.2	7.1	1.0	2.2	22.5
		Scenario D	10.9	7.8	1.2	2.3	22.3
		Scenario E	10.9	7.4	1.2	2.3	21.8

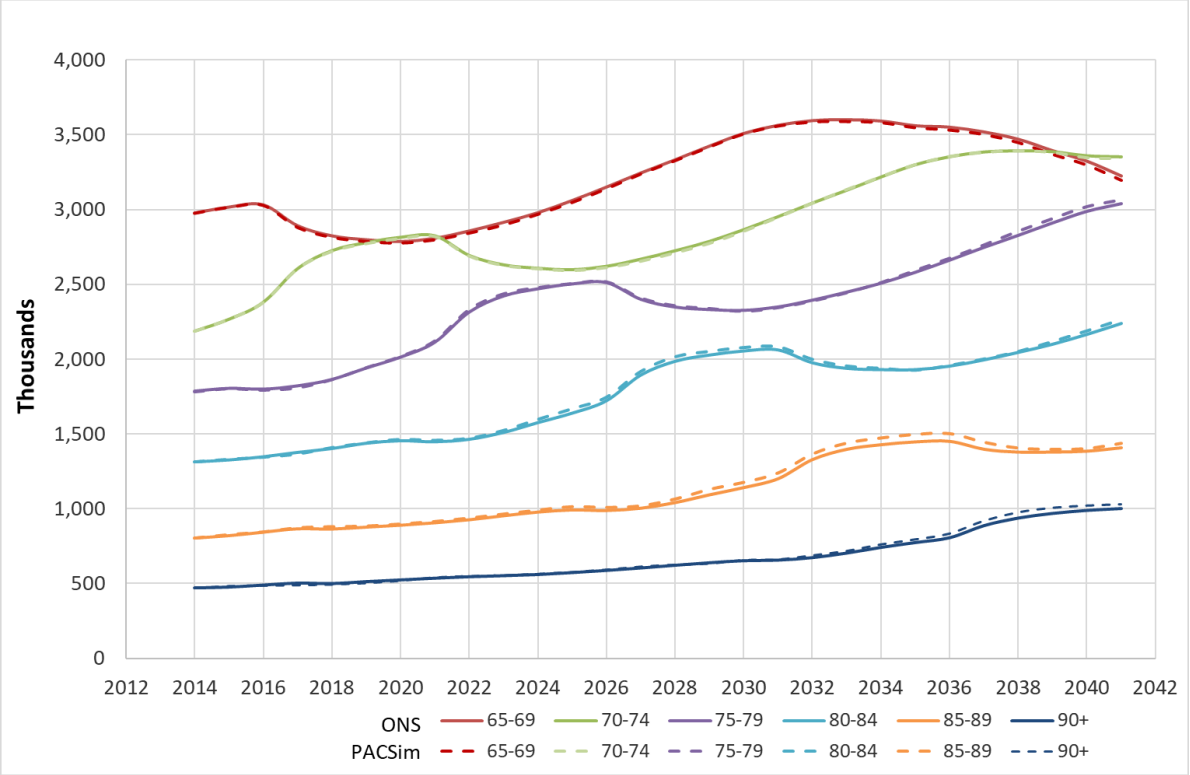
*Scenario A: reductions in transitions from independent to low dependency of 10% and 20%; Scenario B: reductions in transitions from low to moderate dependency and increases in transitions from low dependency to independence, 10% and 20%; Scenario C: reductions in all worsening transitions (independent to low, low to moderate, moderate to high) and increases in recovering transitions (mild to independent, moderate to low) of 10%; Scenario D: increases in all worsening transitions and reductions in recovering transitions of 10%; Scenario E: as Scenario D but with low LE projections.

Appendix Table 4 Projected number of older people with ADL limitations and receiving long-term care for scenarios of change in transitions, 2018-2038 (thousand persons)

ADL disabled older people	2018	2023	2028	2033	2038
Scenario A 10%	1,693	1,694	1,734	1,797	1,980
Scenario B 10%	1,693	1,683	1,725	1,797	1,917
Scenario C	1,693	1,649	1,666	1,735	1,867
Scenario D	1,693	1,739	1,834	1,958	2,130
Scenario E	1,693	1,761	1,885	1,979	2,160
Unchanged prevalence	1,693	1,860	2,063	2,320	2,521
Base case	1,693	1,709	1,775	1,877	2,019
Community Care	**2018**	**2023**	**2028**	**2033**	**2038**
Scenario A 10%	346	356	388	436	488
Scenario B 10%	346	357	389	438	485
Scenario C	346	351	378	425	472
Scenario D	346	373	417	473	530
Scenario E	346	375	420	475	530
Unchanged prevalence	346	380	429	496	550
Base case	346	363	399	450	501
Residential care	**2018**	**2023**	**2028**	**2033**	**2038**
Scenario A 10%	318	343	358	395	457
Scenario B 10%	318	344	368	402	453
Scenario C	318	336	360	401	446
Scenario D	318	345	367	413	467
Scenario E	318	356	387	426	490
Unchanged prevalence	318	346	385	444	492
Base case	318	351	374	420	470

Appendix Table 5 Projected total expenditure on social care for older people for scenarios of change in transitions, 2018-2038, England (£billion, 2018 prices)

Total expenditure	**2018**	**2023**	**2028**	**2033**	**2038**
Scenario A 10%	18.3	21.6	24.3	28.5	34.7
Scenario B 10%	18.3	21.7	24.7	28.9	34.4
Scenario C	18.3	21.2	24.2	28.6	33.8
Scenario D	18.3	21.9	25.1	30.0	35.9
Scenario E	18.3	22.4	26.0	30.6	37.0
Unchanged prevalence	18.3	22.1	26.2	32.0	37.7
Base case	18.3	22.0	25.1	29.9	35.5
Expenditure as % GDP	**2018**	**2023**	**2028**	**2033**	**2038**
Scenario A 10%	0.87%	0.96%	0.99%	1.08%	1.22%
Scenario B 10%	0.87%	0.96%	1.01%	1.10%	1.21%
Scenario C	0.87%	0.94%	0.99%	1.09%	1.19%
Scenario D	0.87%	0.98%	1.02%	1.14%	1.26%
Scenario E	0.87%	1.00%	1.06%	1.16%	1.30%
Unchanged prevalence	0.87%	0.99%	1.07%	1.22%	1.33%
Base case	0.87%	0.98%	1.02%	1.14%	1.25%



Appendix Figure 1: Comparison of number of individuals in England by age group and year from PACSim with ONS 2018-based population projections

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