The Strategy Unit.

The Effect of Demographic Change on Acute Hospital Utilisation

Prepared for NHS Dudley Clinical Commissioning Group

December 2015

NHS
Midlands and Lancashire
Commissioning Support Unit

About the Strategy Unit

The Strategy Unit is a team of experts who are committed to helping you to improve health and care in ever more challenging circumstances. Hosted by the Midlands and Lancashire Commissioning Support Unit, we operate autonomously as a free-standing health and care consultancy business.

Our team offers advanced technical skills combined with practically grounded strategic and operational experience. We specialise in analysis; evidence review; strategic financial planning; policy and strategy development; consensus building; programme design, assurance and implementation; capacity building; evaluation; and trusted advisor support for senior leaders.

We welcome the opportunity to discuss your needs and challenges at any time. If we think we can help you, we will gladly develop a detailed proposal. If we think we can't, then we will tell you, and explain why, helping you to find an alternative if needed.

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Purpose of this report

The objective of this report is to respond to the question, 'what effect will an older population have on demand for health and care services?' We explain why typical approaches 'overlook the fact that rising life expectancy makes ... older people "younger", healthier, and fitter than their peers in earlier cohorts',[1] and how this omission causes the effect of population ageing to be overstated.

We outline the three main theories of population ageing and use curve fitting techniques alongside trends in health expectancies to adjust our estimates of future demand for temporal changes in population health status. Results are reported for three scenarios, and for all types of acute hospital activity (including breakdowns by diagnosis and specialty).

This report is the first in a set of three reports produced by the Strategy Unit that each address a crucial aspect of commissioner planning for acute services. As a collective, these three reports provide a useful and robust framework on which local commissioning organisations can base their strategic planning.

Analytics report set to support commissioner planning

1. The Effect of Demographic Change on Acute Hospital Utilisation

2. Identifying Potential QIPP Opportunities

3. Balancing Income, Cost Pressures and Opportunities for Savings

1. Spijker, J. & MacInnes, J., 2013. Population ageing: the timebomb that isn't? BMJ (Clinical research ed.), 347, p.f6598.

Population change

Population estimates and projections

The Office for National Statistics (ONS) produce two main measures of population change: estimates and projections. Population estimates consider only past population size and structure, population projections are concerned with future populations. The ONS is considered the most reliable source of population data, and its estimates and projections are used by a wide range of public and private sector organisations. Estimates of the usual resident population are produced annually and published in June relating to the previous year. The term resident population includes all people who usually live within a defined geographic area, whatever their nationality.

For clinical commissioning groups (CCG), resident populations will differ from the population of patients registered with member practices. The size and direction of difference will vary across CCGs. In general, the number of patient registrations is greater than the number of people living in England according to population estimates from the ONS. The analyses produced for this report relate hospital activity for patients registered to member practices of a particular CCG to the resident population of the same CCG.

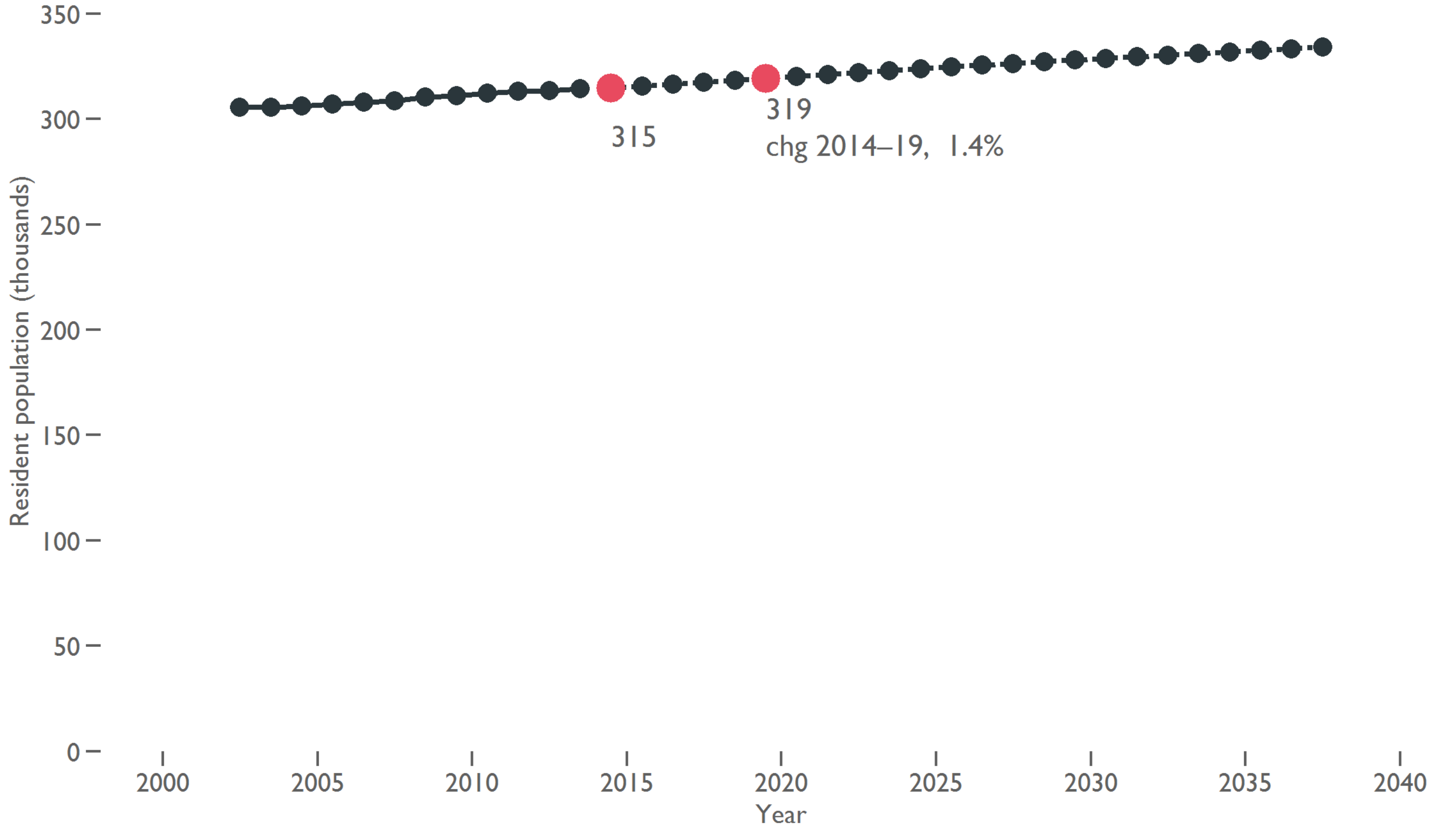
Population projections show what the population will be if recent trends continue, indicating potential size, sex and age structure. They are not forecasts and do not attempt to predict the impact that future government policies, changing economic circumstances or other factors might exert. ONS calculates a principal projection, and a number of variant projections based on alternative assumptions of future fertility, mortality and migration. The analyses undertaken in this report use the principal (main) projection—reflecting the most 'likely' population developments on the basis of recently observed trends—from the 2012-based sub-national population projections.[1]

Methods guide for ONS population estimates: http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/pop-ests/index.html

1. Ons.gov.uk, (2015). 2012-based Subnational Population Projections for England - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html [Accessed 3 Sep. 2015].

Resident population estimates and projection, 2002–2037

Dudley CCG



Sources:

Ons.gov.uk, (2015). Health Geography Population Estimates, Mid-2002 to Mid-2010 revised - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/sape/health-geography-population-estimates/mid-2002-to-mid-2010-revised/index.html [Accessed 3 Sep. 2015].

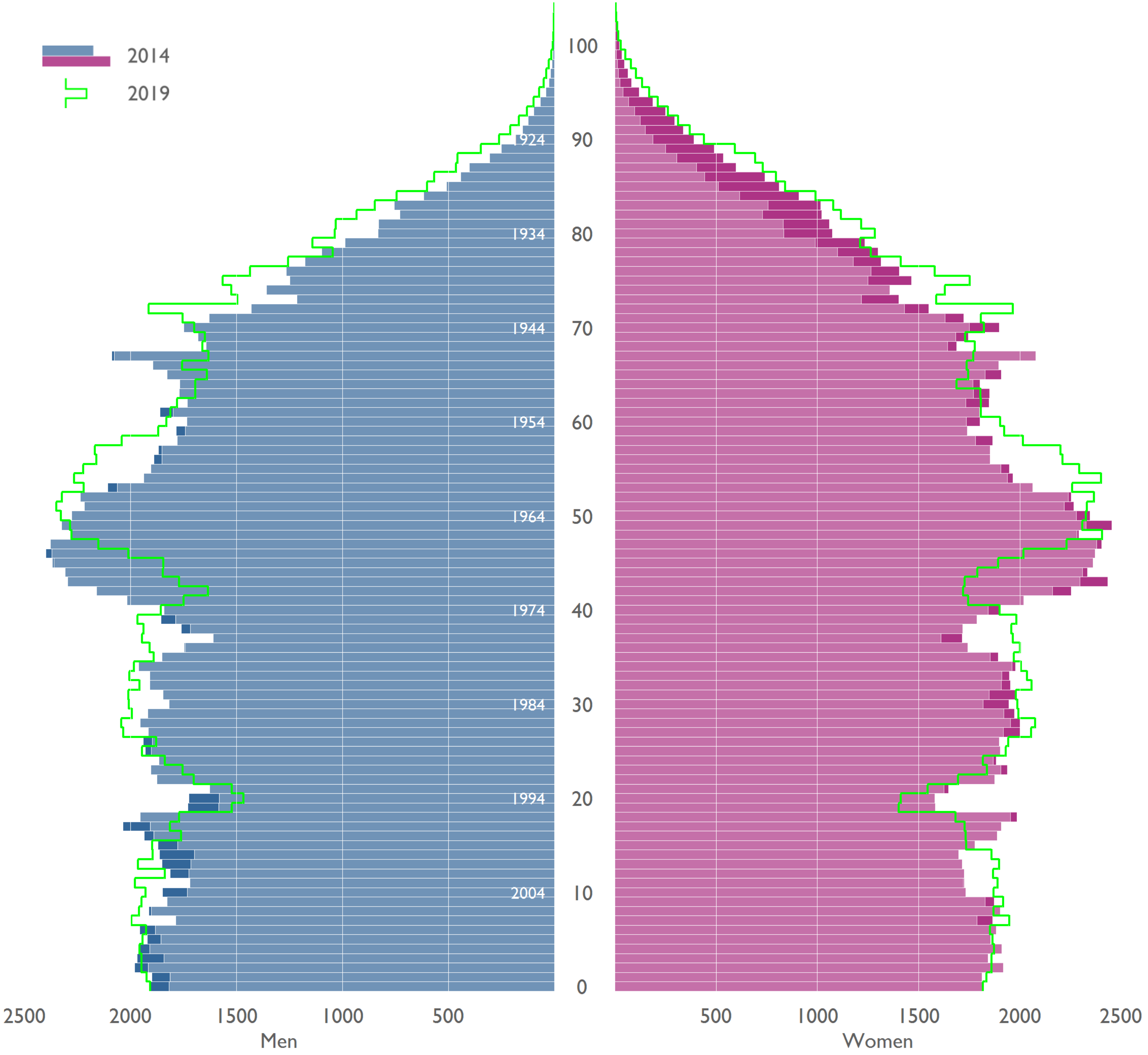
Ons.gov.uk, (2015). Health Geography Population Estimates, Mid-2012 - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/sape/health-geography-population-estimates/mid-2012/index.html [Accessed 3 Sep. 2015].

Ons.gov.uk, (2015). Annual Small Area Population Estimates, 2013 - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/sape/small-area-population-estimates/mid-2013/mid-2013-small-area-population-estimates-statistical-bulletin.html#tab-Clinical-Commissioning-Group-Population-Estimates [Accessed 3 Sep. 2015].

Ons.gov.uk, (2015). 2012-based Subnational Population Projections for England - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html [Accessed 3 Sep. 2015].

Change in resident population age structure, 2014–2019

Dudley CCG



Note:
Population estimates for clinical commissioning groups (CCGs) are published for single years of age 0–89 and a 90-plus age group. To estimate CCG populations for single years of age 0–104 and 105-plus national estimates of the age distribution among the very old were applied to CCG counts of the 90-plus population.

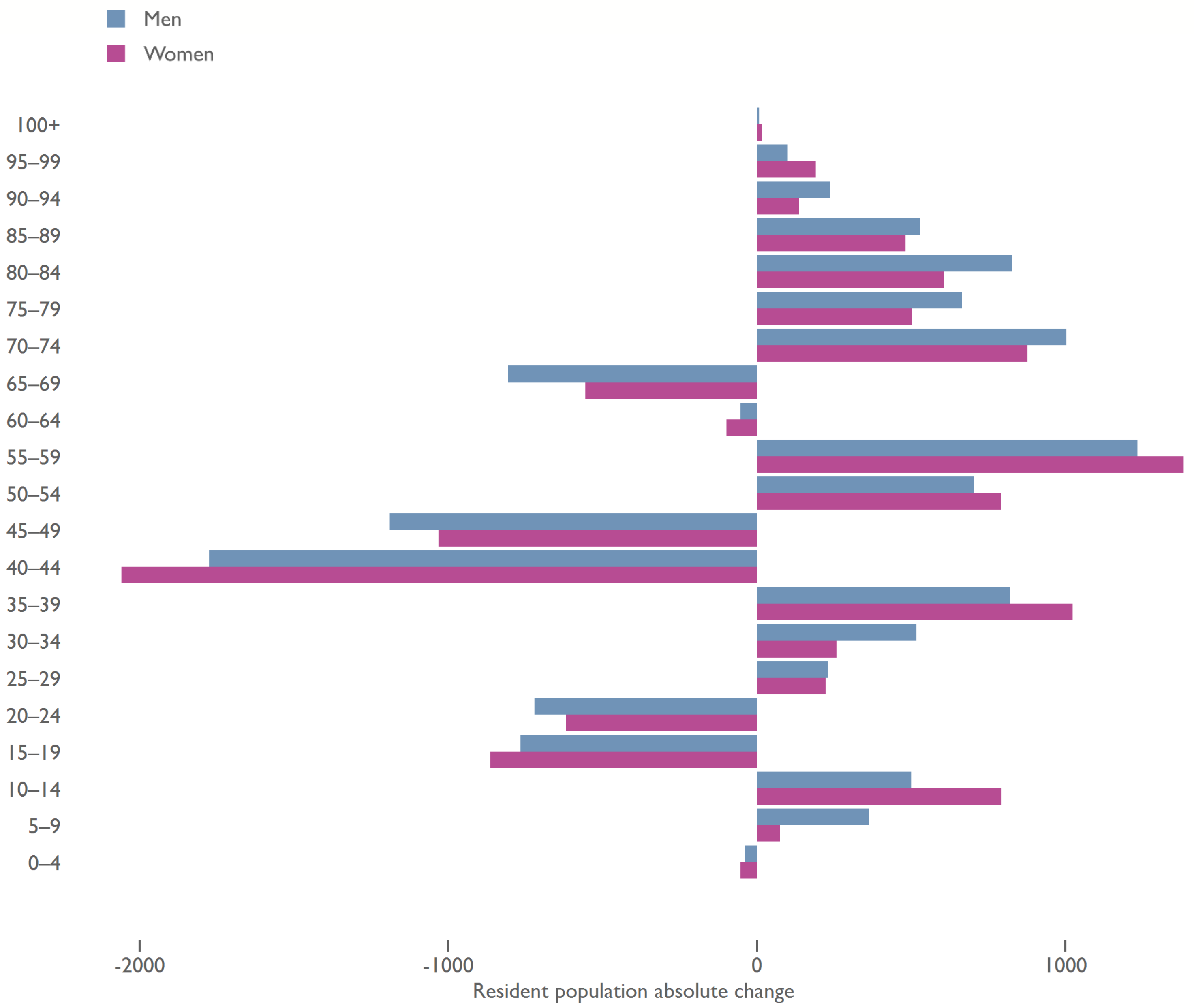
Sources:
Ons.gov.uk, (2015). Annual Small Area Population Estimates, 2013 - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/sape/small-area-population-estimates/mid-2013/mid-2013-small-area-population-estimates-statistical-bulletin.html#tab-Clinical-Commissioning-Group-Population-Estimates [Accessed 3 Sep. 2015].

Ons.gov.uk, (2015). 2012-based Subnational Population Projections for England - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html [Accessed 3 Sep. 2015].

Ons.gov.uk, (2015). Estimates of the Very Old (including Centenarians), 2002 - 2013, England and Wales; United Kingdom. - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/mortality-ageing/estimates-of-the-very-old--including-centenarians-/2002---2013--england-and-

Resident population absolute change by age group, 2014–2019

Dudley CCG



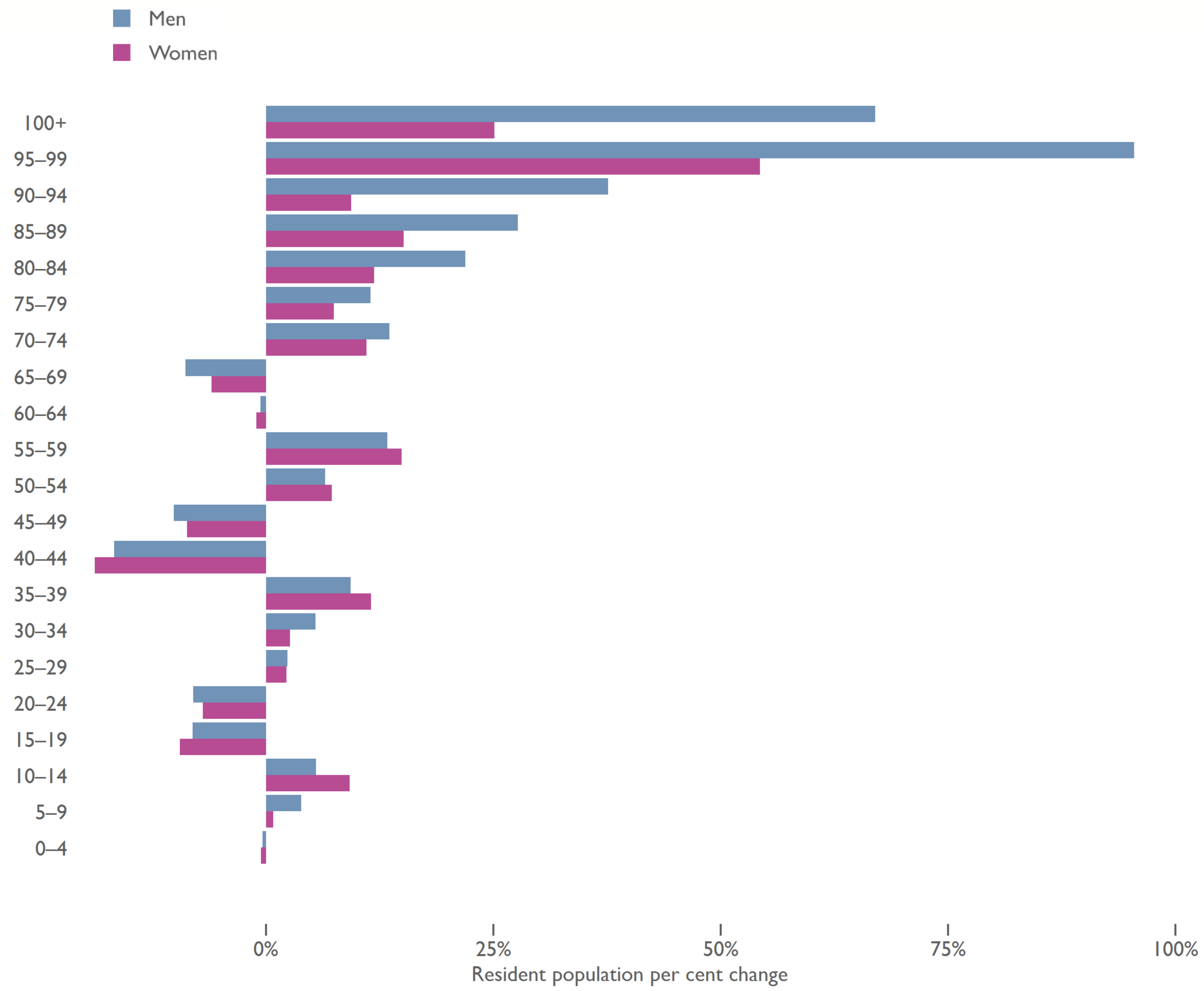
Sources:

Ons.gov.uk, (2015). Annual Small Area Population Estimates, 2013 - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/sape/small-area-population-estimates/mid-2013/mid-2013-small-area-population-estimates-statistical-bulletin.html#tab-Clinical-Commissioning-Group-Population-Estimates [Accessed 3 Sep. 2015].

Ons.gov.uk, (2015). 2012-based Subnational Population Projections for England - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html [Accessed 3 Sep. 2015].

Resident population per cent change by age group, 2014–2019

Dudley CCG



Sources:

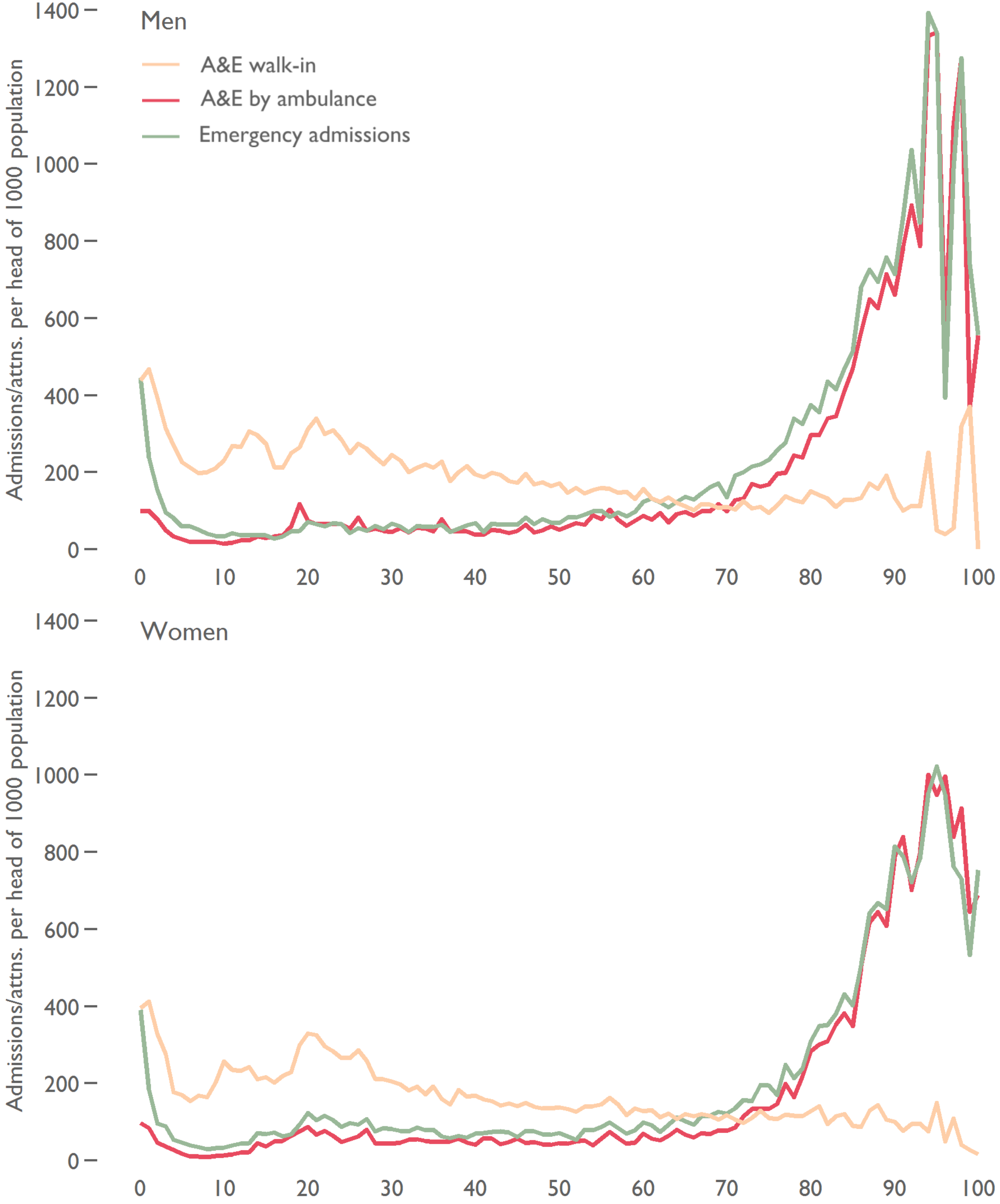
Ons.gov.uk, (2015). Annual Small Area Population Estimates, 2013 - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/sape/small-area-population-estimates/mid-2013/mid-2013-small-area-population-estimates-statistical-bulletin.html#tab-Clinical-Commissioning-Group-Population-Estimates [Accessed 3 Sep. 2015].

Ons.gov.uk, (2015). 2012-based Subnational Population Projections for England - ONS. [online] Available at: http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html [Accessed 3 Sep. 2015].

Utilisation rates

Unplanned services acute hospital utilisation rates, 2014–15

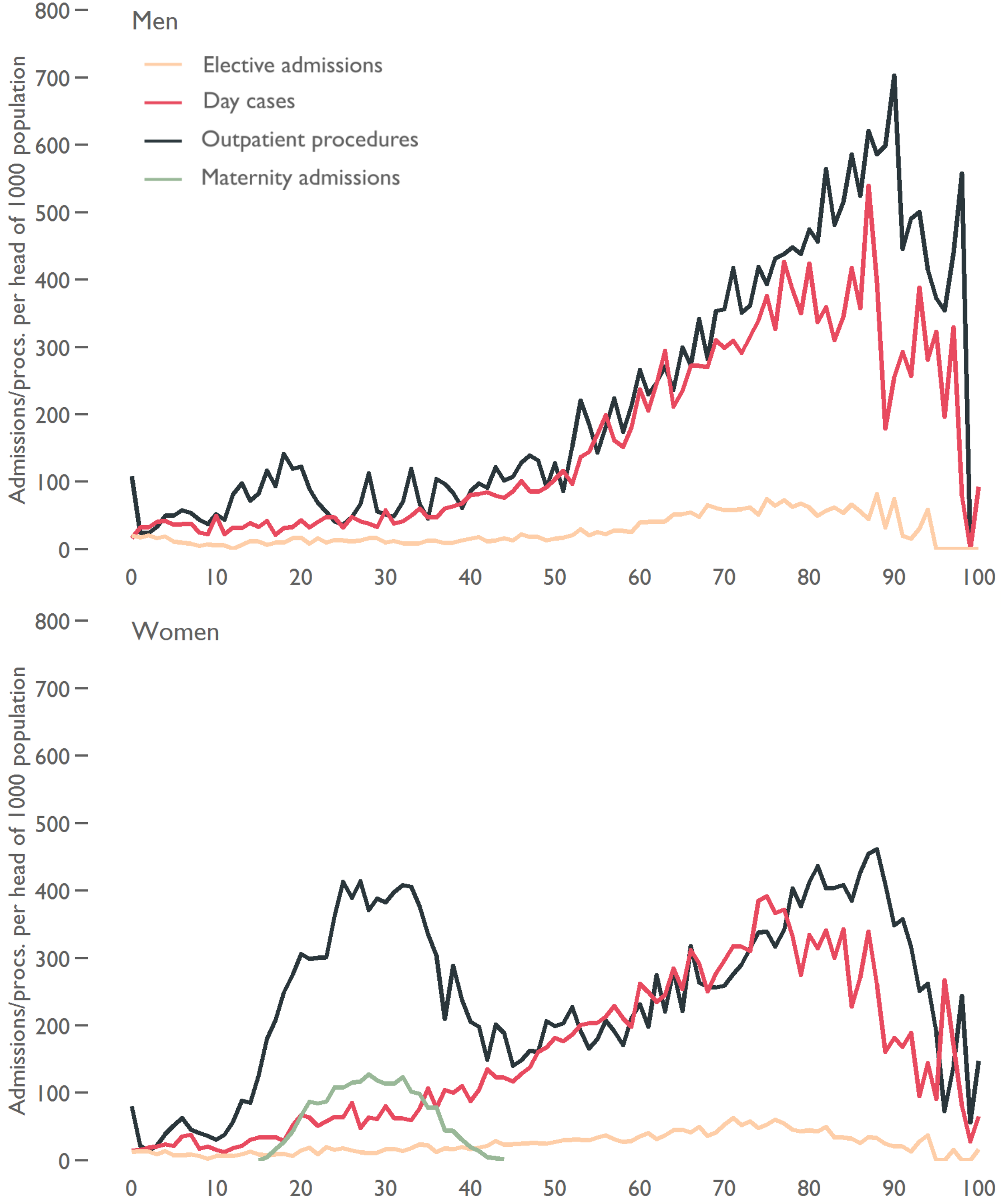
Dudley CCG resident population



Sources:
Secondary Uses Service (SUS) PbR admitted patient care, 2014–15; Hospital Episode Statistics (HES) Accident and Emergency attendances, 2014–15.

Planned services acute hospital utilisation rates, 2014–15

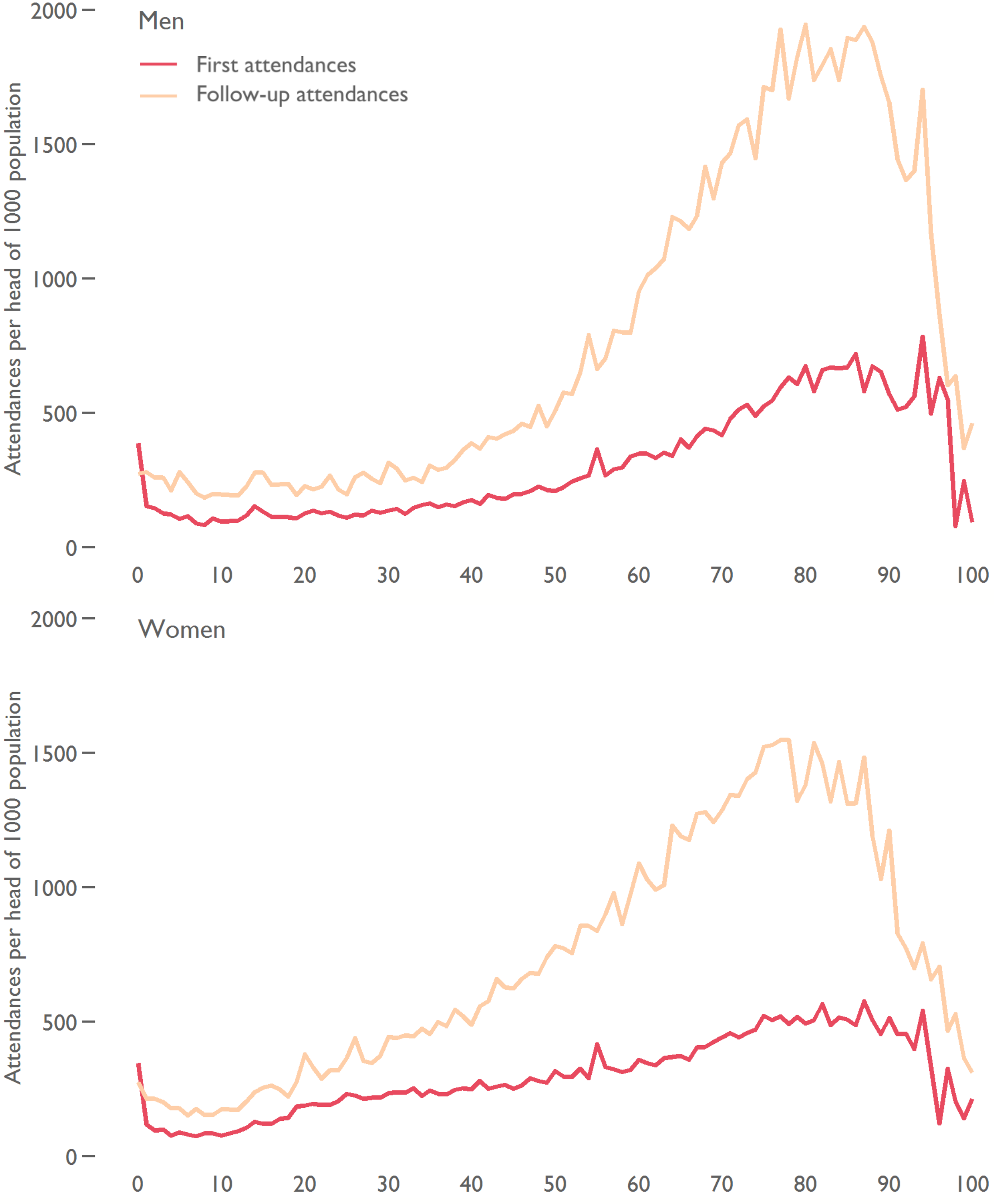
Dudley CCG resident population



Sources:
Secondary Uses Service (SUS) PbR admitted patient care, 2014–15; Hospital Episode Statistics (HES) outpatient activity, 2014–15.

Outpatient services acute hospital utilisation rates, 2014–15

Dudley CCG resident population



Source:
Hospital Episode Statistics (HES) outpatient activity, 2014–15.

Methods

How do demographic changes impact healthcare utilisation?

Healthcare need or demand is not constant across age groups as evidenced by the strong positive association between age and healthcare utilisation. For this reason, it is common to consider the impact of demographic changes on the need for health and care services as dependent on two factors:

1. **population size**—a bigger population requires more healthcare

2. **population age structure**—utilisation rates for most healthcare services increase with age

To account for the effect of this relationship on future demand, information on the age profile of utilisation rates is typically combined with estimates of change in the absolute number of people within each age group. This method is widely applied in modelling exercises to determine estimates of future activity. Such an approach, however, 'overlooks the fact that rising life expectancy makes … older people "younger", healthier, and fitter than their peers in earlier cohorts'.[1] If correct, this omission will cause the effect of population ageing on demand for health and care services to be overstated.

The reason behind the observed relationship between age and utilisation is not age per se, rather the real determinant of utilisation is underlying health status. Studies have demonstrated that healthcare costs are much more strongly correlated with 'time-until-death' than with age. The link between distance from death and expenditure is especially strong for acute care. The relationship between age and health status can also be expected to vary over time. Therefore in our analyses we allow for the impact of a third demographic factor on demand for health and care services.

3. **population health status**—changes in health status may cause a population to require more/less healthcare (even after changes in population size and age structure are controlled for)

1. Spijker, J. & MacInnes, J., 2013. Population ageing: the timebomb that isn't? BMJ (Clinical research ed.), 347, p.f6598.

Theories of population ageing

There is an unsettled debate about how population health status will evolve—will the additional years of life that recent cohorts have gained (and stand to gain) be spent in good health or disability and frailty? Alternative explanations for continued increases in life expectancy emphasise different causal factors and have very different implications for morbidity in later life.

We summarise the three main schools of thought below.

Expansion of morbidity (Greunberg; Kramer)[1] [2]
The expansion of morbidity thesis holds that chronic disease prevalence and disability will increase as life expectancy is increased. Gruenberg (1977) highlighted the implications for population health of the increasing life-sustaining capabilities of modern medicine in people with severe and potentially fatal chronic disease, 'the net effect of successful technical innovations used in disease control has been to raise the prevalence of certain diseases and disabilities by prolonging their average duration.'

Compression of morbidity (Fries)[3]
When Fries outlined his compression of morbidity hypothesis in 1980, the prevailing view of population ageing argued that increasing life expectancies would lead inevitably to additional years of chronic debilitating illness. Fries' counterpoint was based on evidence of delays in onset of chronic disease/disability and a slowdown in rate of increase in life expectancy. He described a scenario of 'healthy ageing' where substantial delays in the onset of chronic disease in later life compress morbidity into a shorter period with reduced lifetime disability.

Dynamic equilibrium (Manton)[4]
Manton's work highlighted delays in the intermediate stage of chronic disease as the key driver of reduced mortality (as oppose to delayed onset or delays in death for those with severe disease). This leads to an increase in overall prevalence of disability due mostly to increases in the prevalence of less severe disability, with largely stables rates of severe disease.

1. Gruenberg, E.M., 1977. The failures of success. The Milbank Memorial Fund quarterly. Health and society, 55(1), pp.3–24.

2. Kramer, M., 1980. The rising pandemic of mental disorders and associated chronic diseases and disabilities. Acta Psychiatrica Scandinavica, 62(S285), pp.382–397.

3. Fries, J.F., 1980. Aging, natural death, and the compression of morbidity. New England journal of medicine, 303(3), pp.130–135.

4. Manton, K.G., 1982. Changing concepts of morbidity and mortality in the elderly population. The Milbank Memorial Fund quarterly. Health and society, 60(2), pp.183–244.

Evidence for theories of population ageing

The three theories of population ageing described imply quite different pressures on health systems and services. It is therefore important to consider which scenario is unfolding. However, the international evidence for healthy ageing is mixed[1] and there are difficulties in collecting consistent empirical data on trends in disability over extended time periods.

Using US data for the period 1991–2009, Cutler, Ghosh and Landrum found strong evidence for compression of morbidity based on measured disability.[2] However, results from New Zealand suggest a dynamic equilibrium scenario provides the best fit to evidence on changes in population health.[3]

National governments produce long-term assessments of public finances; and estimates of future health expenditure are often a major component of such assessments. The work underpinning these assessments often includes a review of the evidence base for changes in population health status. For example, the New Zealand Treasury adjust projections to account for future changes in population health status.[4]

> *Earlier versions of Treasury's long-term fiscal model assumed a straightforward expansion of morbidity ... This version attempts to model a dynamic equilibrium scenario, meaning that part of every additional year of life expectancy is assumed to be spent in good health.*

The effect on estimates of future expenditure of adjusting for 'healthy ageing' can be significant. A long-term forecast of healthcare expenditure in Denmark found an adjustment for healthy ageing reduced the impact of increased life expectancy on health expenditure by 50 per cent compared with a situation without healthy ageing.[5]

Theories of population ageing can be expressed in terms of the relationship between life expectancies and health expectancies. Health expectancies partition years of life into periods spent in particular health states, and data on health expectancies can be useful in evaluating the evidence for different theories. The following slide describes a framework for how data on health expectancies can be used to indicate which of the three scenarios—compression, expansion or dynamic equilibrium—is unfolding. Subsequent slides review trends in life expectancies and health expectancies in the UK.

1. European Commission (2012). The 2012 Ageing Report. Brussels.

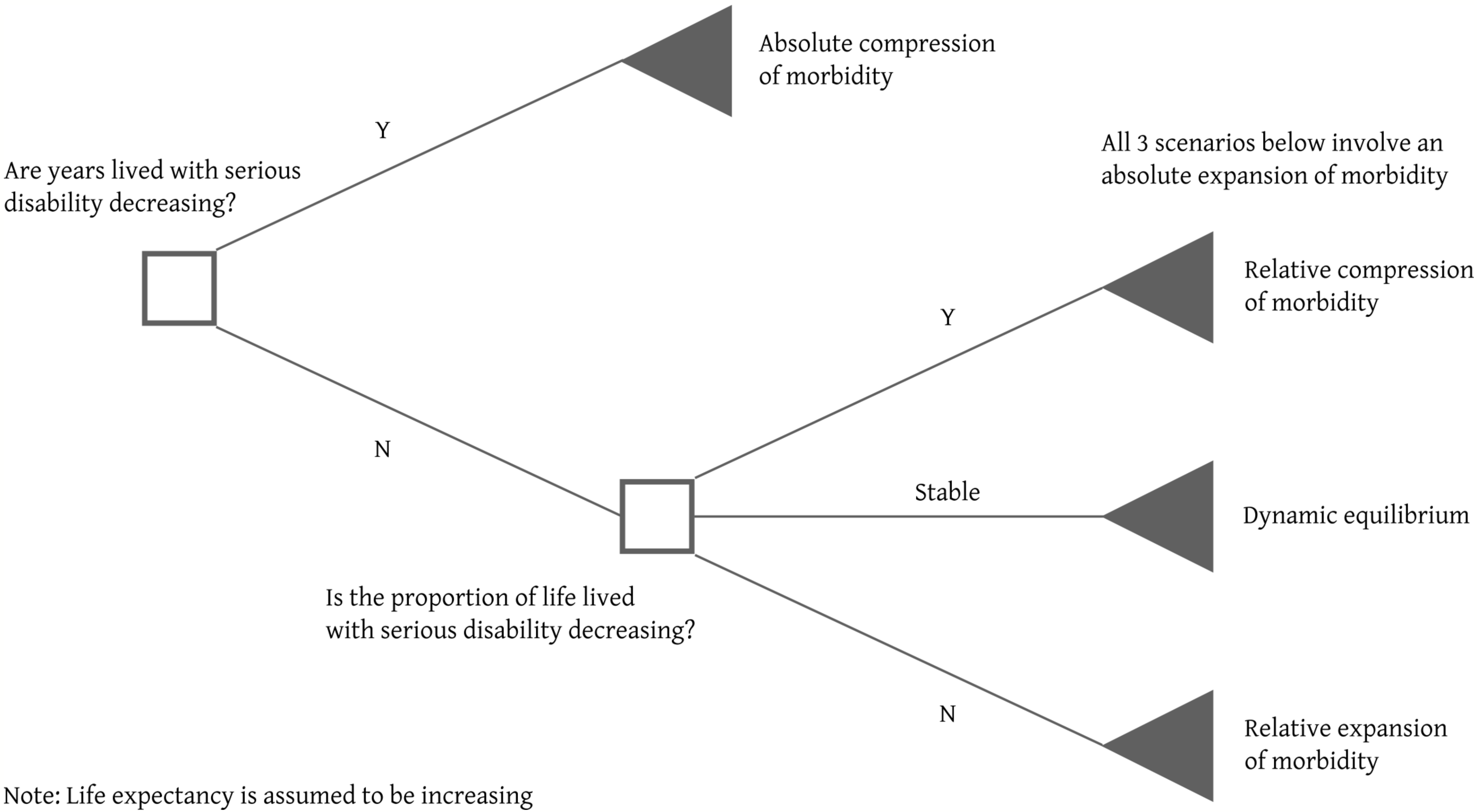
2. Cutler, D.M., Ghosh, K. & Landrum, M.B., 2013. *Evidence for significant compression of morbidity in the elderly US population*. No. w19268. National Bureau of Economic Research, 2013.

3. Graham, P. et al., 2004. Compression, expansion, or dynamic equilibrium? The evolution of health expectancy in New Zealand. *Journal of epidemiology and community health*, 58(8), pp.659–66.

4. Treasury, N.Z., 2013. Health Projections and Policy Options - July 2013.

5. Pedersen, K.M., Bech, M. & Vrangbæk, K., 2011. The Danish Health Care System: An Analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT analysis).

A framework for theories of population ageing



Note: Life expectancy is assumed to be increasing

Health expectancies

Evidence for trends in population health status comes from responses to questions about health status collected from repeated cross-sectional general population surveys or longitudinal studies of specific cohorts. In England, questions on self-reported health status are collected as part of the general lifestyle survey.[1] Responses from the survey are combined with information on mortality to estimate 'health expectancies'. Health expectancies partition years of life into periods spent in favourable and unfavourable health. The Office for National Statistics routinely publishes two types of health expectancies:

Healthy life expectancy (HLE), which estimates lifetime spent in 'Very Good' or 'Good' health based upon how individuals perceive their general health, and;

Disability free life expectancy (DFLE), which estimates lifetime free from a limiting persistent illness or disability. This is based upon a self-rated assessment of how health limits an individual's ability to carry out day-to-day activities.[2]

These measures are used to assess changes in population health status over time, and at sub-national level provide information on the geographical distribution of morbidity. Estimates of healthy life expectancy are typically lower than for estimates of disability free life expectancy.

Self-reported health status is inherently subjective and will change in response to wider societal changes and expectations. Some studies have though linked user rated health to more objective measures of healthcare demand. We consider DFLE a more functional assessment of individual health status than HLE and therefore expect a closer link to real healthcare need/usage. A further advantage in focussing on DFLE is that there is greater consistency in the question asked over time (in 2005, ONS estimates of HLE were adapted in response to the European Union (EU) harmonisation of the survey question relating to general health).

Trends in DFLE are produced for at birth and at age 65 years. Our primary focus is trends at age 65—older people, on average, have higher healthcare usage rates making changes in the health status of older people of greater significance for overall healthcare demand. Trends in DFLE at birth are included in appendix A.1.

1. The General Lifestyle Survey (GLF) is a multi-purpose continuous survey carried out by the Office for National Statistics (ONS). It collects information on a range of topics from people living in private households in Great Britain.

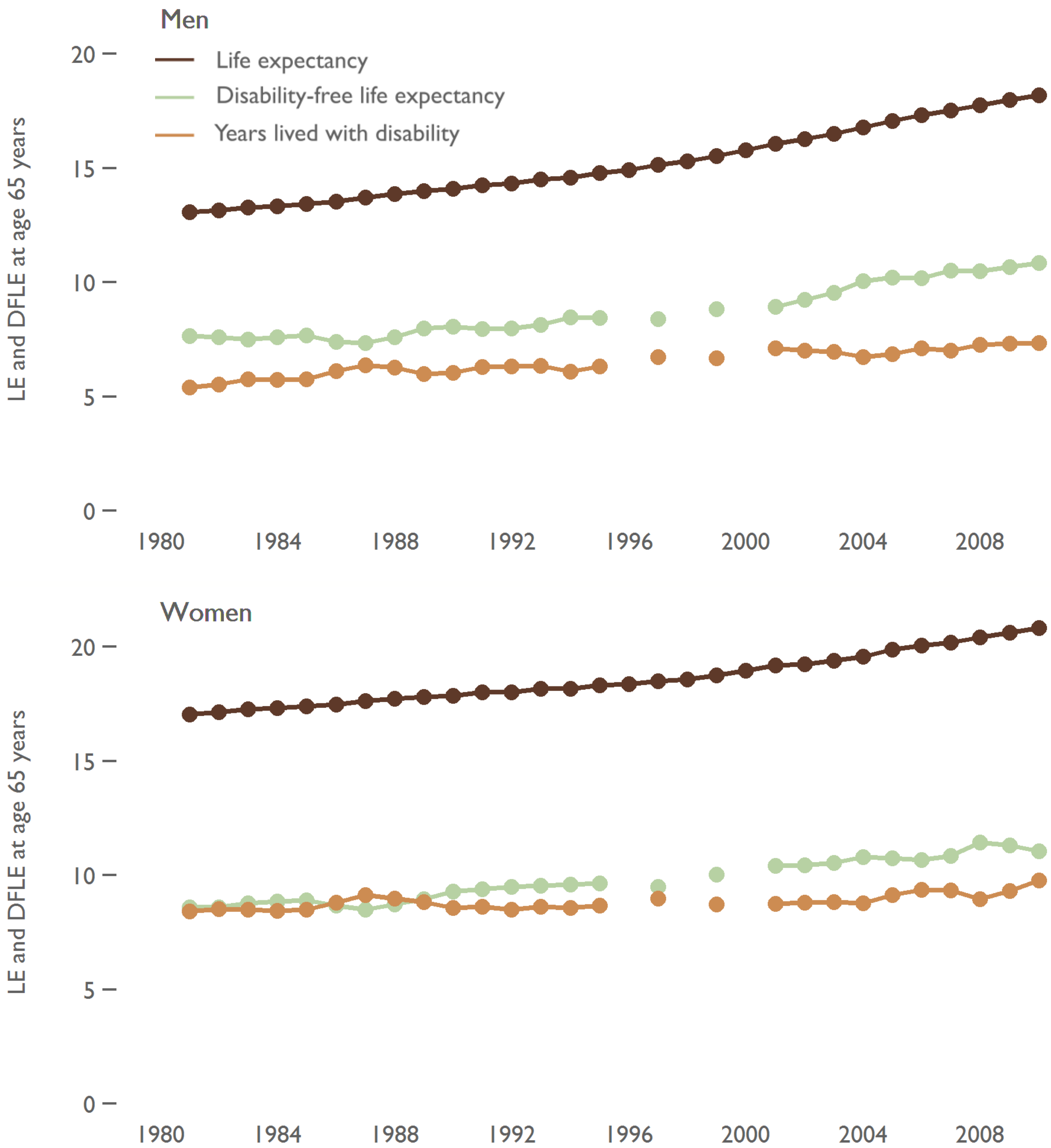
2. Do you have any long-standing illness, disability or infirmity—by long-standing I mean anything that has troubled you over a period of time or that is likely to affect you over a period of time? Yes/No.

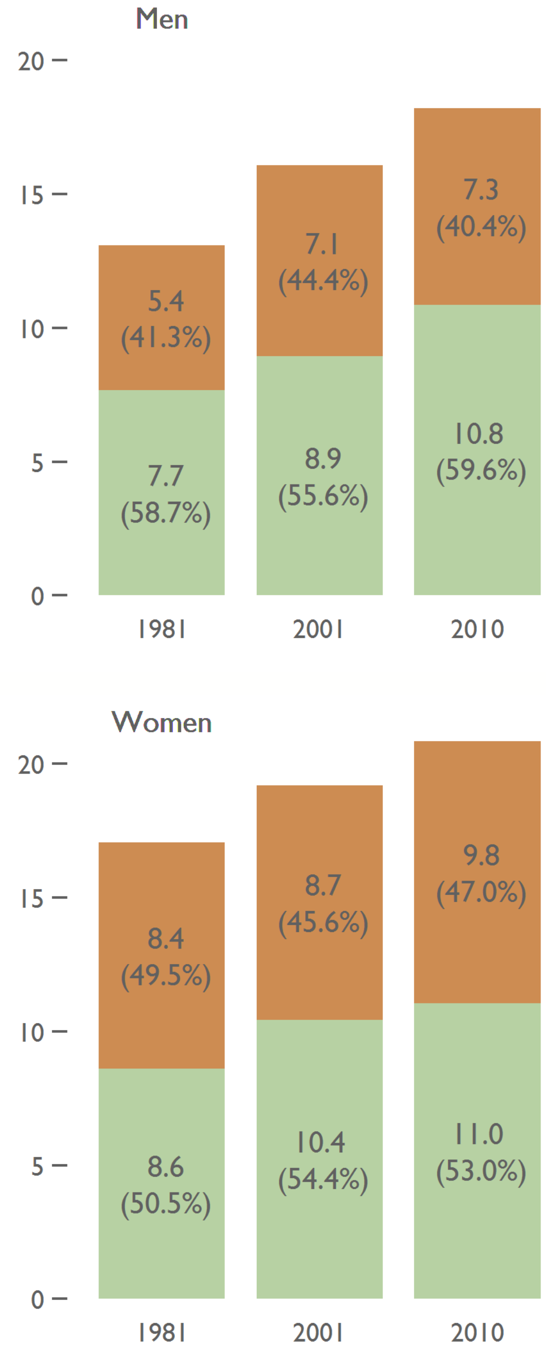
If 'Yes' the respondent is then asked:

Does this illness or disability (Do any of these illnesses or disabilities) limit your activities in any way? Yes/No.

Respondents answering 'Yes' to both questions are considered to have a limiting long-standing illness.

Long-term trends in life expectancy and disability free life expectancy at age 65 years, England





Methods for modelling the effect of future changes in population health status on acute hospital activity I

In situations where uncertainty is high scenario planning is a useful tool and can act to improve critical understanding through comparison of alternatives. We produce estimates of future acute hospital activity for three scenarios based on alternative theories of population ageing and implied changes in population health status.

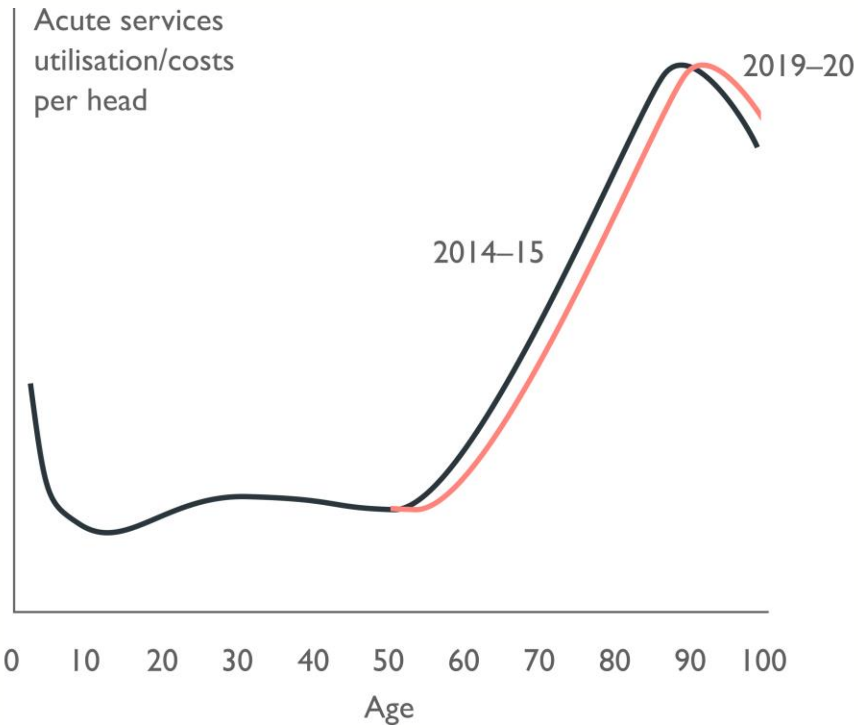
1. **Pessimistic**—no adjustment is made for improvement in future health status. Consistent with an absolute and relative expansion of morbidity.

2. **Optimistic**—greater adjustment for improvement in future health status. Consistent with a relative compression of morbidity.

3. **Moderate**—lesser adjustment for improvement in future health status. Consistent with 'dynamic equilibrium'.

We model the relationship between age and healthcare utilisation in the baseline year by fitting curves to observed activity rates. To adjust for improvements in population health status, the curves are shifted rightward in later years so that at older ages the assumed rate of utilisation in the final year is lower than that for someone of the same age in the base year. These 'health-status-adjusted' utilisation rates are multiplied by the projected population in the final year to obtain an estimate of future demand. For example, if observed rates in our base year are adjusted by a single year (i.e. the utilisation curve is shifted rightward by a single year) then we assume an eighty-five-year-old in the final year has the utilisation rate of an eighty-four-year-old in the base year.

This approach requires a decision on the most appropriate age to apply the adjustment from. Compression of morbidity theory implies a breakpoint separating an initial period of good health from a period of increasing morbidity. A recent US-based study by Silbermen *et al.*[1] empirically demonstrated the existence of such a breakpoint and reported a significant increase, at 45.5 years of age (95% CI, 41.3–49.7), in the rate of change *of the rate of change* in morbidity. We adjust utilisation rates from age 50 years (for both men and women).



1. Silberman, J. et al., 2015. The avalanche hypothesis and compression of morbidity: testing assumptions through cohort-sequential analysis.

Methods for modelling the effect of future changes in population health status on acute hospital activity II

To inform the level of adjustment applied, in scenarios 2 and 3, to account for improvements in future health status we use national trends[1] in life expectancies and health expectancies.

Scenario 2 Optimistic—greater adjustment for improvement in future health status. Consistent with a relative compression of morbidity.

A scenario of absolute compression requires that all additional lifespan is spent in good health and that years lived with limiting illness remain flat or decline (see slide 19). Historic trends in years lived with limiting illness show no extended period of decline therefore we model a slightly more conservative scenario consistent with a relative compression of morbidity where for every year that life expectancy increases DFLE rises by 0.75 years. For reasons of parsimony we use this level for both men and women. Over the period 2014–2019 this translates to an increase in DFLE (at age 65 years) of 0.8 years for men and 0.7 years for women. Therefore in scenario 2, we adjust utilisation rates in the final year by 0.8 years for men and 0.7 years for women.

Scenario 3 Moderate—lesser adjustment for improvement in future health status. Consistent with 'dynamic equilibrium'.

In 2010, DFLE at age 65 years was 10.8 years for men and 11.0 years for women; these 'healthy' periods without a limiting illness equate to 59.6% and 53.0% respectively of remaining lifespan (at age 65 years). Over the period 2014–2019, life expectancy at age 65 years is projected to rise by 1.0 years for men and 0.9 years for women. In order for the proportion of life without a limiting illness to remain constant, i.e. maintain a dynamic equilibrium , DFLE (at age 65 years) must rise by 0.6 years for men and 0.5 years for women. Therefore in scenario 3, we adjust utilisation rates in the final year by 0.6 years for men and 0.5 years for women.

1. Ideally, when modelling at CCG level local data would be used to inform the level of adjustment applied. However, reliable trend data for local health expectancies is not available and more recent data are typically based on limited sample sizes. Widely reported disparities in life expectancies and health expectancies between areas are not necessarily a cause for concern. It is the relative gap between DFLE and LE, over time, rather than their absolute levels that is of primary significance.

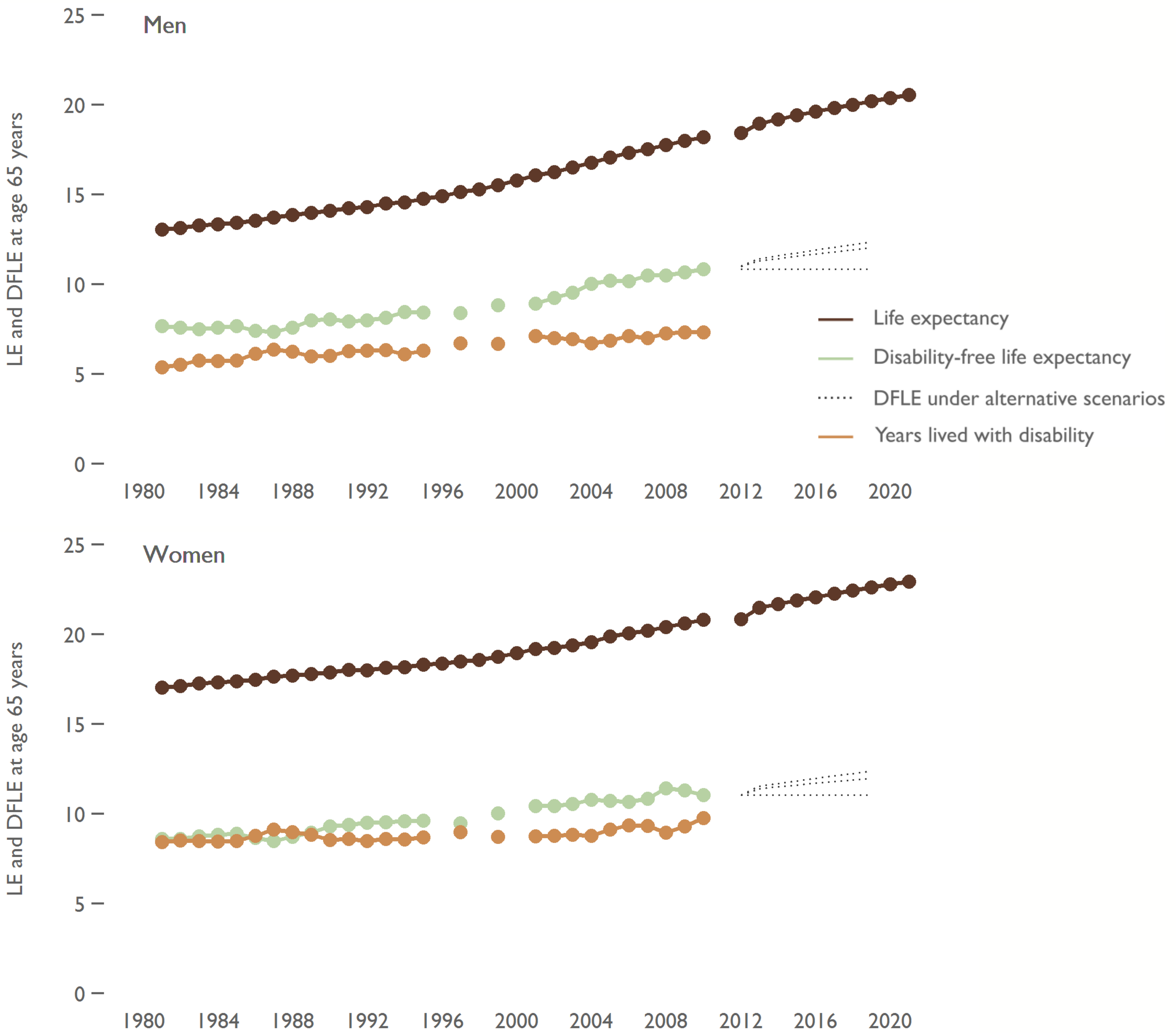
Level of adjustment applied to utilisation rates under different scenarios (years)

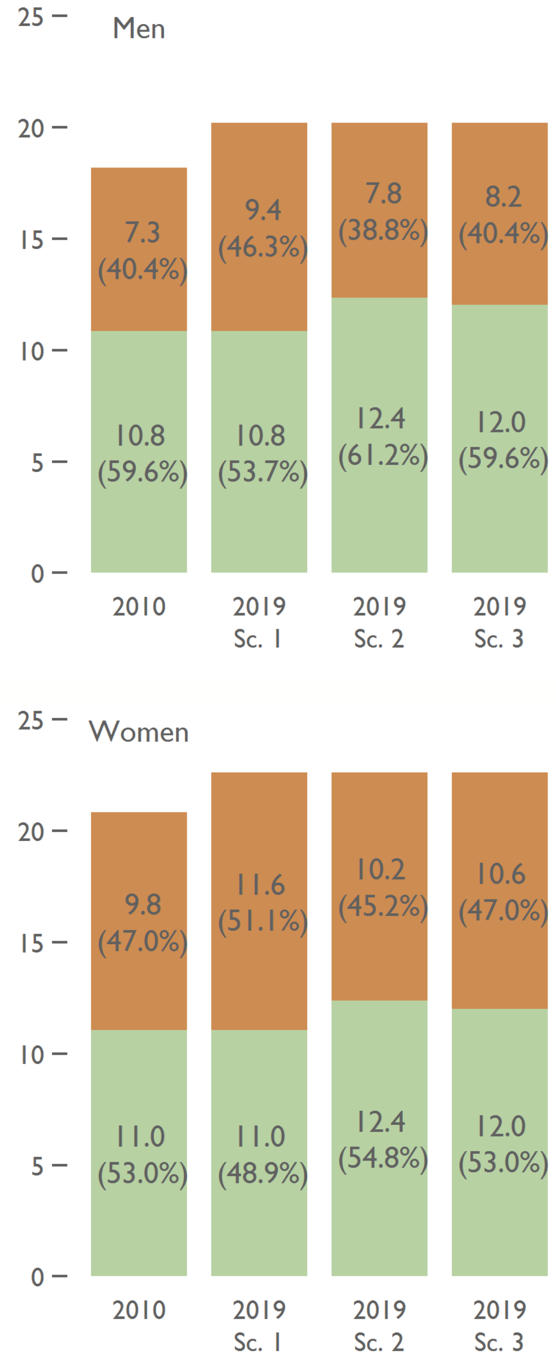
Scenario	Men	Women
Pessimistic	N/A	N/A
Optimistic	0.8	0.7
Moderate	0.6	0.5

Additional scenarios

We present results for three plausible scenarios based around three competing theories of population ageing. It is, however, entirely possible to use the same methods to produce estimates across a much wider range of levels of adjustment.

Projections of life expectancy and scenarios for disability free life expectancy at age 65 years, England





Results

Results

The following slides report estimates of acute hospital activity for NHS Dudley clinical commissioning group in 2019–20. These estimates are the results of applying the methods described to observed activity levels in 2014–15. The estimates show the likely impact of demographic change on future activity levels. Other non-demographic factors that may influence future activity and costs are not accounted for.[1]

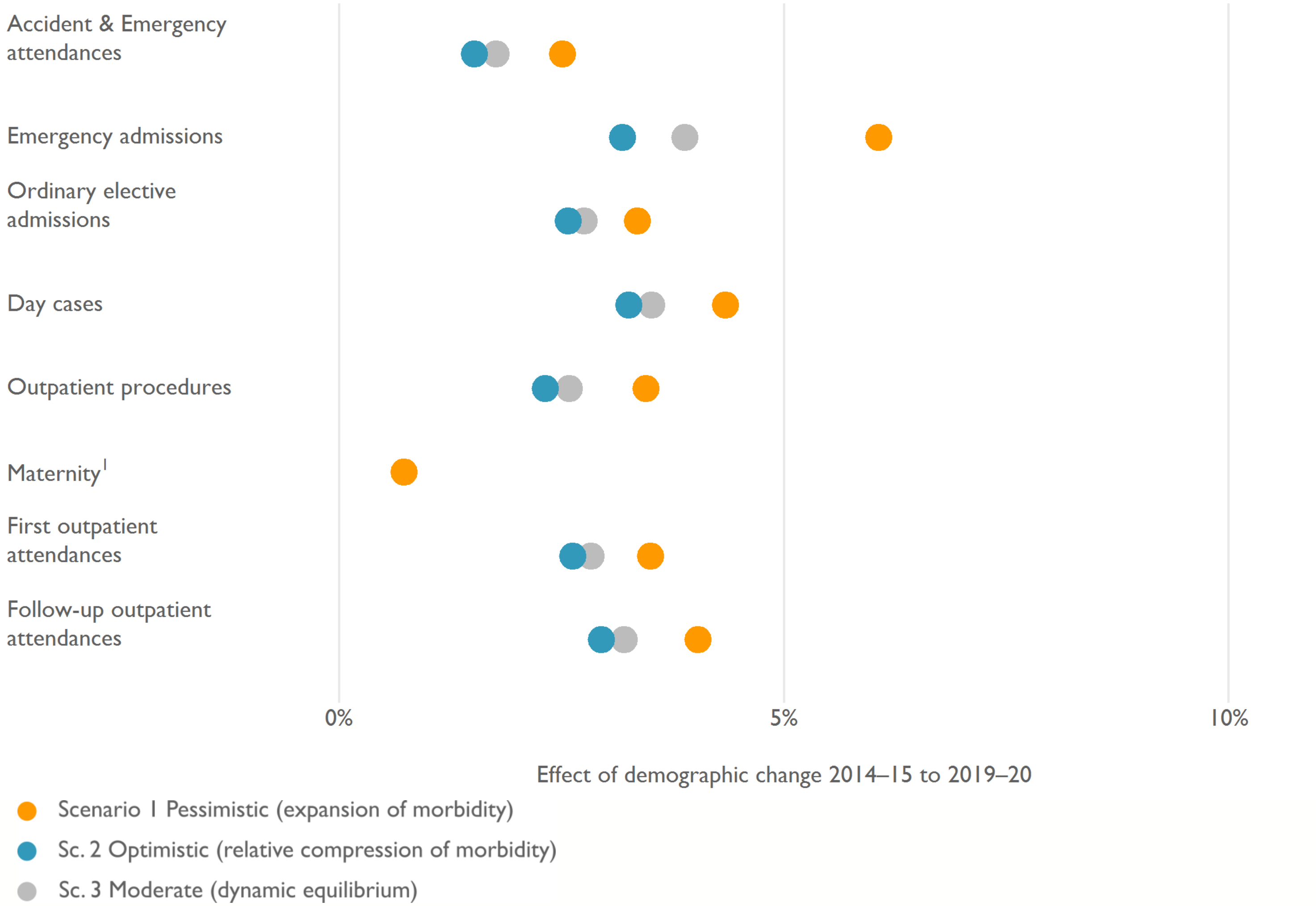
1. **Scenario 1 Pessimistic**
   No adjustment is made for changes in future population health status. This is the default approach regularly applied in modelling exercises. It implies an absolute and relative expansion of morbidity.

2. **Scenario 2 Optimistic**
   Unlike scenario 1 an adjustment is made for changes in future population health status. The level of adjustment applied is scaled to represent a relative compression of morbidity—the absolute number of years lived with a limiting illness increases only slowly, and falls as a proportion of an increasing lifespan.

3. **Scenario 3 Moderate**
   Like scenario 2, an adjustment is made for changes in future population health status. The level of adjustment applied is scaled to maintain a ‘dynamic equilibrium’—the absolute number of years lived with limiting illness increases, but remains a constant proportion of an increasing lifespan.

1. Econometric studies looking at historical trends in healthcare activity and costs typically include estimates of non-demographic volume growth. The main factors behind growth in healthcare activity, not accounted for by population change, are the tendency for national governments to, over time, choose to spend relatively more of their income on healthcare as income levels rise, and the development of new treatments /interventions in response to technological change.

Effect of demographic change on acute hospital activity, 2014–15 to 2019–20



Effect of demographic change, 2014–15 to 2019–20

Point of delivery	Sc. 1	Sc. 2	Sc. 3
A&E attendances	2.5	1.5	1.8
Emergency admissions	6.1	3.2	3.9
Ordinary elective adms.	3.3	2.6	2.8
Day cases	4.3	3.3	3.5
Outpatient procedures	3.4	2.3	2.6
Maternity admissions[1]	0.7	N/A	N/A
First outpatient attns.	3.5	2.6	2.8
Follow-up outpatient attns.	4.0	2.9	3.2

Notes:

1. Maternity admissions are assumed to be unaffected by changes in population health status, which only exert an effect on those aged 50 or over.

For scenario 1, the effect of demographic change on maternity admissions is calculated using the same methodology used for all other points of delivery. This method accounts for changes in the number of women of child-bearing age, but does not allow for possible changes in fertility rates. 'Best practice' demand modelling that is specific to maternity services should include consideration of trends in fertility rates.

Effect of demographic change on acute hospital admissions, by diagnosis group, 2014–15 to 2019–20

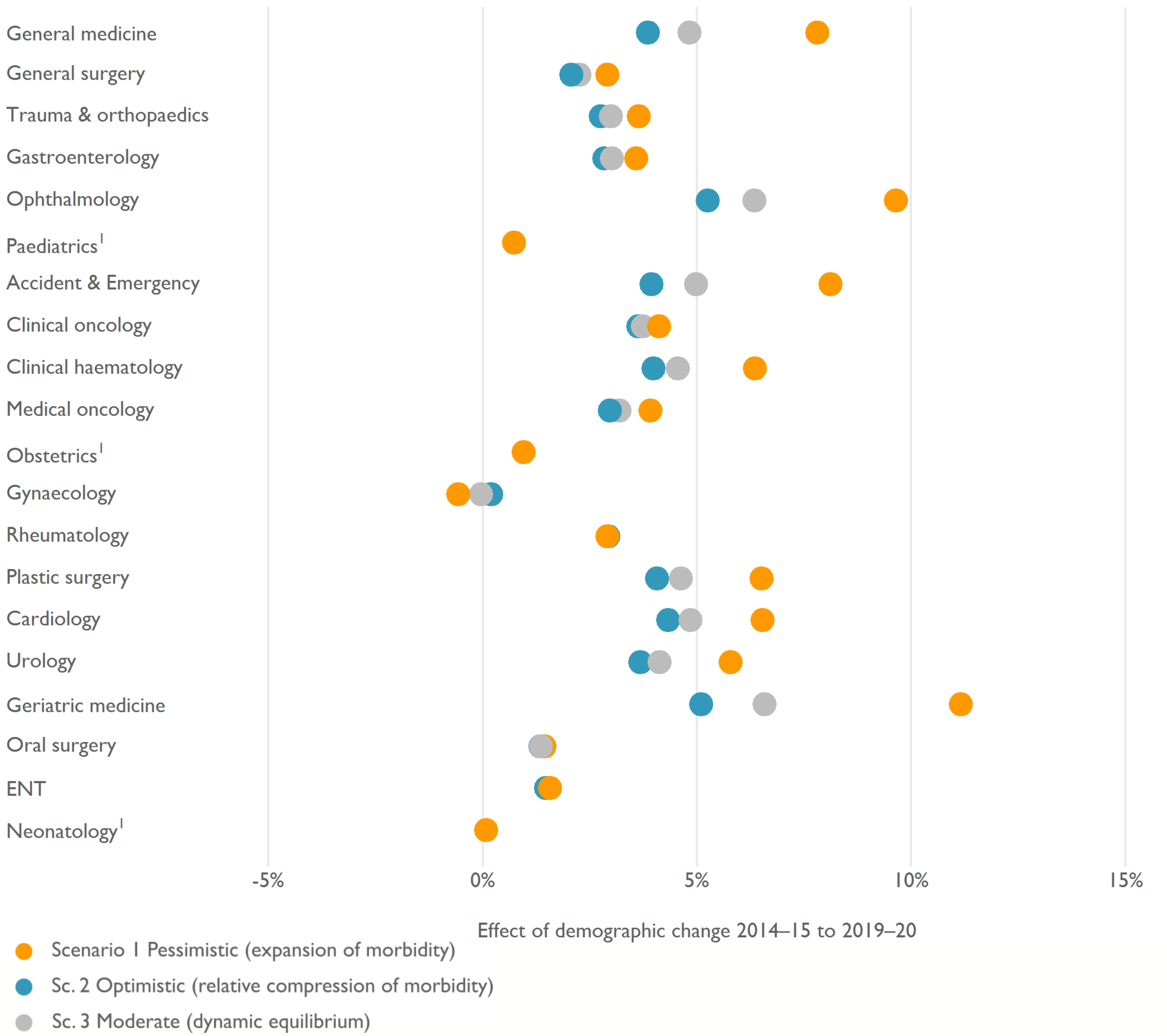
Effect of demographic change, 2014–15 to 2019–20

	ICD-10 chapter	Sc. 1	Sc. 2	Sc. 3
1	Infectious diseases	3.1	1.9	2.2
2	Cancer	5.4	3.9	4.2
3	Blood and immune	5.2	3.4	3.8
4	Endocrine, nut. and met.	4.8	2.8	3.3
5	Mental and behavioural	-0.3	-0.4	-0.4
6	Nervous system	3.0	2.4	2.5
7	Eye and adnexa	9.5	5.2	6.3
8	Ear and mastoid process	1.7	1.7	1.7
9	Circulatory system	7.5	4.4	5.1
10	Respiratory system	7.1	3.6	4.4
11	Digestive system	3.3	2.4	2.6
12	Skin and subcut' tissue	4.4	2.8	3.2
13	Musculoskeletal system	3.3	2.9	3.0
14	Genitourinary system	4.8	2.6	3.1
15	Pregnancy and childbirth[1]	0.5	N/A	N/A
16	Perinatal[1]	0.1	N/A	N/A
17	Congenital malformations[1]	0.1	N/A	N/A
18	Symptoms and signs n.e.c.	4.3	2.6	3.0
19	Injury, poisoning ext. cause	5.7	2.8	3.5
21	Factors infl. health status	2.6	2.1	2.2

Notes:
1. Pregnancy and childbirth related admissions, and admissions for conditions present at birth (ICD-10 chapters 15, 16 and 17) are assumed to be unaffected by changes in population health status, which only exert an effect on those aged 50 or over.

Results are not calculated for ICD-10 chapters 20 (external causes of morbidity) and 22 (codes for special purposes) as these are rarely used in the primary diagnosis field.

Effect of demographic change on acute hospital admissions, by treatment specialty, 2014–15 to 2019–20



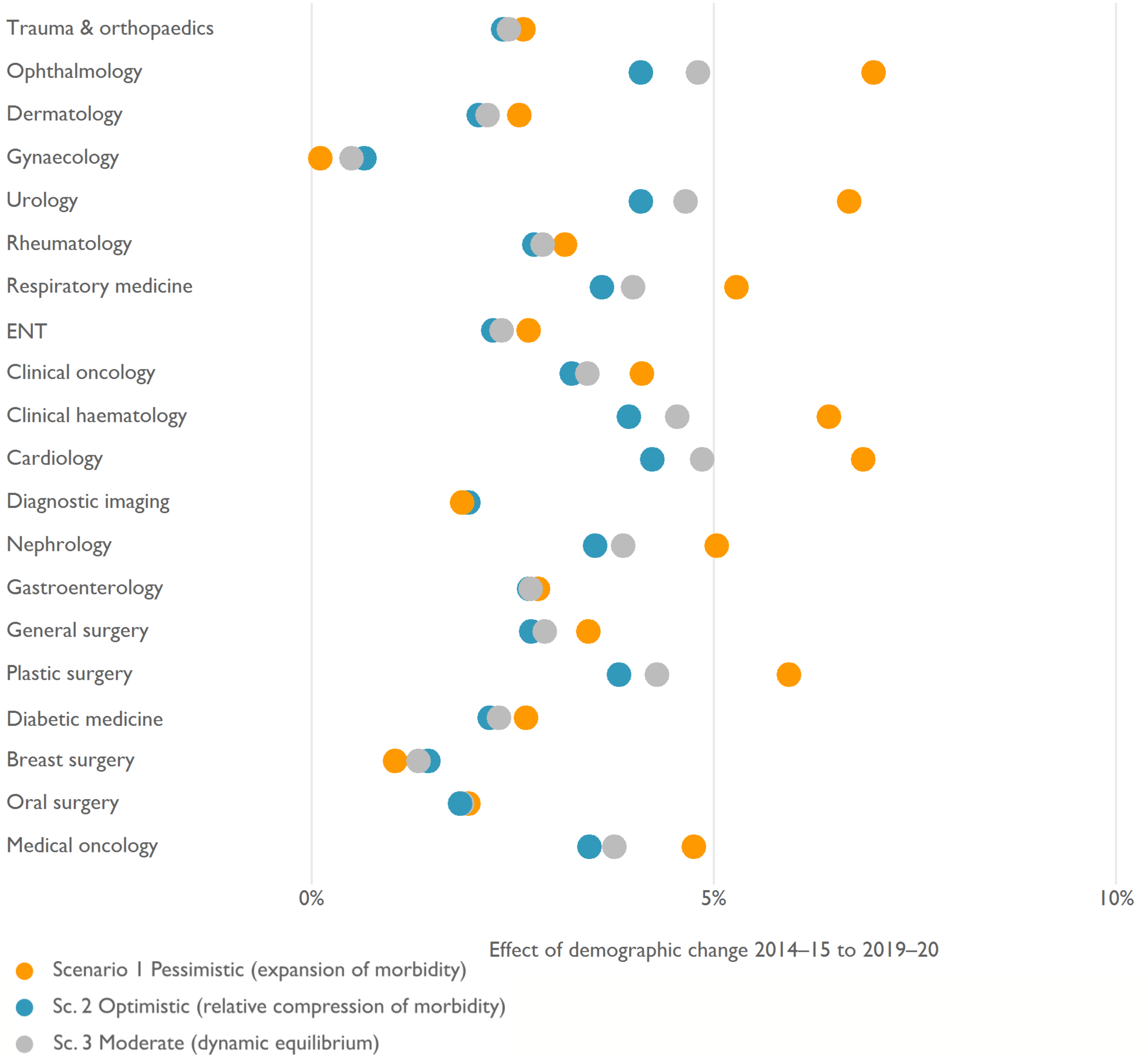
Effect of demographic change, 2014–15 to 2019–20

Treatment specialty	Sc. 1	Sc. 2	Sc. 3
General medicine	7.8	3.9	4.8
General surgery	2.9	2.1	2.3
Trauma & orthopaedics	3.6	2.7	3.0
Gastroenterology	3.6	2.8	3.0
Ophthalmology	9.6	5.3	6.3
Paediatrics[1]	0.7	N/A	N/A
Accident & Emergency	8.1	3.9	5.0
Clinical oncology	4.1	3.6	3.7
Clinical haematology	6.3	4.0	4.5
Medical oncology	3.9	3.0	3.2
Obstetrics[1]	0.9	N/A	N/A
Gynaecology	-0.6	0.2	0.0
Rheumatology	2.9	2.9	2.9
Plastic surgery	6.5	4.1	4.6
Cardiology	6.5	4.3	4.8
Urology	5.8	3.7	4.1
Geriatric medicine	11.2	5.1	6.6
Oral surgery	1.4	1.3	1.4
ENT	1.6	1.5	1.5
Neonatology[1]	0.1	N/A	N/A

Notes:
Results calculated for top 20 treatment specialties by volume in 2014–15. Specialties are listed in descending order of volume.

1. Admissions to obstetrics, neonatology, and paediatric specialties and for services provided under the direct care of a midwife are assumed to be unaffected by changes in population health status, which only exert an effect on those aged 50 or over.

Effect of demographic change on acute hospital outpatient attendances, by treatment specialty, 2014–15 to 2019–20



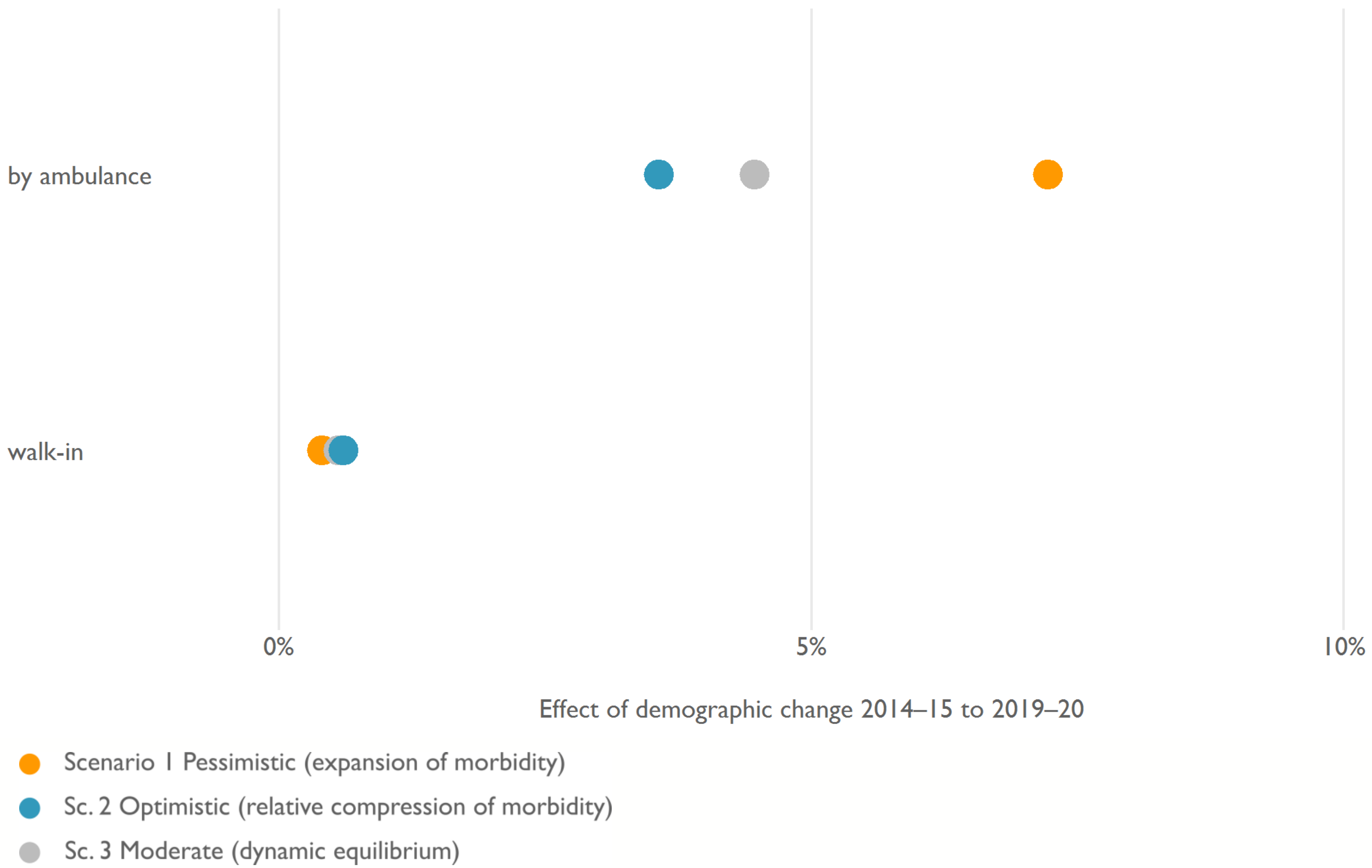
Effect of demographic change, 2014–15 to 2019–20

Treatment specialty	Sc. 1	Sc. 2	Sc. 3
Trauma & orthopaedics	2.6	2.4	2.5
Ophthalmology	7.0	4.1	4.8
Dermatology	2.6	2.1	2.2
Gynaecology	0.1	0.7	0.5
Urology	6.7	4.1	4.6
Rheumatology	3.1	2.8	2.9
Respiratory medicine	5.3	3.6	4.0
ENT	2.7	2.3	2.4
Clinical oncology	4.1	3.2	3.4
Clinical haematology	6.4	3.9	4.5
Cardiology	6.9	4.2	4.8
Diagnostic imaging	1.9	1.9	1.9
Nephrology	5.0	3.5	3.9
Gastroenterology	2.8	2.7	2.7
General surgery	3.4	2.7	2.9
Plastic surgery	5.9	3.8	4.3
Diabetic medicine	2.7	2.2	2.3
Breast surgery	1.0	1.5	1.3
Oral surgery	1.9	1.8	1.9
Medical oncology	4.7	3.5	3.8

Notes:
Results calculated for top 20 treatment specialties by volume in 2014–15. Specialties are listed in descending order of volume.

1. Attendances to obstetrics, neonatology, and paediatric specialties and for services provided under the direct care of a midwife are assumed to be unaffected by changes in population health status, which only exert an effect on those aged 50 or over.

Effect of demographic change on acute hospital A&E attendances, by arrival mode, 2014–15 to 2019–20



Effect of demographic change, 2014–15 to 2019–20

Arrival mode	Sc. 1	Sc. 2	Sc. 3
By ambulance	7.2	3.6	4.5
Walk-in	0.4	0.6	0.6

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Appendices

A.1 Long-term trends in life expectancy and disability free life expectancy at birth, England