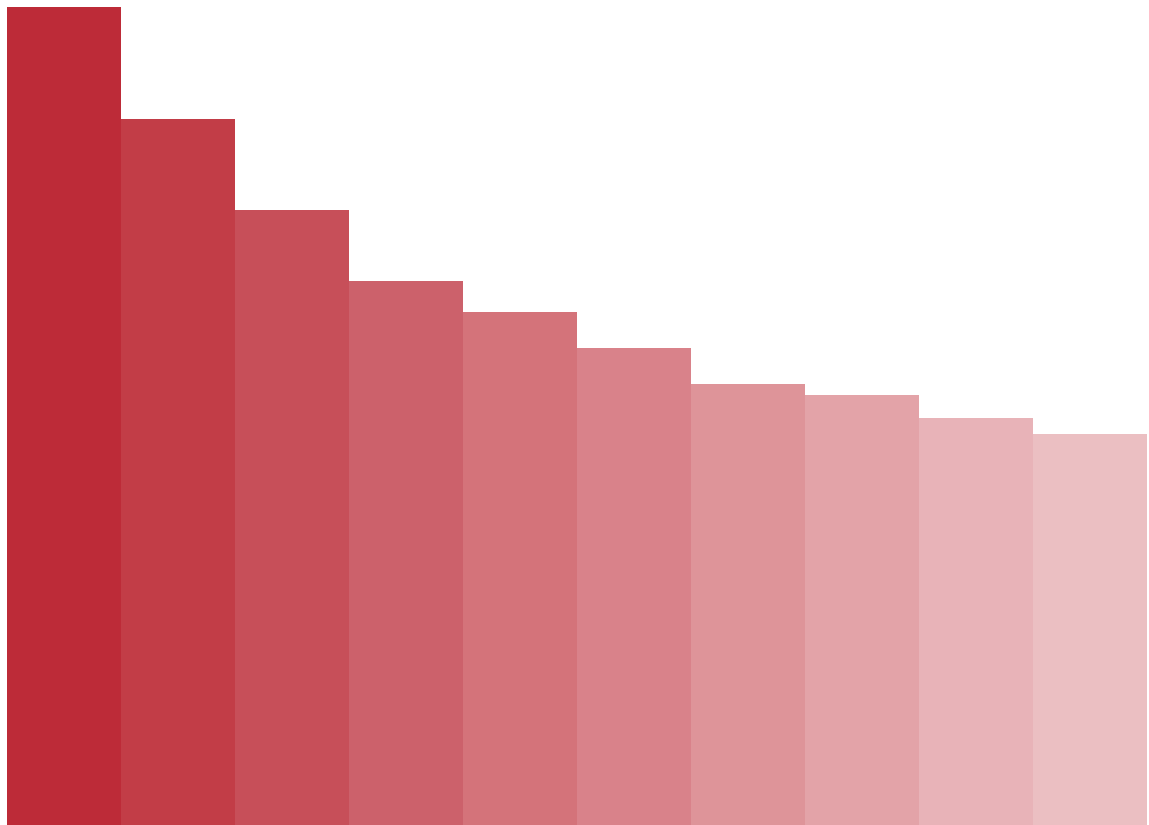


REAL Centre

Health inequalities in 2040: current and projected patterns of illness by deprivation in England

Insight report • April 2024

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**The
Health
Foundation**

About the REAL Centre

The Health Foundation's REAL Centre (research and economic analysis for the long term) provides independent analysis and research to support better long-term decision making in health and social care.

Its aim is to help health and social care leaders and policymakers look beyond the short term to understand the implications of funding and resourcing decisions over the next 10–15 years. The Centre works in partnership with leading experts and academics to research and model the future demand for care, and the funding, workforce and other resources needed to respond to this.

The Centre supports the Health Foundation's strategic priorities to provide evidence and analysis to improve health and care policy.

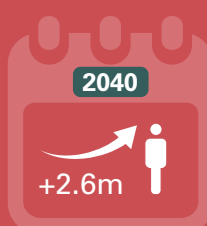
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Key findings

This report explores how patterns of diagnosed ill health vary by socioeconomic deprivation in England. It is the second report from a major research programme led by the Health Foundation's Real Centre in partnership with the University of Liverpool.

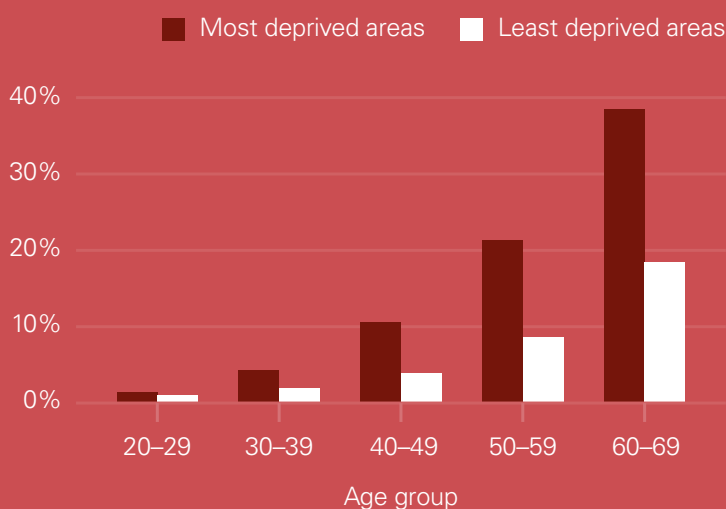
Our first report projected 9.3 million people – around 1 in 5 adults in England – could be living with major illness by 2040



1

Most of this increase, equivalent to around 2.6 million people, would be the result of the population living longer.

This report focuses on inequalities in major illness among working-age people



2

14.6% of people aged 20–69 years have major illness in the most deprived areas – more than double that of the least deprived areas (6.3%).

3

People in the 10% most deprived areas can expect to develop major illness 10 years earlier than people in the 10% least deprived areas. They are also three times more likely to die before the age of 70 years.

Our findings have significant implications for local economies and labour markets, as well as for the health of people living in these areas

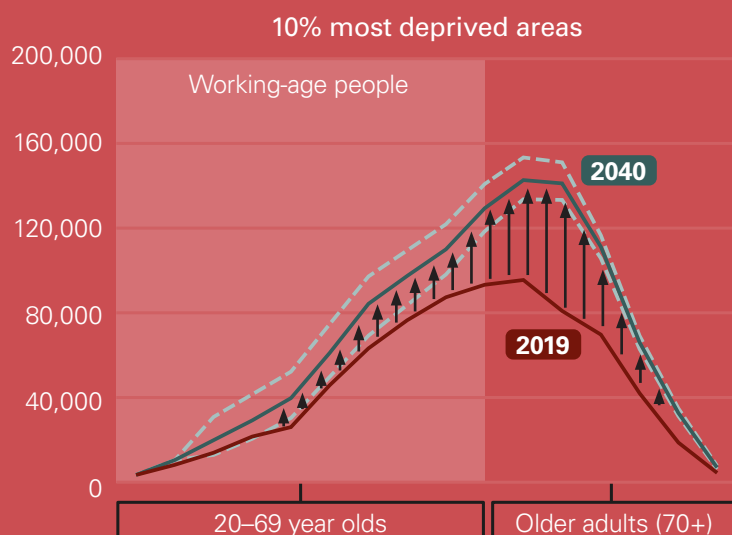


2.7 million people
report not working due to
long-term sickness

4

Increasing economic prosperity requires a healthy working-age population. But the UK has some of the deepest economic and health inequalities among developed countries – our report shows without change, these inequalities are set to continue at significant cost to our health and prosperity.

We project inequalities in major illness will persist through to 2040 based on current trends



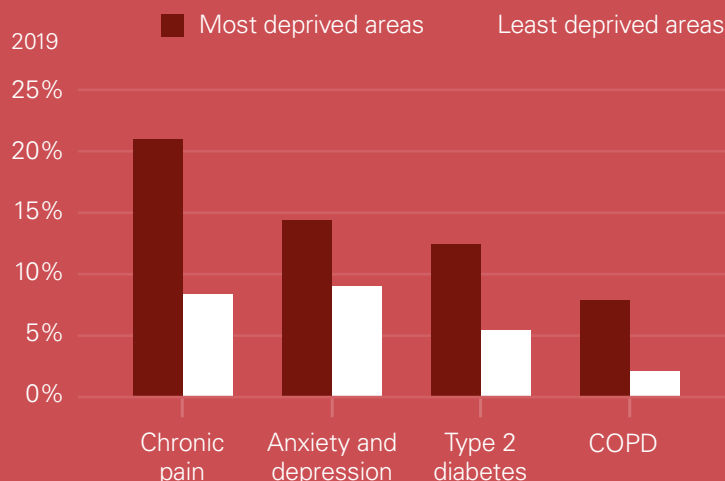
5

We project the overall number of working-age people experiencing major illness to grow from 3 million (2019) to 3.7 million (2040).

6

We project 80% of this increase in major illness among working-age people will be in the more deprived 50% of areas.

A handful of long-term conditions are contributing most to health inequality



7

COPD is the condition with the highest level of relative inequality. We project that chronic pain, type 2 diabetes and anxiety and depression will increase at a faster rate in the most deprived areas through to 2040.

8

These conditions are typically managed by GPs and community services, underlining the need to invest in primary care and focus on prevention.

Levels of health inequality in England – and the prospect they will persist – make for sobering reading.

Our report signals the need for a cross-government approach to narrow health inequality, reduce economic inactivity and ease pressure on overstretched health and care services.

Read our report to understand the full picture.

Executive summary

Background

This report has been produced as part of the REAL Centre's programme of research with the University of Liverpool to develop projections of illness, health inequalities and health care demand. It adds to the evidence on inequalities in self-reported health by describing inequality in diagnosed illness across multiple conditions. To our knowledge, it is one of the first studies to project future patterns of health inequalities in England.

In our previous analysis, we projected the number of people living with major illness to increase by 2.6 million to reach 9.3 million people in 2040. Most of this increase is projected to be among people aged 70 years and older. The overall growth in people with major illness (up by 39%) will be 3.5 times greater than the projected growth in the working-age population (growing by 11%).

While most of the growth in major illness is occurring in the older populations, there are important changes among the working-age population that have implications for both inequality and for economic performance. Economic growth is vital for the sustainability of public services and living standards. But inequalities in the health of the working-age population pose a challenge to labour supply with rising levels of economic inactivity as a result of ill health. Decades of research has shown that the health of England's population is unequal, with people who live in more deprived areas experiencing illness earlier in life and dying younger. This preventable ill health represents a massive lost opportunity, hampering economic recovery and growth.

This report examines in detail how current patterns of ill health vary with deprivation for the adult population, and within that for the working-age population in particular. It explores the conditions that contribute most to health inequality, and to what extent the situation is projected to change by 2040. We present new analysis that links patient data on illness and mortality with data on where people live to show the pattern of health inequality over the lifetime, by type of illness and by deprivation. The analysis focuses on major illness, that is diagnosed illness that involves high health care use or high risk of death using data from health records. This complements other commonly used measures of health inequality that are based on individuals' self-reported health, such as healthy life expectancy.

Key findings

- On current trends, inequalities in health will persist over the next two decades: the gap in major illness-free life expectancy between the 10% most and least deprived areas is projected to remain around 10 years by 2040. People in the most deprived areas are also more likely to die prematurely – four times more likely by the age of 70 years in 2040.
- In 2040, we project many more working-age adults will be living with major illness in the most deprived areas, more than double the rate in the least deprived areas (15.2% versus 6.8% in 2040 compared to 14.6% and 6.3% in 2019). On current trends there would be no improvement in health inequalities for working-age adults between 2019 and 2040.
- Based on the pattern of ill health and mortality in 2040, over 50% of people in the most deprived areas could be expected either to be living with major illness or to have died by the age of 70. This share is projected to be less than 30% in the least deprived areas, representing no progress on narrowing inequality between 2019 and 2040.
- The number of working-age people living with major illness is projected to increase from 3 million to 3.7 million between 2019 and 2040. Most of this increase (80%) will be concentrated in more deprived areas (deciles 1–5).
- The earlier onset and greater prevalence of major illness among the working-age population in more deprived areas has significant implications for labour supply, prospects for economic growth and regional inequalities.
- A small group of long-term conditions contribute to most of the health inequality: chronic pain, COPD, type 2 diabetes, cardiovascular diseases and anxiety and depression.
- Chronic pain, type 2 diabetes and anxiety and depression are projected to increase at a faster rate in the most deprived areas than in the least deprived areas.
- These conditions are typically managed in primary care, underlining the need to invest in general practice, particularly in the most deprived areas, and community-based services and focus on prevention and early intervention.
- Action focused on risk factors linked to major illness is essential but insufficient on its own to tackle health inequalities. Making progress on inequalities in major illness will also require long-term effort across government and the economy to address the underlying causes of health inequality, such as poor housing, low income and insecure employment.

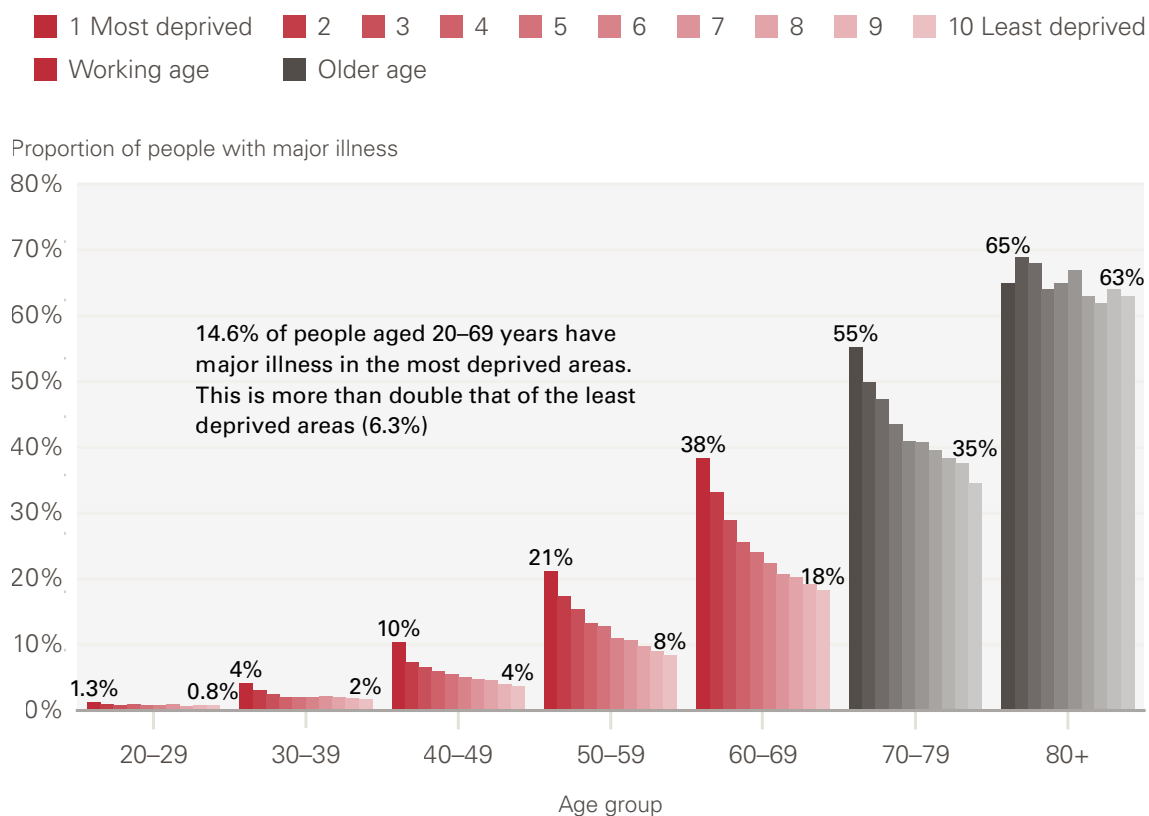
- In the meantime, the NHS, local government and the voluntary sector need to be prepared for higher levels of demand, especially in more deprived areas.

Health inequality in 2019

Our analysis shows that men in the most deprived areas have the shortest lives on average, but women in the most deprived areas spend the most time living with major illness. Health inequality is wide throughout adulthood with the gap widest over the years people are usually expected to be economically active. Rates of major illness among people aged 20 to 69 years in the 10% most deprived areas is more than double those in the 10% least deprived areas (14.6% versus 6.3%).

Figure E1 illustrates how inequality changes throughout adulthood and grows steadily during working age in particular. By the time people reach their 60s more than 2 in 10 people in the most deprived areas have major illness compared with just under 1 in 10 people in the least deprived areas. Health inequalities level off in the oldest age group (80 years and older). This is because many of the people in poor health during working age who are more likely to live in the more deprived areas, will already have died before reaching 80 years.

Figure E1: Share of people with major illness by 10-year age group and by decile of deprivation, England, 2019



Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

The majority of diagnosed health inequality is due to a small group of long-term conditions: chronic pain, chronic obstructive pulmonary disease (COPD), type 2 diabetes, cardiovascular diseases (CVD) (including heart failure, coronary heart disease and stroke) and anxiety and depression.

Inequality in these conditions is present between every decile of deprivation. For some conditions, including chronic pain, anxiety and depression, COPD and coronary heart disease, the difference between the share of people living in the most deprived areas (decile 1) and the next most deprived areas (decile 2) is much greater than the differences between other adjacent deciles of deprivation.

Projected health inequality in 2040

Health inequalities are projected to persist

Major illness-free life expectancy (the average time people can expect to live without diagnosed major illness) is projected to remain broadly unchanged in England over the next two decades at around 70 years. But this is an average estimate and so it masks the differences in the age at which people are diagnosed with major illness according to where they live: in the 10% most deprived areas major illness-free life expectancy is 63.7 years, which is 10.4 years lower than the 10% least deprived areas (74.1 years). This inequality is projected to persist through to 2040.

Most of the increase in major illness in the working-age population will be in more deprived areas

9.3 million people are projected to be living with major illness in 2040, 2.6 million more than in 2019. The majority of this increase is due to population growth and the population living longer, rather than people developing illness earlier in life. The Office for National Statistics (ONS) projects the population in England to increase by 7.3 million between 2019 and 2040, and the share of people aged 70 years and older is projected to increase by 44%, more than five times the growth projected in the population aged younger than 70 years.

The age distribution of the current and projected population is different depending on where people live and the level of deprivation in that area.* In addition, the ONS projects a large proportion of the population growth over the next 15 years to be due to international migration.† The projected rise in international migration to England is largely made up of people of working age. Moreover, people of working age, irrespective of immigration status, are more likely to live in more deprived areas. As a result, the growth in the working-age population in England is projected to be concentrated in the more deprived areas (Figure E2). In the more deprived half of England (deciles 1–5), the population aged 20 to 69 years is projected to grow by 3.2 million. In the less deprived half (deciles 6–10) it is projected to grow by 800,000.

Figure E2 illustrates the combined effect of population growth and rates of major illness. It shows the change in the number of people aged 20–69 years and 70 years and older with and without major illness, by decile of deprivation. It indicates that population growth and the increase in major illness among the working-age population (20–69 years) will be greater in the more deprived areas of England (deciles 1–5). By contrast, the increase in the population aged 70 years and older and the growth in major illness is projected to be evenly distributed across all deprivation deciles.

Of the 2.6 million increase in people with major illness by 2040, 670,000‡ is projected to be among working-age people, with the vast majority (80%) of this increase in more deprived areas (deciles 1–5).

* The model projections are tied to ONS projections of the population in England at a local authority level from 2018. We assume that, within each local authority, the proportions of each Lower Layer Super Output Area (LSOA – the level at which IMD deciles are assigned) stays constant.

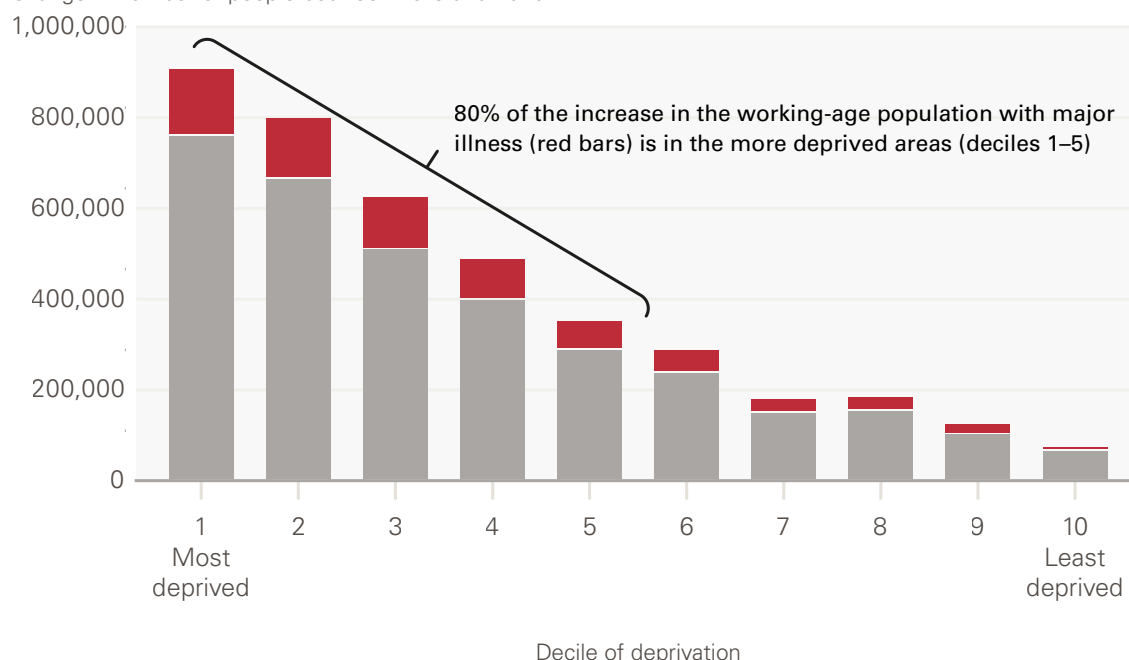
† The ONS projects that international migration will make up more than 90% of the population growth in the UK between 2021 and 2036.

‡ This number is slightly different to that in Box 1 (page 16). This is because it is estimated by adding up the different deciles of deprivation and rounding. The number in Box 1 does not involve aggregation by IMD.

Figure E2: Projected change in the number of people aged 20–69 years and aged 70 years and older with and without major illness between 2019 and 2040, by decile of deprivation, England

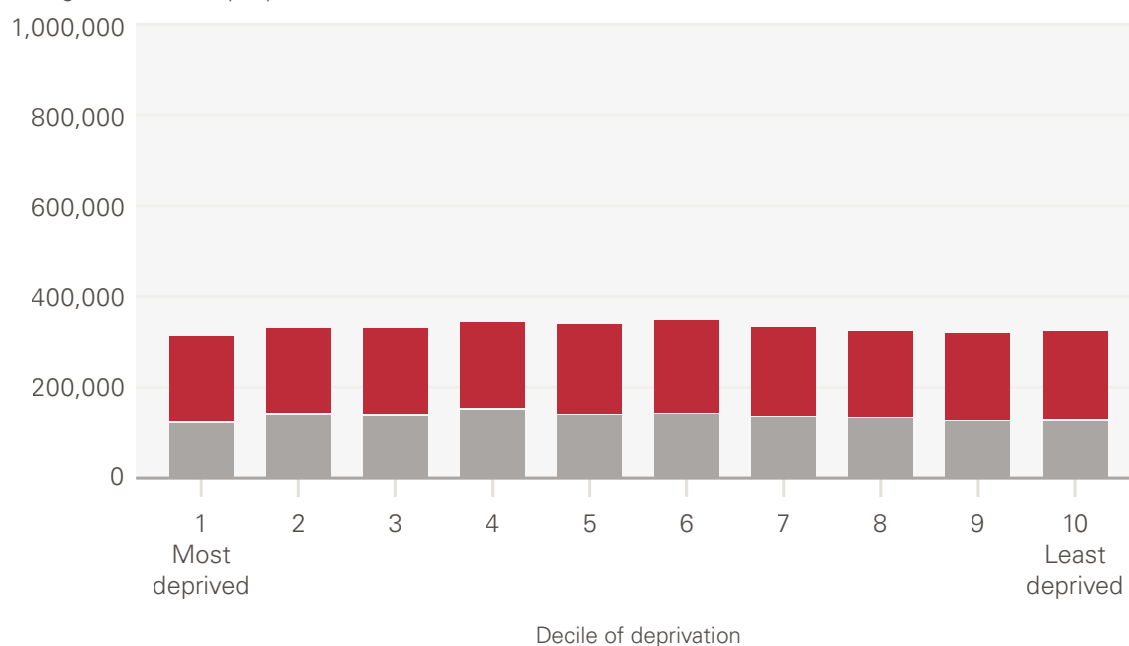
20–69 years People without major illness People with major illness

Change in number of people between 2019 and 2040



70 years and older

Change in number of people between 2019 and 2040



Note: The total length of the bars shows the projected population change by decile of deprivation. This relies on ONS projections that do not offer uncertainty intervals.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

Figure E3 shows the number of people with major illness for the 10% most deprived and 10% least deprived areas only. All areas are projected to have an increase in major illness between 2019 and 2040, but the increase is greatest in the 10% most deprived areas (330,000 more people compared with 200,000 in the 10% least deprived areas).

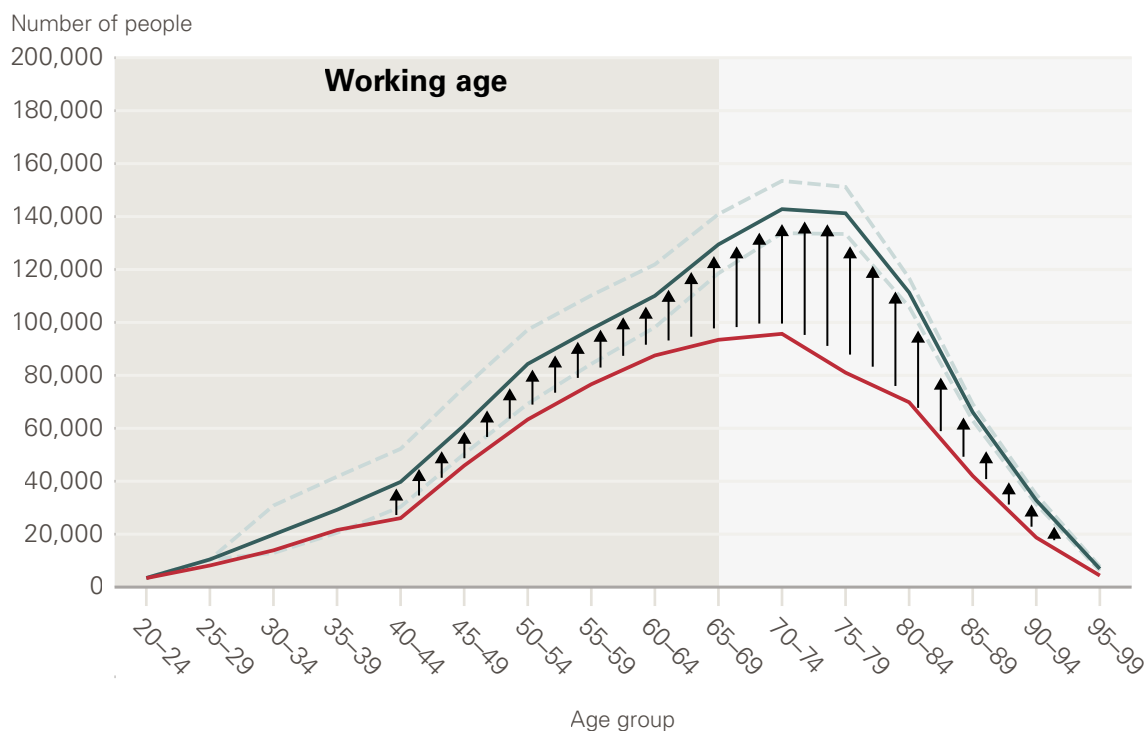
In the most deprived areas, this increase is more evenly distributed across working ages and older ages whereas in the least deprived areas, it is largely concentrated in the older ages. In the most deprived areas, 43% of the increase in major illness is projected to occur in the working ages (20–69 years), compared with 3% in the least deprived areas. This is driven by the higher proportion of people living with major illness in those ages and the projected population growth in those ages.

This pattern is reversed for people aged 90 years and older. In the most deprived areas, 5% of the increase in major illness is projected to occur among people aged 90 years and older compared with 23% in the least deprived areas. This is because many of the people with the poorest health in the most deprived areas have already died by this age.

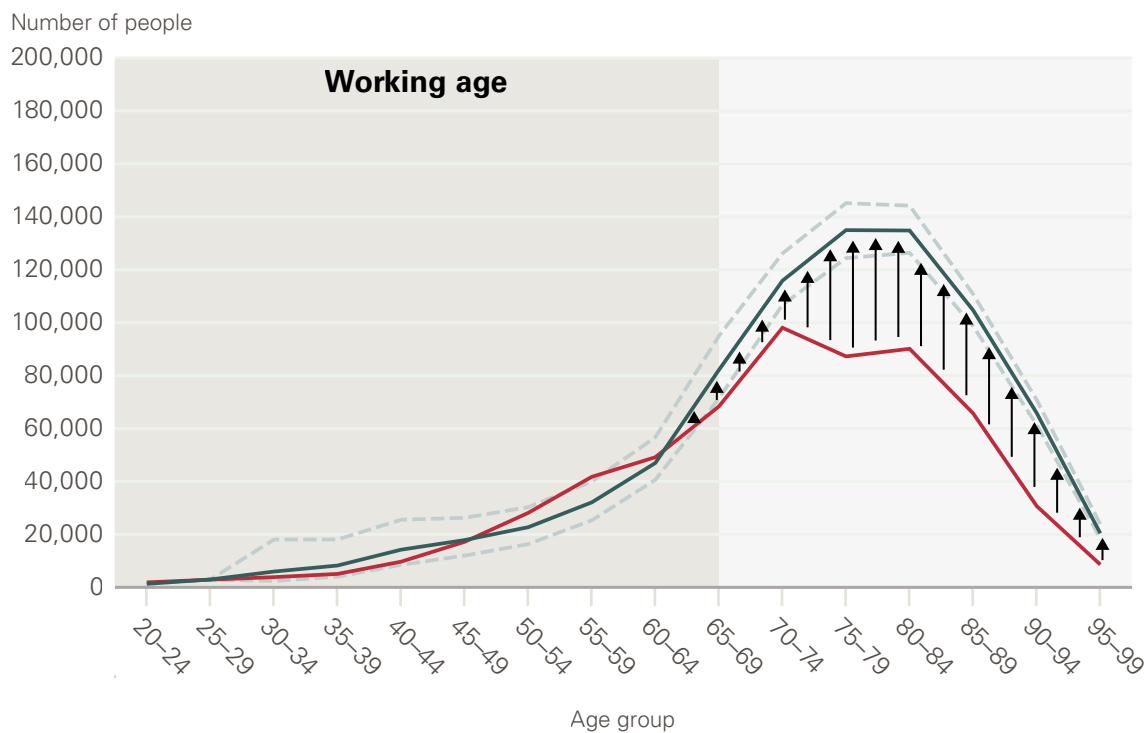
Figure E3: Number of people with major illness by age, 2019 and projected for 2040, 10% most and least deprived areas, England

10% most deprived areas

— 2019 — 2040



10% least deprived areas



Note: The dashed lines represent uncertainty intervals.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

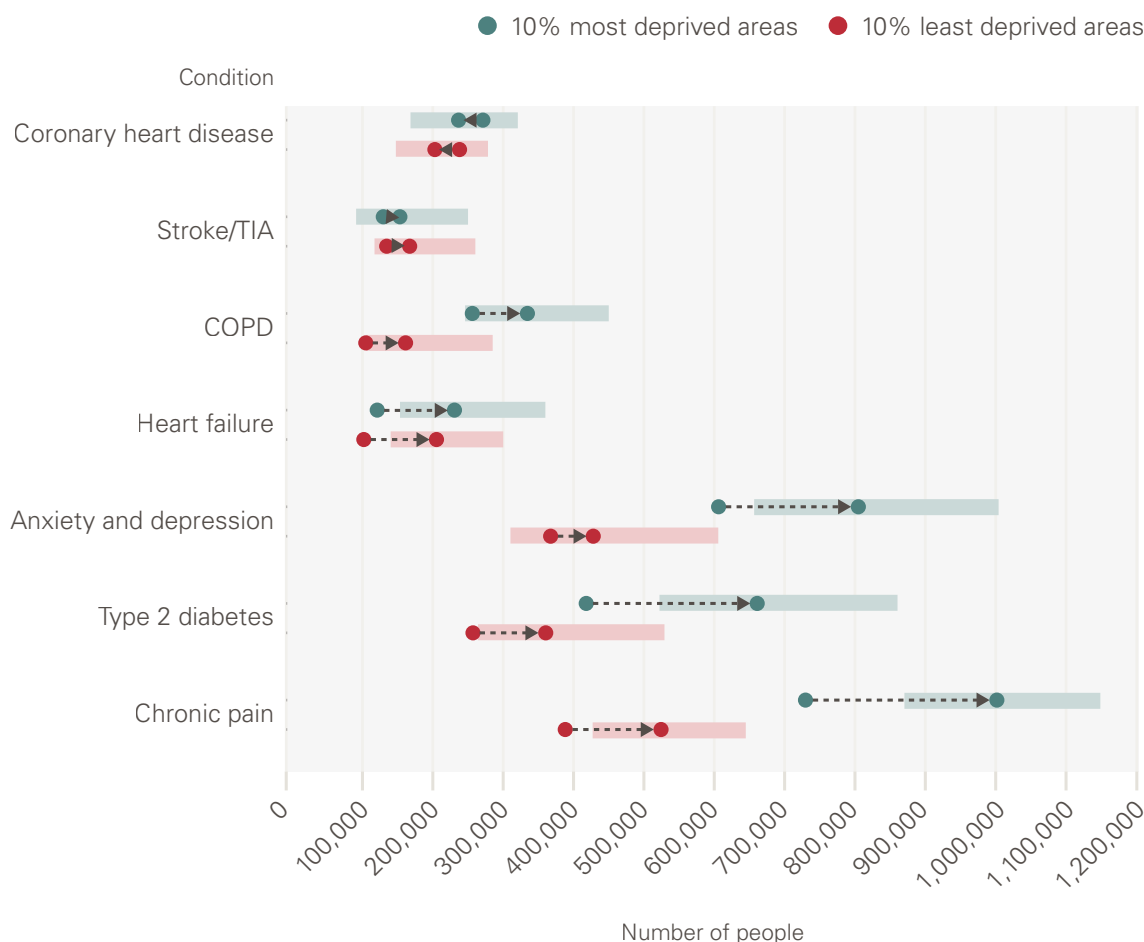
The number of people with chronic pain, type 2 diabetes, and anxiety and depression is projected to increase more in the most deprived areas

Of the conditions that contribute most to health inequality,^{*} chronic pain, anxiety and depression and type 2 diabetes are projected to be the most prevalent in both the 10% most deprived and least deprived areas. Population growth is higher in the most deprived areas in people aged 20 to 69 years and these conditions are more common in these age groups. For both these reasons, the number of cases is increasing fastest in the most deprived areas.

Between 2019 and 2040, we project more than 270,000 more people living with chronic pain, 240,000 more people with type 2 diabetes, and 200,000 more people with anxiety and depression in the most deprived areas. The corresponding numbers for the least deprived areas are 140,000 more people diagnosed with chronic pain, 100,000 more for type 2 diabetes and around 60,000 more for anxiety and depression.

^{*} These are the conditions that have the greatest impact on health care use, the greatest risk of death and contribute the most to differences in illness between the 10% most and least deprived areas.

Figure E4: Projected change in the number of people living with a specific diagnosed condition between 2019 and 2040 in the 10% most and least deprived areas, England



Note: The shaded bars represent uncertainty intervals. TIA is transient ischaemic attack and COPD is chronic obstructive pulmonary disease.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

Conclusions

This report shows that health inequalities are wide and if current trends in population, and patterns of illness continue, they are not going to narrow in the next two decades. This will have major implications for economic growth, the quality of people's lives and health services. To move the dial, the government needs to help people to live longer healthier lives through improving access to the building blocks of good health. This will require cross-government action on a wide range of policy areas including prevention and the wider determinants, targeted in the most deprived areas.

This kind of change takes time to deliver. In the meantime the NHS and other public services need to deliver effective care in the right areas to support health as an asset, enhance wellbeing and promote economic growth.

Introduction

England's population is increasing and living longer.^{1,2} As a result, by 2040 9.3 million people in England are projected to be living with major illness, 2.6 million (39%) more than in 2019.³ There are also large inequalities in health across the country. Women and men in the most deprived areas of England die, on average, 7.6 years and 9.4 years earlier than their counterparts in the least deprived areas.⁴ The number of years people live in good health varies too: 60-year-old women in the 10% most deprived areas is likely to have a similar level of ill health as 76-year-old women in the 10% least deprived areas.⁵

These differences in health have consequences not only for people's quality of life, but also for their ability to work and the wider economy.⁶ In England, the share of people who are out of the workforce (referred to as being 'economically inactive')^{*} due to poor health is around 4%, but this ranges from 9% in the most deprived areas to 1% in the least deprived areas.⁷

These inequalities are not uniformly distributed – there are pockets of highly deprived areas all over the country, in cities and in rural or coastal areas.⁸ The north-east and north-west regions of England in particular have the highest levels of diagnosed illness⁵ and the lowest life expectancies.⁹ Other research published in 2023 showed that these regions also had the lowest self-reported health, the highest rates of people reporting disability,[†] and the highest rates of economic inactivity for health reasons.¹⁰

Population health and the economy are closely linked, and regional health inequality is mirrored by inequality in GDP per capita, productivity, disposable income and educational attainment.^{11,12,13} Governments face political choices about how to tackle inequality, with both the current Conservative government and the Labour Party proposing measures to improve healthy life expectancy and reduce health inequalities.^{14,15}

At the same time, the Chief Medical Officer has called for more urgent efforts to be focused on compressing the period of life spent living with illness later into older age as a means of increasing healthy life expectancy.¹⁶ He also highlighted the significant gap in biological age (which is different from chronological age)[‡] between those living in the most and least deprived areas. The Office for Budget Responsibility is also warning that the ratio of the working-age to retired population

* The Census defines economically inactive people as those aged 16 years and older who did not have a job between 15 March and 21 March 2021 and had not looked for work between 22 February and 21 March 2021 or could not start work within two weeks.

† This is measured as people self-reporting that their day-to-day activities are limited a lot by a disability

‡ Biological age is different from the mere passing of time (chronological age), and acknowledges that biology and the associated risks of illness change at different rates for different people.

is projected to reduce from four-to-one to three-to-one over the next 50 years.¹⁷ This will put even more pressure on the government to find a way to pay for the increasing health and care needs of the population.

About this report

This report has been produced by the Health Foundation's REAL Centre in partnership with the University of Liverpool, as part of a wider project that looks at projections of illness, health inequalities and health care demand. In the first report, *Health in 2040*, published last year, we focused on how patterns of illness are projected to change in England up to 2040. This new report explores current and future patterns of illness for people living in more and less deprived areas of England.

There are two overarching aims of this report:

1. To examine patterns of diagnosed ill health and health inequality seen in 2019.
2. To project these patterns into the future and examine how health inequality could change by 2040.

This is the first study of its kind to use linked patient records to describe and project inequality in diagnosed illness across multiple conditions. It adds to the evidence around inequalities in self-reported health and also provides further detail about the specific conditions driving inequality and health care demand. It adds important insight into the extent and form of health inequality in England and could help to target efforts to reduce health inequalities in the future. It also shows how our updated national projections of ill health from *Health in 2040* translate for people living in different areas of the country with varying levels of deprivation. Anticipating these trends gives policymakers an opportunity to act now to address these inequalities and increase economic growth.

Box 1: Findings from our previous analysis

This report builds on analysis from *Health in 2040*, published in 2023, which projected patterns of illness in England up to 2040. Here are the key findings from *Health in 2040*, updated in line with new national population projections by age and sex from the Office for National Statistics.^{*,18}

- 9.3 million people in England are projected to be living with major illness by 2040, or 2.6 million more than in 2019. This is an increase from almost 1 in 6 to nearly 1 in 5 of the adult population living in poor health.
- 74% (1.9 million people) of the projected increase in major illness is for people aged 70 years and older as the baby boomers reach old age.
- There is projected to be 680,000 more people of working age (those aged 20–69) living with major illness: totalling 3.7 million (9% of the working-age population) in 2040.
- Much of the projected growth in illness relates to conditions such as anxiety and depression, chronic pain and diabetes, which are predominantly managed outside hospitals in primary care and the community.
- A reduction in some of the main causes of poor health, such as smoking and high levels of cholesterol, are offset by the impact of an increase in obesity. The impact of obesity is even greater since people who reach older age are more likely to have been living with obesity for longer.

* The projections rely on assumptions about birth rates, mortality rates and international migration that are developed using analysis of past trends. In 2022 and 2023 there was an increase in immigration into the UK, which has given the ONS cause to update their assumptions about net migration in the coming years.

Approach and methods

Estimating the overall health of a population

Analysing health inequality involves measuring and understanding the differences in people's health, but there are a number of different ways this can be done. A key measure of health inequality is the differences in mortality rates and life expectancy across a population. Life expectancy is important but good health means more than longevity – quality of life also matters. This is measured using healthy life expectancy (HLE) or disability-free life expectancy (DFLE).

These measures alone do not capture health inequality in its entirety. Differences in healthy life expectancy or disability-free life expectancy can be used to estimate inequalities in the time spent in poor health or with a disability. But inequalities in life expectancy and health inequality do not always move in tandem; they can also change independently of each other. For example, an effective new treatment for a severe illness that is more common in more deprived areas would improve survival rates in those areas and reduce inequality in life expectancy. However, the new treatment would not stop people getting and living with the illness, so health inequality might not change. Thus, both life expectancy and healthy life expectancy should ideally be considered together to develop targeted action to tackle health inequalities.

Our analysis adds to these measures of health inequality by exploring inequalities in diagnosed illness using patient records. In the next chapter, we also show how the different measures compare to provide a fuller picture of health inequality.

Methods

Patient records provide a detailed picture of diagnosed health by individual characteristics such as age and type of illness across the life course. They also include information on the level of deprivation of their area of residence. We combined these data with the Cambridge Multimorbidity Score (CMS)¹⁹ to compare the average level of illness in different population groups by level of deprivation. This enabled us to gather new insights into health inequalities across England.

We used linked patient-level health care data that combined primary care and secondary care records with mortality data.^{*,20} This was then linked by the data provider to geographical data to estimate the difference in diagnosed illness by level of deprivation in England in 2019.

To quantify the average level of illness, we used the CMS.¹⁹ This assigns a weight to 20 common long-term conditions[†] based on patients' use of primary care, unplanned hospital admissions and mortality.[‡] These 20 conditions together accounted for nearly two-thirds (65%) of the burden of illness in England in 2019.²¹

The CMS measures multimorbidity by adding up the scores for individuals diagnosed with more than one condition at the same time. Our focus is major illness, which corresponds to a person having a condition, or multiple conditions, that result in a CMS greater than 1.5.[§] For instance, a person would be defined as having major illness if they had cancer (score of 1.53) and no other condition. A person who has both chronic pain (score of 0.92) and diabetes (score of 0.75) would also be defined as having major illness.[¶] We used this as an indicator of illness that involves high health care needs or substantial risk of mortality.

We calculated additional health outcome measures such as life expectancy and health state life expectancies (the average time people can expect to spend in different states of good and poor health) by decile of deprivation (see Box 2). The main health state life expectancy measure that we report is major illness-free life expectancy. This estimates the average time that a person can expect to spend without major illness.

We developed a model to project future patterns of illness by level of deprivation that combined survey data on key health risk factors (Health Survey for England), linked patient records and epidemiological evidence on the relationship between illness and risk factors such as smoking, alcohol use, obesity, diet and physical activity. We estimated how levels of ill health are projected to change in England between 2019 and 2040 based on trends in these risk factors, rates of illness, life expectancy and population changes. For a high-level description of the data and methods used, refer to the Background and approach chapter of *Health in 2040*.³ For more detail on the modelling methodology, refer to the technical appendix.²²

* Primary care records came from Clinical Practice Research Datalink (CPRD) Aurum, secondary care records came from Hospital Episode Statistics, and mortality data was provided by the Office for National Statistics. The data are provided by patients and collected by the NHS as part of their care and support. Regulatory approvals to use CPRD data for this analysis were granted by the CPRD Independent Scientific Advisory Committee (ISAC protocol number 20-000096).

† These conditions are: dementia, cancer (all types), chronic obstructive pulmonary disease (COPD), atrial fibrillation, heart failure, constipation, epilepsy, chronic pain, stroke/transient ischaemic attack (TIA), diabetes (type 1 or 2), alcohol problems, psychosis/bipolar disorder, chronic kidney disease, anxiety and depression, coronary heart disease, connective tissue disorders, irritable bowel syndrome, asthma, hearing loss and hypertension.

‡ We used the 'general outcomes' weights of conditions that combined their impact on primary care consultations, unplanned admissions, and risk of death.

§ The threshold of 1.5 puts a person into the 87th percentile of the score for the overall population of England and into the 72nd percentile for the population with any illness.

¶ For the complete list of the 20 conditions and their scores, please refer to Table 8.1 in the *Health in 2040* working paper.³²

In addition to the measures explained, we estimated the number of people living with major illness in the population and how this is projected to change between 2019 and 2040 to project patterns of future health inequality. To do this, we combined our projections of the change in the prevalence of major illness (the proportion of the population living with major illness at a specific moment in time) with the projected change in the population, by age and decile of deprivation. We used the same methodology to estimate the growth in the number of people with a specific condition by level of deprivation between 2019 and 2040.

We use 2019 to explore current patterns of health inequality as it is the latest year of health data unaffected by the COVID-19 pandemic (see Box 3).

Box 2: The Index of Multiple Deprivation (IMD)

The IMD is the official measure of relative deprivation in England that ranks each small area from the most to the least deprived.²³ It combines 39 indicators across seven domains that include income, employment, education, health, crime, barriers to housing and services, and living environment. Our linked health data include the deprivation decile based on the IMD2015 rankings of local areas.*

Research that explores socioeconomic health inequalities in England most commonly uses IMD due to its availability and linkage with other datasets. But despite its widespread use, this measure has several limitations.²⁴ First, it is a relative measure; it tells us how deprived an area is relative to others. It does not tell us anything about absolute levels of deprivation of an area. Second, it is an area-based measure rather than a person-based measure such as income level or employment status. There may be relatively high-income individuals living in more deprived areas and vice versa. So, all our results in this report pertain to population-level effects of living in different levels of deprivation, not individual experience.²⁴

What this analysis adds

Our research complements existing evidence of health inequalities in England that uses measures of self-reported health or of individual conditions. It is one of the first studies to document inequalities in diagnosed multimorbidity (more than one condition). The Cambridge Multimorbidity Score enabled comparisons of different conditions based on their impact on people's health care use and risk of death. We also made use of linked primary and secondary care data that provides greater detail of people's illness histories. This is also one of the first studies to project future patterns of health inequalities in England.

* CPRD (the provider for our patient data) were only able to provide IMD2015 deciles rather than the latest IMD2019 deciles.

Box 3: Limitations of this analysis

Projections are designed to help provide an informed assessment of the future based on current data and trends. There is inherent uncertainty in projections analysis as it requires several assumptions to be made about the factors that determine the extent of future health care needs in a population. However, given the recent improvements in methods and data linkage, this report gives a uniquely detailed presentation of patterns of health inequality. Aside from the assumptions and limitations of the model (which are detailed in the technical appendix²²), we highlight six key limitations of the data and methods we use.

First, the projections of future illness are based on the existing evidence on the causal relationships between risk factors and the conditions we model. There are significant gaps in this evidence either because of lack of research in those topic areas or, where research does exist, a lack of good quality and robust data and research methods. Further detail on our complete evidence base linking risk factors with conditions can be found in the technical appendix.²²

Second, we report trends in diagnosed ill health. These data only identify differences in illness recorded in health data. There is evidence of under provision of health care relative to need in more deprived areas.²⁵ There is also evidence of additional barriers to accessing health services in these areas.²⁶ These factors together could contribute to underdiagnosis of illness in the more deprived areas that could in turn mean our analysis underestimates the extent of health inequalities in England.

Third, primary care data is not consistently accurate for the conditions we model. For instance, our estimates of the prevalence of chronic pain rely on data on prescriptions of painkillers. But there might be instances of people managing chronic pain through over-the-counter medication or other means, which will not be reflected in health records.

Fourth, in the absence of any official population projections by deprivation, we use the latest version of the ONS's population projections at the local authority level from 2018.²⁷ We then applied the population growth rate by local authority to the modelled population irrespective of deprivation. In reality, different levels of deprivation within each local authority might have different population growth rates.

Fifth, we align our modelled projections with the ONS's 2021-based national population projections, which assume a greater level of migration than the 2018-based local authority projections. As a result, a large majority of the trends in working-age population growth in this analysis is due to international migration. There is insufficient research looking at the health and illness profiles of international migrants compared with the population of the countries they migrate to. Therefore, our model assumes that future migrants have a similar distribution of IMD and similar health characteristics to the local population of England by age, sex and IMD.

Finally, we did not include COVID-19 or long COVID as a condition in our analysis. Our data sample was limited to the period up to 2019/20 so we did not have data for either condition. The long-term impact of the pandemic on mortality rates are reflected in the use of recent ONS projections on mortality. The link between long COVID and other conditions is yet to be quantitatively and epidemiologically analysed. In addition, the pandemic led to disruption in health services, increase in waiting times and the non-pharmaceutical interventions (lockdowns) may have altered health-related behaviours. Therefore, it was not possible to include robust estimates of the direct impact of COVID-19 on the future of inequality in long-term conditions. We will be able to include data from the COVID period in future iterations of our projections.*

* There are additional limitations that have been described in detail in Box 1 of our previous publication *Health in 2040*.

What is the pattern of health inequality in England?

In this chapter, we focus on the current pattern of health inequality in England and show the impact of deprivation on rates of major illness and time spent in different health states. We also explore the key conditions that contribute to health inequality. Finally, we report on the relationship between measures of life expectancy based on self-reported health and those based on diagnosed illness, and how this relationship is impacted by deprivation.

Key findings

- People in the 10% most deprived areas can currently expect to develop major illness at least 10 years earlier than people in the 10% least deprived areas in England. They are also more likely to die prematurely – over three times more likely to die before the age of 70 years.
- There are more working-age adults living with major illness in the most deprived areas (14.6%), more than double the rate in the least deprived areas (6.3%).
- Health inequality widens throughout adulthood. 10% of people in the most deprived areas have major illness in their 40s, rising to 38% in their 60s. This compares with 4% of people in the least deprived areas who have major illness in their 40s rising to 18% in their 60s.
- By the age of 70 years, over 50% of people in the most deprived areas are either living with major illness or have died, compared with less than 30% of people in the least deprived areas.
- A small group of long-term conditions contribute to most of the health inequality: chronic pain, COPD, type 2 diabetes, cardiovascular diseases and anxiety and depression. Among those aged 50–69 years, the share of people with these conditions in the most deprived areas is at least twice that of the least deprived areas, with the share of people with COPD 5 times higher.
- People in the most deprived areas die earlier and spend more time living with major illness. Men in the most deprived areas have the shortest lives on average, while women in the most deprived areas spend the longest time living with major illness.

Measuring health inequality using diagnosed illness

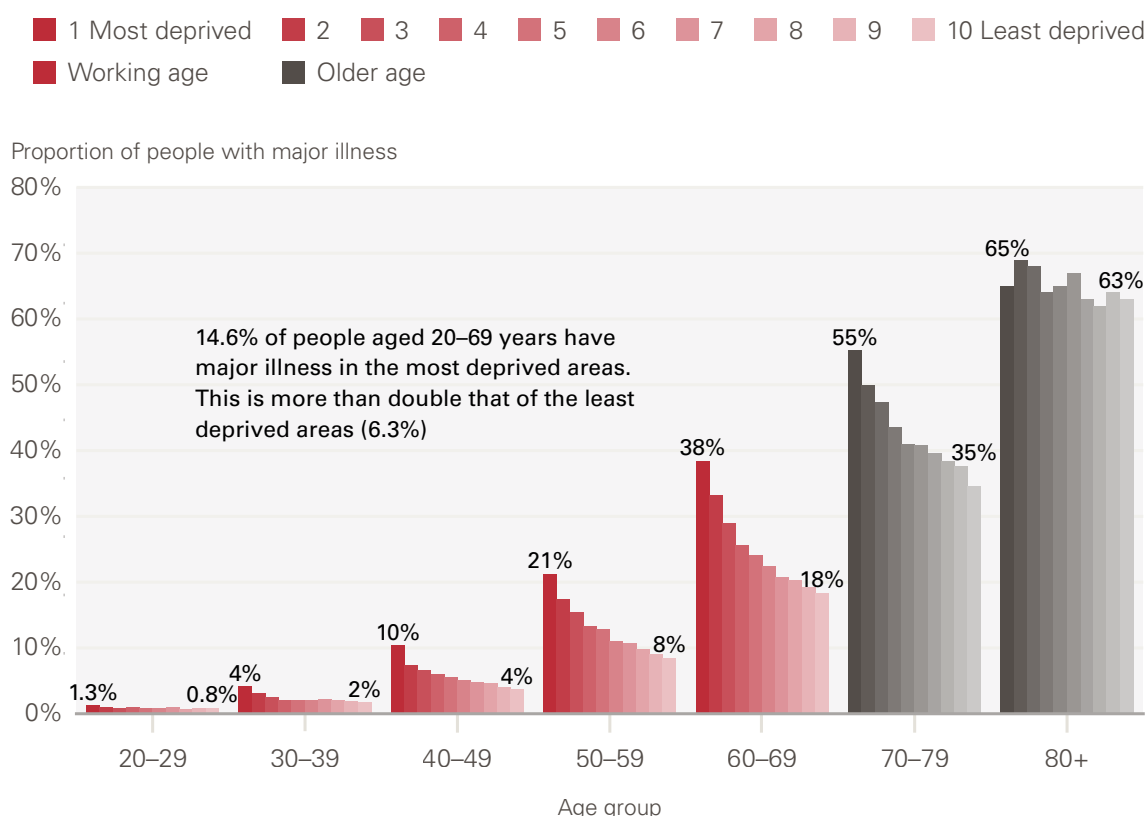
What is the difference in the extent of major illness by level of deprivation?

Health inequality is typically measured using self-reported measures, such as healthy life expectancy, and shows that people living in more deprived areas are more likely to be in ill health. Levels of major illness also underline this relationship. A person is defined as having major illness when their individual CMS is greater than 1.5. Across all adult ages, a greater share of people in the 10% most deprived areas have major illness compared with the 10% least deprived areas. Figure 1 shows the proportion of people living with major illness by age and decile of deprivation for their local area.

Significant levels of inequality in diagnosed illness exist within the working-age population (20–69 years). Once we adjust for the different population sizes and age distributions across different levels of deprivation, we find that 14.6% of working-age people live with major illness in the most deprived areas. This is more than twice that in the least deprived areas (6.3%). Inequality in diagnosed illness remains wide beyond the state pension age (currently 66 for men and women). In the 70–79 years age group, the share of people with major illness in the most deprived areas is 1.6 times that of the least deprived areas and then levels off among people aged 80 years and older.

Figure 1 shows that inequality in diagnosed illness widens throughout adulthood, with a difference in prevalence of major illness already appearing when people are in their 20s. In the 50–59 years age group, well below the state pension age, more than 2 in 10 people in the most deprived areas have major illness compared with just under 1 in 10 people in the least deprived areas.

Figure 1: Share of people with major illness by 10-year age group and by decile of deprivation, England, 2019



Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

The pattern of major illness by deprivation is different for the oldest age group (80 years and older). This is because many of the people with the poorest health (who are more likely to live in the more deprived areas) will already have died before reaching 80 years, so the difference in the health of the people who are still alive is smaller between the more and less deprived areas.

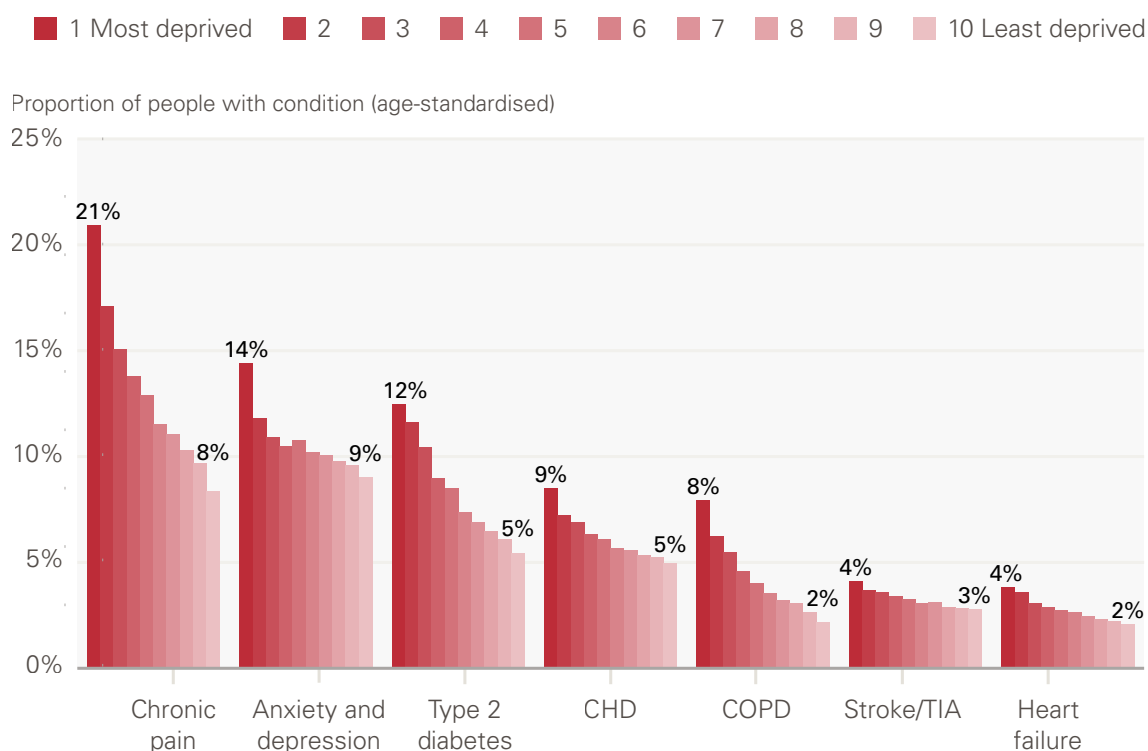
Which conditions contribute to inequality in diagnosed illness?

We also looked at the specific conditions that result in the largest differences in diagnosed illness out of the 20 conditions included in the scope of this analysis. Of those conditions, a small group contribute to most of the observed health inequalities. These are chronic pain,* chronic obstructive pulmonary disease

* Chronic pain is calculated using data on prescriptions of painkillers as detailed in Table 6-2 in the technical appendix.²² Currently in England, people on low incomes and certain benefits are exempt from prescription charges and this could influence prescription patterns by level of deprivation.⁴² In addition, our prevalence estimate of chronic pain is generally lower than self-reported prevalence of chronic pain.⁴³ This could be due to people self-medicating their long-term pain issues through over-the-counter medication or non-pharmaceutical means which would not be picked up by health records.

(COPD), type 2 diabetes, cardiovascular diseases (CVD) (including heart failure, coronary heart disease (CHD) and stroke) and anxiety and depression (see Box 4). Figure 2 shows the share of people with these conditions (age-standardised prevalence) by level of deprivation.

Figure 2: Prevalence of key contributing conditions to health inequality by decile of deprivation in England, 2019



Note: CHD is coronary heart disease, COPD is chronic obstructive pulmonary disease and TIA is transient ischaemic attack.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

After taking age into account, the prevalence of these conditions in the 10% most deprived areas is at least one and a half times that of the 10% least deprived areas. The largest difference is in COPD: in the most deprived areas the prevalence is around four times that of the least deprived areas.

As with major illness as a whole, inequality in these conditions is present between every decile of deprivation. In fact, for conditions such as chronic pain, anxiety and depression, COPD and coronary heart disease, the difference between the share of people living in the most deprived areas (decile 1) and the next most deprived areas (decile 2) is much greater than the differences between other adjacent deciles of deprivation.

Box 4: How we identify the conditions contributing to health inequality

Inequality in diagnosed illness can be quantified in multiple ways. A person is defined as having major illness when their individual CMS is greater than 1.5. To identify the key conditions we compare the average CMS between the most and least deprived areas while taking age into account. The average CMS is calculated from the prevalence of each of their diagnosed conditions, multiplied by each condition's score (see Methods section).

Chronic pain, COPD, type 2 diabetes, CVD and anxiety and depression were the conditions with the largest deprivation gaps in prevalence according to their CMS. CVD is an umbrella term for a number of conditions that includes heart failure, coronary heart disease and stroke/transient ischaemic attack – the three conditions with the most inequality in average CMS. These conditions are shown individually.

We found that these seven conditions (chronic pain, COPD, type 2 diabetes, anxiety and depression and three key cardiovascular conditions) together made up 90% of the difference in the average levels of diagnosed illness between the most and least deprived areas.

Diagnosed cancer is more prevalent in less deprived areas after age is taken into account. This is because more people are likely to be living with a cancer diagnosis in the less deprived areas due to a higher prevalence of cancers associated with high survival rates. It is therefore not one of the conditions that contributes most to inequalities in diagnosed illness despite higher frequency of new cases of cancer in more deprived areas.²⁸

Which conditions contribute to health inequality for people of working age?

People living in more deprived areas have worse health on average compared with people living in less deprived areas. For instance, we know that on average a 60-year-old woman in the 10% most deprived areas in England has around the same level of diagnosed ill health as a 76-year-old woman in the 10% least deprived areas.⁵

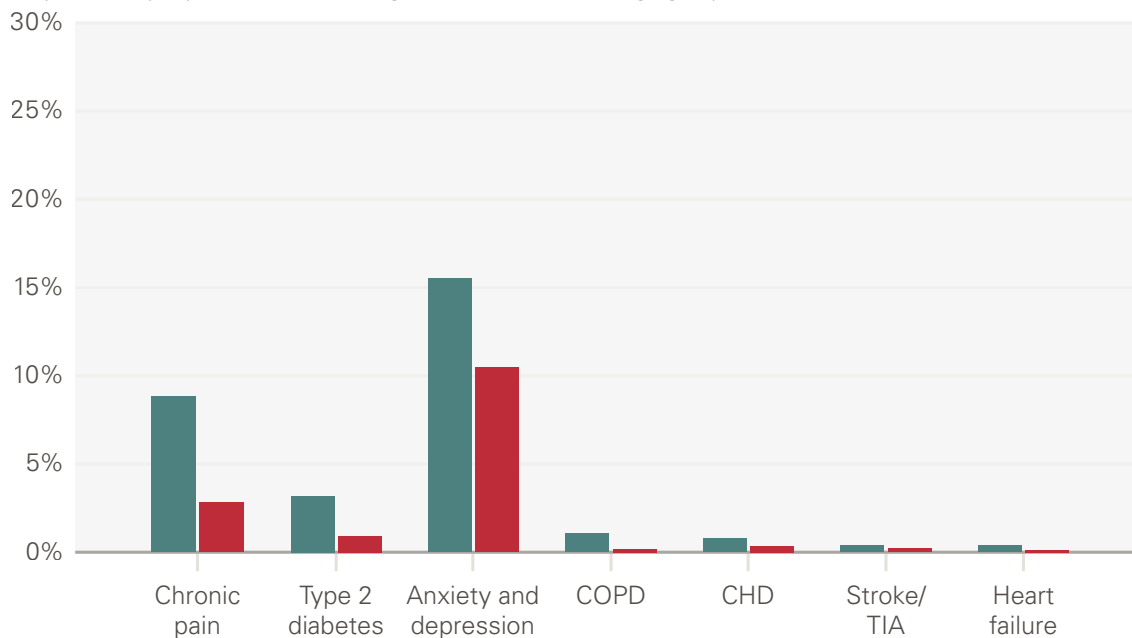
Figure 1 demonstrated that there are large differences in the share of working-age people with major illness in the most and least deprived areas. Figure 3 below shows the proportion of the population of working-age people living with a specific condition in the most and least deprived areas in England. We report two age groups separately, 20–49 years and 50–69 years, to highlight the difference in the prevalence of specific conditions and how this affects inequality at different ages.

Figure 3: Prevalence of key contributing conditions to health inequality in the 10% most and least deprived areas in England, ages 20–49 years and 50–69 years, 2019

20–49 years

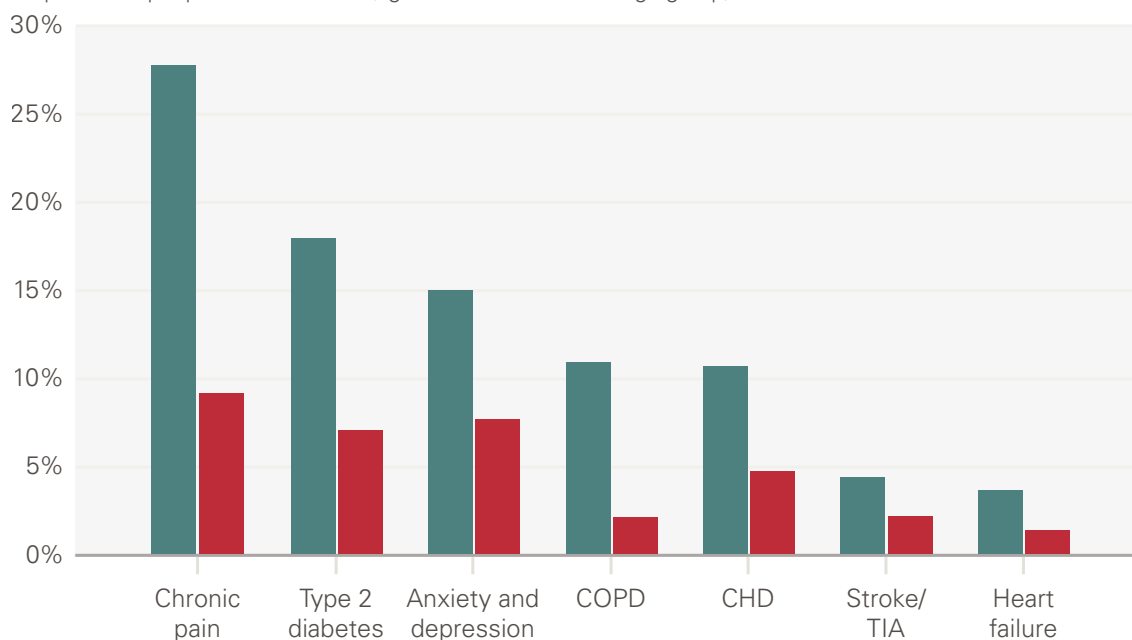
■ 10% most deprived areas ■ 10% least deprived areas

Proportion of people with condition (age-standardised within age group)



50–69 years

Proportion of people with condition (age-standardised within age group)



Note: COPD is chronic obstructive pulmonary disease, CHD is coronary heart disease and TIA is transient ischaemic attack.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

Comparing the two charts shows that the share of people living with one of these conditions is consistently lower among younger working-age people for all conditions except anxiety and depression, and cases of heart failure and stroke/transient ischaemic attack are rare.

The first panel of Figure 3 shows that of the key conditions contributing to health inequality, only anxiety and depression, chronic pain and type 2 diabetes are present to any significant degree among people aged 20–49 years. Chronic pain – a significant work-limiting condition – and type 2 diabetes are also highly unequal, with over three times more prevalence in the most deprived areas compared with the least deprived areas. The difference is less stark for anxiety and depression, with prevalence in the most deprived areas one and a half times higher, although there is evidence of under-diagnosis of mental health conditions in more deprived areas that potentially underestimates the extent of inequality for anxiety and depression.^{29,30}

The second panel of Figure 3 shows that diagnosed illness rates start to increase more rapidly as people reach their 50s and 60s – when most of the population would expect to still be working. The share of people with these specific conditions in the most deprived areas is at least twice that of the least deprived areas. COPD, while not the most common condition, has the highest relative inequality with over five times the prevalence in the most deprived areas in people aged 50–69 years. Inequality in cases of type 2 diabetes is less extreme in this age group than among those aged 20–49 years, but there are still two and a half times more cases in the most deprived areas.

What is the relationship between inequalities in major illness and inequalities in life expectancy?

So far in this chapter we have focused on diagnosed illness. But in addition to developing illness earlier, people living in more deprived areas also die earlier. Capturing both aspects of inequality at the same time is a challenge. In this section, we use data on rates of major illness and mortality rates from 2019 by age group to illustrate the combined effect of this early onset of major illness and mortality in the 10% most deprived areas against the 10% least deprived areas.

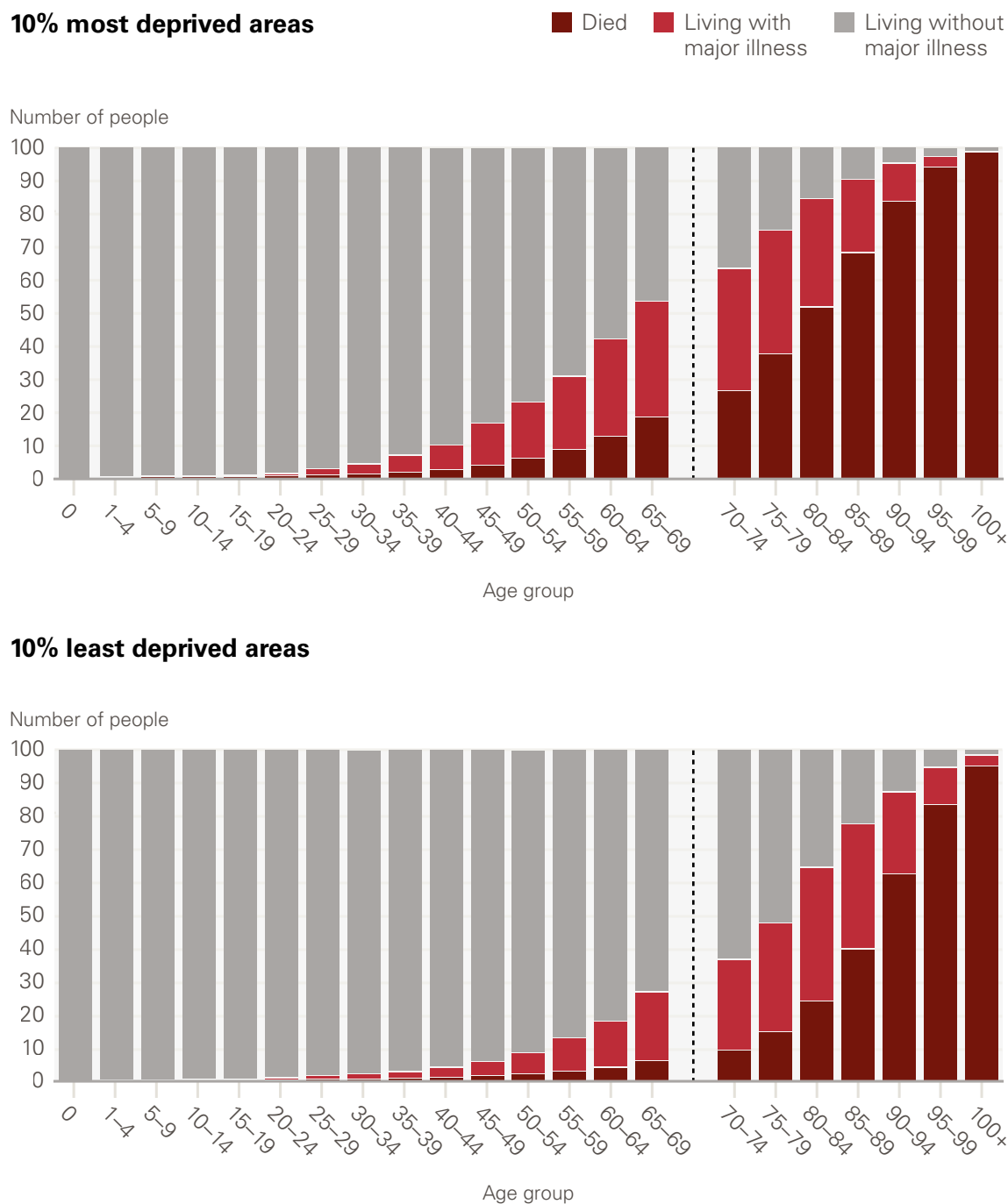
Figure 4 is a visual representation of the amount of time people live with major illness and the age at which they die.* Each column represents 100 people, with colours indicating their state of health: grey indicates alive without major illness, light red alive with major illness and dark red indicates death.

The chart shows that if 100 people lived out their lives in the most deprived areas on average 19 people would have died and 35 people would be living with major illness by their 70th year (based on 2019 illness and mortality rates). As a result, over half (54 out of 100) of people in the most deprived areas would either be living with major illness or would have died by the time they reach 70 years.

* This analysis mirrors calculations for nationally reported 'period life expectancy'.³¹

By contrast, in the least deprived areas on average six people would have died and 21 people would be living with major illness by their 70th year (27 out of 100). More than half of people (52 out of 100) could also expect to reach their 80th year without major illness, double the proportion in the most deprived areas (25 out of 100).

Figure 4: Major illness and mortality rates by age group for people living in the 10% most and least deprived areas in England, 2019 data



Note: These rates are used to calculate period life expectancy and major illness-free life expectancy in 2019. Of 100 people born in these areas, we can estimate how many can expect to reach each age in each state of health.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

Life expectancy, diagnosed illness and self-reported health

What is the relationship between the time lived with diagnosed illness and deprivation?

Life expectancy and the share of people in different states of illness can be combined to provide an aggregate measure of healthy life expectancy called 'major illness-free life expectancy'. This reflects the time people can expect to live before the onset of major illness. Major illness in this context is defined as having a CMS of greater than 1.5 (see Methods section).*

Earlier in this chapter, we showed that people in the most deprived areas are more likely to die at a younger age. In addition to having shorter lives, they also spend less time in good health before developing major illness, around 10 years less than people in the least deprived areas.

Figure 5 shows that women in the most deprived areas can expect to spend on average 64.5 years without major illness compared with 75.4 years in the least deprived areas, a gap of 10.9 years. The equivalent for men is 62.9 years and 72.8 years, a gap of 9.9 years.

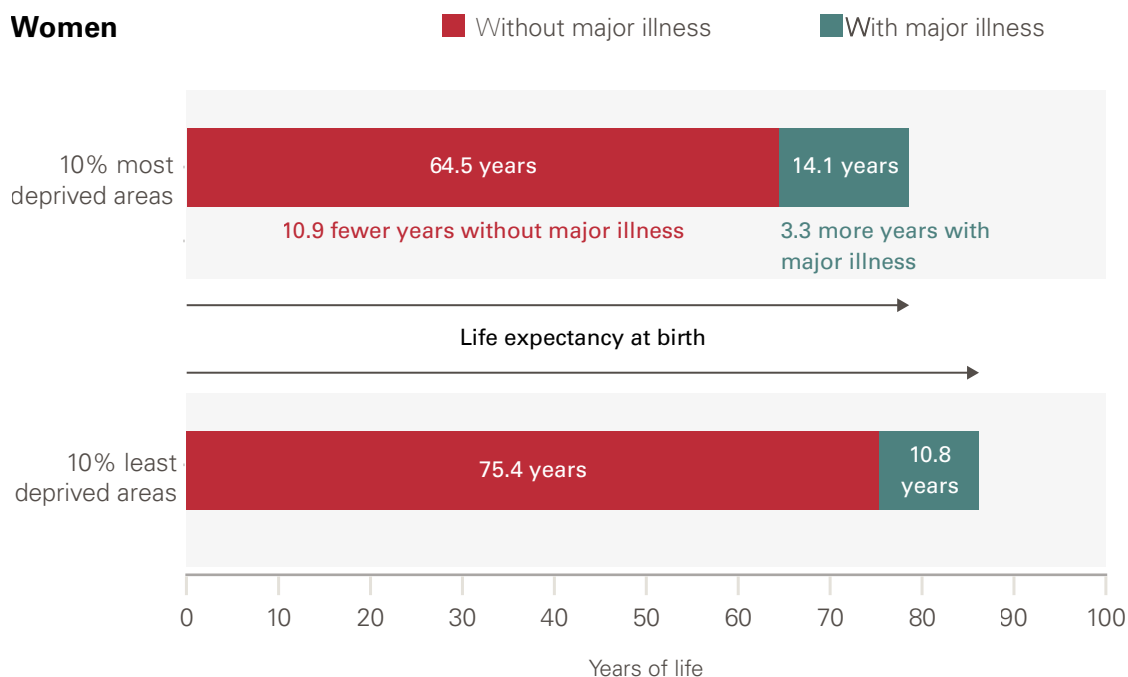
Although men in the most deprived areas are diagnosed with major illness around a decade earlier, they still spend a similar amount of time living with major illness to their counterparts in the least deprived areas (11.1 years versus 10.4 years). This is because they are also more likely to die at a younger age than men in the least deprived areas.

For women in the most deprived areas, the difference in the time spent with major illness with women living in the least deprived areas is greater (14.1 years versus 10.8 years). So, in addition to being diagnosed with major illness earlier and dying younger, women in the most deprived areas also spend a greater part of their shortened lives with major illness.

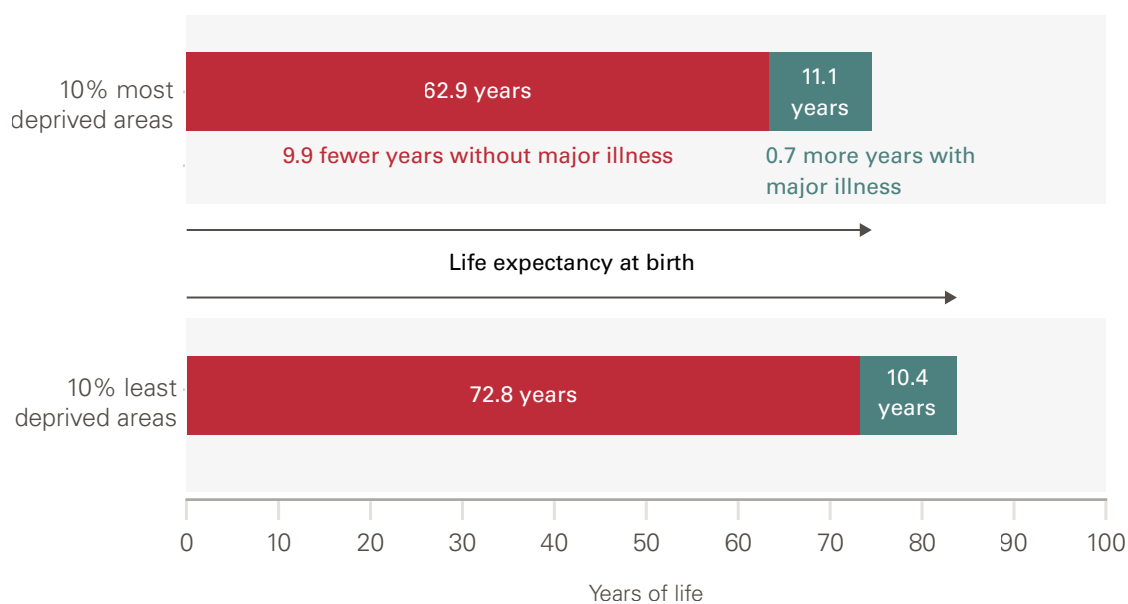
* The score of 1.5 represents both a single health condition such as cancer or dementia, and a combination of conditions that together are equivalent to having cancer in terms of mortality risk and health care use.³¹

Figure 5: Expected time with and without major illness for women and men in the 10% most and least deprived areas of England, 2019

Women



Men



Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

What is the relationship between self-reported health, diagnosed major illness and deprivation?

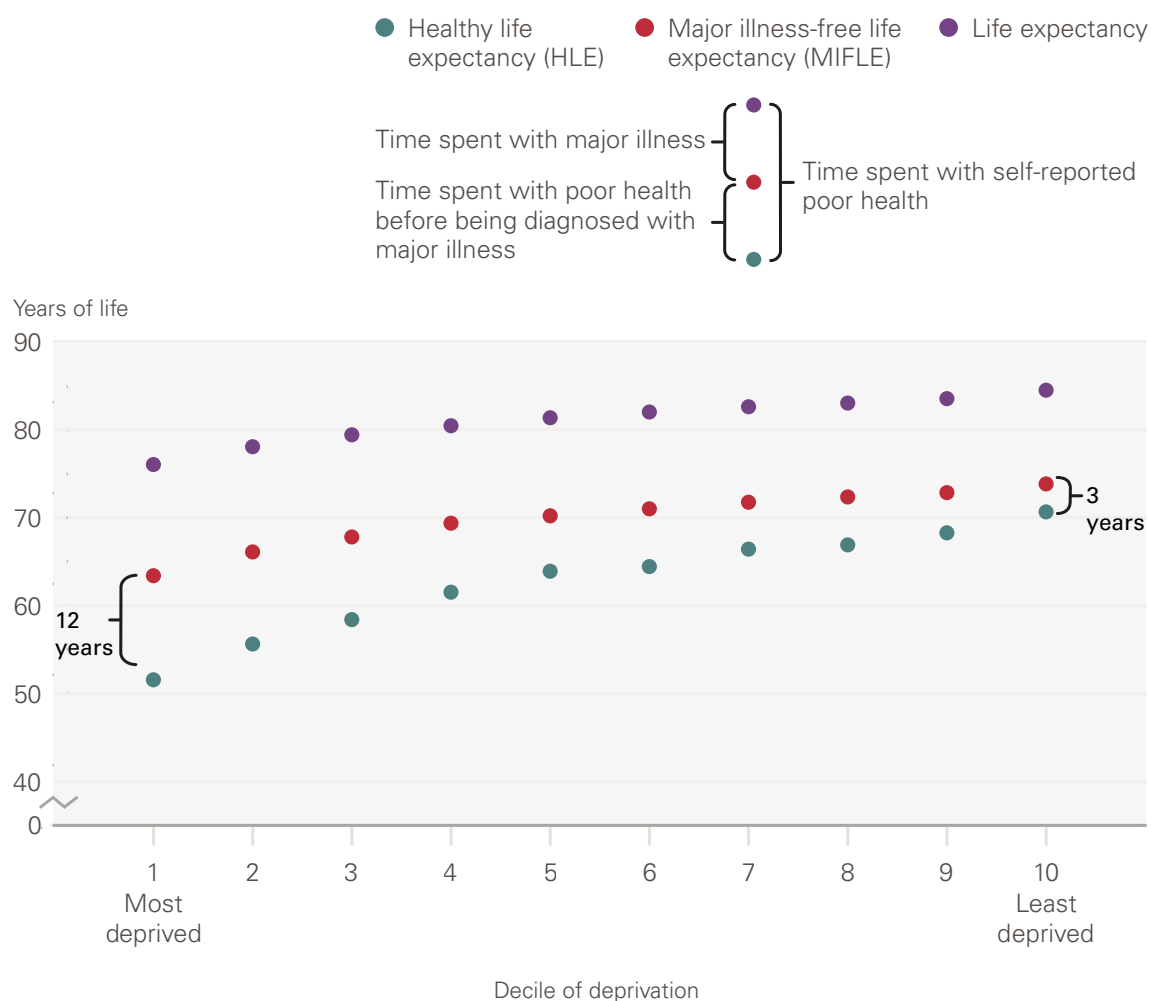
In the previous section we reported on major illness-free life expectancy, which is based on diagnosed major illness. An alternative measure is healthy life expectancy, which uses self-reported health. It uses data from the Annual Population Survey which asks respondents to describe their general health on a five-point scale. 'Very good' and 'good' responses classify a person as being in good health; 'fair', 'bad' and 'very bad' classify a person as being in poor health. Healthy life expectancy is then calculated as the age at which people no longer report good health.³¹ People's responses are influenced by their expectations, experience, and knowledge of what a healthy life could be. So, while it is a more subjective measure of ill health, it nonetheless plays a very important role in understanding how ill health affects people's lives in a way that diagnosed health records cannot.

The Office for National Statistics estimates that self-reported healthy life expectancy in England is on average 63.5 years for women and 63.2 years for men (2017–19). It is much lower in the most deprived areas, with people starting to report poor health in their early 50s. People in the least deprived areas are more likely to start reporting poor health in their early 70s. This means people in the most deprived areas spend on average nearly 20 fewer years in good health compared with their counterparts in the least deprived areas.⁴

Figure 6 shows the impact of deprivation on both major illness-free life expectancy and healthy life expectancy. It shows that the gap between healthy life expectancy (self-reported) and major illness-free life expectancy (diagnosed) is widest in the most deprived areas with people reporting poor health around 12 years earlier than diagnosis of major illness. This compares with a 3-year gap in the least deprived areas. This could be a consequence of differences in the types of conditions that people are diagnosed with at younger ages (see Figure 3) or the extent to which people in less deprived areas are able to access better care and treatment more quickly to effectively manage their condition. Differences in employment opportunities, housing and transport also affect access to care and the impact of having an illness. For example, someone on a zero-hours contract might find it harder to justify missing work for a check-up with their GP, and someone with a physically demanding job might feel more affected by a chronic pain issue. Further reasons for this gap are explored in Box 5.

Figure 6 also shows the difference in the time spent with poor health and the time spent with major illness by deprivation. On average, people living in the most deprived areas live for 24.4 years once they stop reporting being in good or very good health. They spend around half this time (12 years) with diagnosed major illness. In the least deprived areas the differences are much smaller (3 years).

Figure 6: Healthy life expectancy, major illness-free life expectancy and life expectancy at birth, by decile of deprivation in England (2017–2019 average for healthy life expectancy, 2019 for major illness-free life expectancy and life expectancy)



Note: ONS's healthy life expectancy estimates are calculated over a 3-year period to adjust for any abnormalities in mortality patterns that may be present in a single calendar year. We use ONS estimates for 2017–2019 here rather than 2018–2020 to avoid the inclusion of the COVID-19 pandemic period when mortality rates would have been very different to past trends.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

Although healthy life expectancy and major illness-free life expectancy measure different things, their trends over time have been similar. From 2010–19, average major illness-free life expectancy for England remained unchanged at around 70 years.³ Between 2011–13 (the earliest period for which data is available) and 2017–19, average healthy life expectancy remained unchanged at around 63 years.⁴ Between 2010–19, the difference in average major illness-free life expectancy between the most and least deprived areas increased by a year to reach 10 years in 2019. There was a similar change for average healthy life expectancy to reach a difference of 19 years by 2017–19.*

* ONS uses the IMD2015 deciles for the 2011–13 healthy life expectancy estimates and IMD2019 deciles for the 2017–19 estimates. Our analysis uses IMD2015 deciles throughout.

Box 5: Relationship between measures using self-reported health and diagnosed illness

We have already explored the relationship between major illness-free life expectancy and healthy life expectancy. The two measures are reporting different things using different data. Below we outline some of the factors that might contribute to the relationship between self-reported health and diagnosed illness.

Diagnosed illness

The risk of developing a condition increases through biological processes that are influenced by a myriad of different factors. These include, but are not limited to, age, genetics, the effectiveness of medical intervention and exposure to risk factors such as smoking, poor diet, stress and alcohol consumption. An often-used term for the progression of risk is 'biological age', which is different from the mere passing of time (chronological age), and acknowledges that biology and the associated risks of illness change at different rates for different people.

We know from our analysis that different socioeconomic groups have different risks of developing illness. To identify this difference using patient records, as we have done, conditions must be identified through the health system and recorded. This diagnostic process is itself a complex sequential chain of actions that depend both on the individual and how they interact with the health system. After a condition has developed:

1. Pain or discomfort must be presented to a health professional, or, some screening or primary testing must occur for a diagnosis to be made. This will depend on people's ability to access services, which itself is affected by a number of factors, including individual agency, systemic issues and supply of services.
2. A diagnosis can occur directly in a primary or community care setting, or it happens following a referral to secondary care and further tests.

Self-reported health

Self-reported health, however, depends on a different set of factors.

Individuals may report being in very good, good, average, bad, or very bad health depending on, for example:

- how they feel
- whether they are receiving treatment that's making them feel better
- whether they can perform their usual tasks
- the type of condition they might have
- whether their environment worsens or improves their symptoms, for example access to clean air
- whether they are able to mitigate their symptoms, for example by taking time off work
- their expectations of health at a given age
- whether they expect to recover, or to be in good health in the future.

If a person has good access to care and diagnostic services, illness can be diagnosed, treated and mitigated. This process in primary and secondary care determines our measures of diagnosed illness and the results we present in this analysis. In this report we are speaking in general about 'illness'. But the outcomes and experience of this illness will be influenced by a person's environment, their access to care and the type of condition they have. All these features may differ systematically between the most and least deprived areas.

The differences between these measures of health inequality could help us to understand the different experiences of illness between different groups. This would require a better understanding of the process that determines self-reported health and potentially better data linkage.

What are health inequalities projected to be in 2040?

Key findings

- On current trends the number of people with major illness is projected to increase between 2019 and 2040. Inequalities in major illness will persist, with the gap in major illness-free life expectancy between the 10% most and least deprived areas projected to remain at around 10 years.
- The proportion of the working-age population (people aged 20 to 69 years) living with major illness is projected to remain broadly unchanged (15.2% and 6.8% in the most and least deprived areas respectively).
- However, most of the growth in the working-age population is projected to be concentrated in more deprived areas. As a result, 80% of the increase in the number of working-age people living with major illness between 2019 and 2040 (from 3 million to 3.7 million) will be concentrated in the more deprived half of the country (deciles 1–5).
- The number of people with chronic pain, type 2 diabetes and anxiety and depression (key contributing conditions to health inequality) is projected to increase at a faster rate in the 10% most deprived areas.
- Declining smoking rates across the country are showing positive effects through a projected reduction in the proportion of people with coronary heart disease and stroke. The decrease is greater in the 10% most deprived areas, most likely because smoking rates are much higher in those areas in 2019.
- By contrast, obesity rates are growing, and from a higher 2019 level in the most deprived areas. This is where we see the largest prevalence and fastest growth in type 2 diabetes.

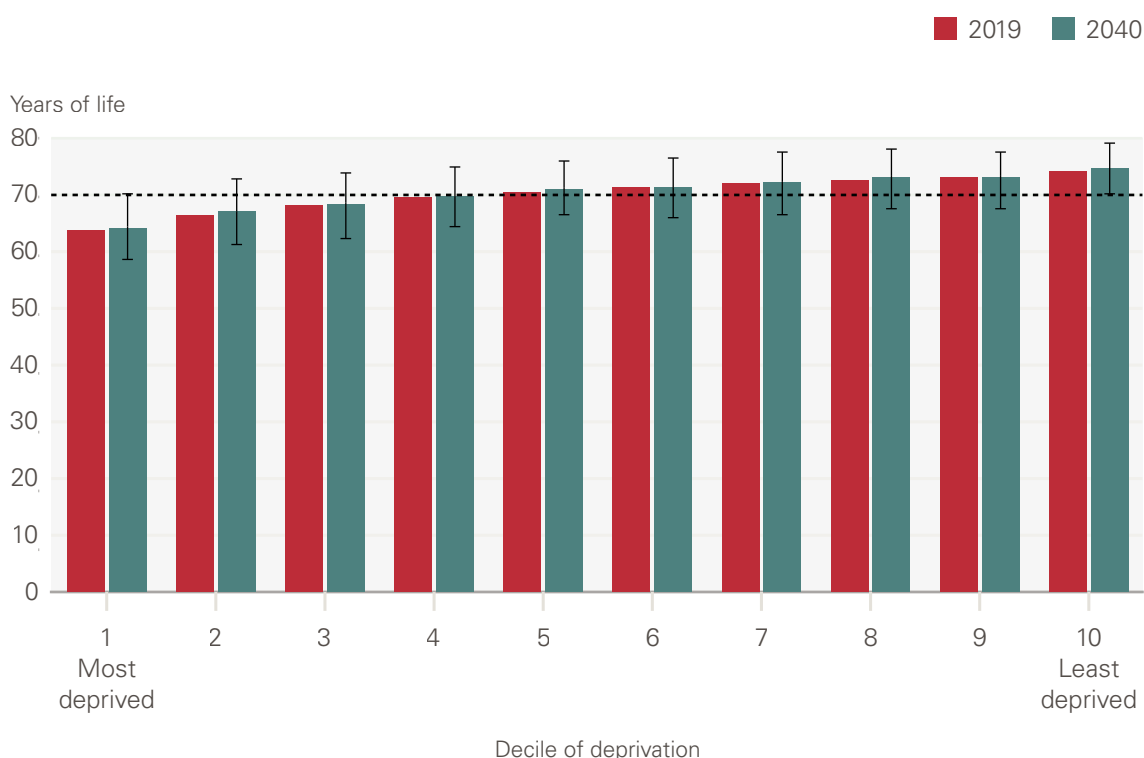
How will major illness-free life expectancy change?

Major illness-free life expectancy is expected to remain broadly unchanged for women and men over the next two decades. In 2019, on average people lived for 70.4 years without major illness, by 2040 this is projected to be 70.5 years.³ Building on this analysis, we project population change and rates of illness by level of deprivation using data on trends in health risk factors and current patterns of illness.

We have already seen that people in more deprived areas are much more likely to be living with major illness at a younger age. Figure 7 shows how many years people can expect to live without major illness in 2019 and 2040. It shows that in 2019, major illness-free life expectancy increases steadily as the level of deprivation falls and that this existing and significant deprivation gradient is projected to continue to 2040.

In Figure 1, we also saw that more working-age adults live with major illness in the 10% most deprived areas (14.6%), more than double the rate in the 10% least deprived areas (6.3%). This inequality is projected to remain broadly unchanged at 15.2% and 6.8% respectively in 2040.

Figure 7: Major illness-free life expectancy by decile of deprivation, 2019 and projected for 2040, England



Note: The capped bars represent uncertainty intervals. The dashed horizontal line is major illness-free life expectancy for England for 2019 and 2040 (it is unchanged during this period).

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

How will the number of people with major illness change by deprivation?

Based on current trends, our projections indicate that health inequality will remain stubbornly persistent. We project a 39% increase in the number of people living with major illness between 2019 and 2040.³ Most of this projected increase is not a result of people developing illness earlier in life but because of population growth and ageing (for more information on our calculations, see Technical appendix).²²

The Office for National Statistics projects the population in England to increase by 7.3 million people between 2019 and 2040.¹ Moreover, the share of people aged 70 years and older is projected to increase by 44%, more than five times the growth projected in the population aged younger than 70 years (8%). However, the distribution of the current population and the projected population change is not uniform across different geographies and levels of deprivation in England.* In addition, the ONS projects that a large proportion of the population growth over the next 15 years will be due to international migration.[†] International migrants are largely made up of people of working age. Moreover, people of working age, irrespective of immigration status, are more likely to be living in more deprived areas. Therefore, growth in the working-age population in England is projected to be concentrated in the more deprived areas: in the more deprived half (deciles 1–5) of England, the population aged 20–69 years is projected to grow by 3.2 million. In the less deprived half (deciles 6–10) of England the population that age is projected to grow by 800,000.

Figure 8 shows the combined effect of population growth and rates of major illness, showing the change in the number of people with and without major illness by decile of deprivation.

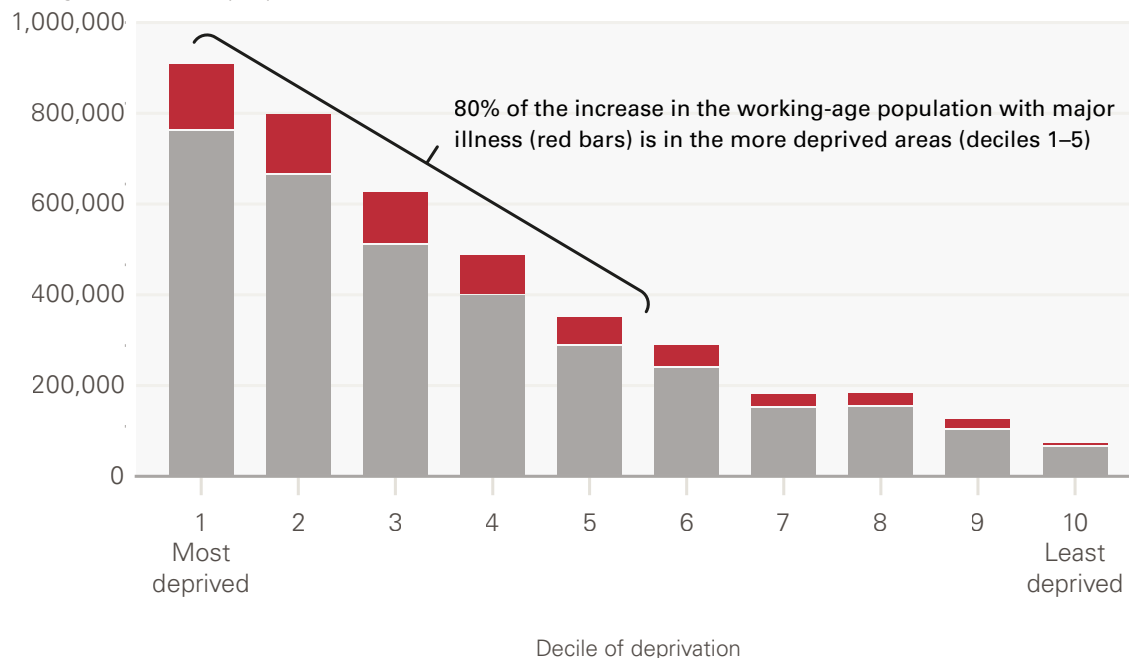
* The model projections are tied to ONS projections of the population in England at a local authority level from 2018. We then assume that, within each local authority, the proportions of each Lower Layer Super Output Area (LSOA – the level at which IMD deciles are assigned) stays constant.

† The ONS projects that international migration will make up more than 90% of the population growth in the UK between 2021 and 2036.

Figure 8: Projected change in the number of people aged 20–69 years and aged 70 years and older with and without major illness between 2019 and 2040, by decile of deprivation, England

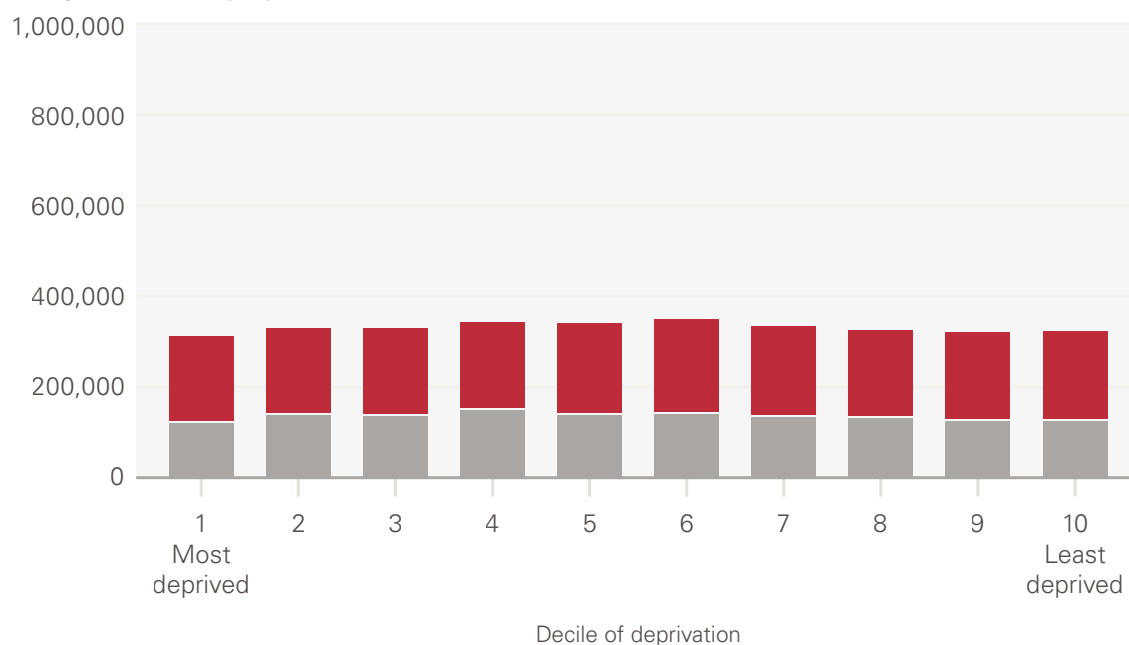
20–69 years People without major illness People with major illness

Change in number of people between 2019 and 2040



70 years and older

Change in number of people between 2019 and 2040



Note: The total length of the bars shows the projected population change by decile of deprivation. This relies on ONS projections that do not offer uncertainty intervals.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

The overall number of people of working age living with major illness in England is projected to increase from 3 million to 3.7 million people between 2019 and 2040. Similar to the pattern for working-age population growth overall, the growth in the working-age population with major illness will also be concentrated in more deprived areas. On current trends 80% (540,000 people) of this increase will be people living in the more deprived half of England (deciles 1 to 5). In the less deprived half (deciles 6 to 10), the number of people of working age living with major illness is projected to increase by 130,000. But this increase in working-age people with major illness (540,000) is only 17% of the total increase in the working-age population.

In contrast to working-age trends, the increase in the number of people with major illness aged 70 years and older is projected to be evenly distributed across all deciles of deprivation. As we showed in *Health in 2040*, most of the increase in the number of people living with major illness is in this age group.³ In 2019 there were 3.6 million people aged 70 years and older living with major illness; by 2040 this is projected to increase to 5.5 million (1.9 million more people).

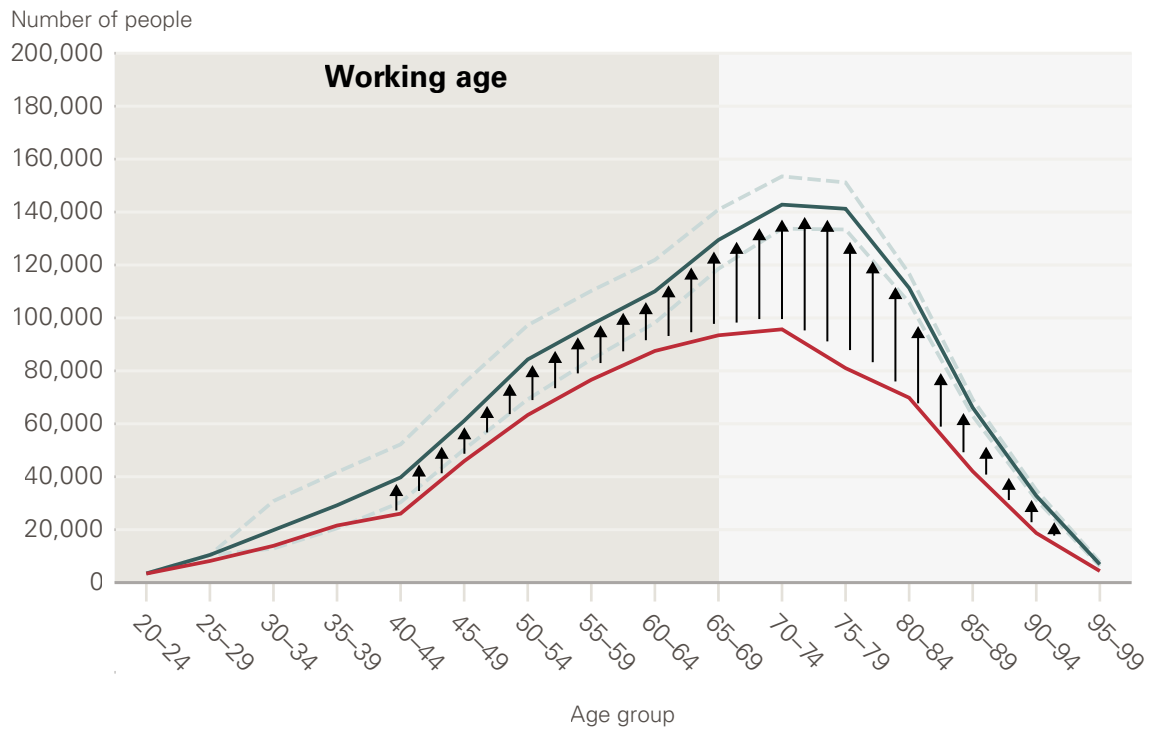
In Figure 9, we show the estimated (in 2019) and projected (in 2040) total numbers of people with major illness for the 10% most and least deprived areas. There is a larger projected increase in the number of people living with major illness at all adult ages: 330,000 in the most deprived areas, compared with 200,000 in the least deprived areas.

In Figure 1 we showed that from ages 30–69 years people in the most deprived areas are at least twice as likely to be living with major illness than those in the least deprived areas. As a result, we see many more people of working age living with major illness in the most deprived areas in 2019.

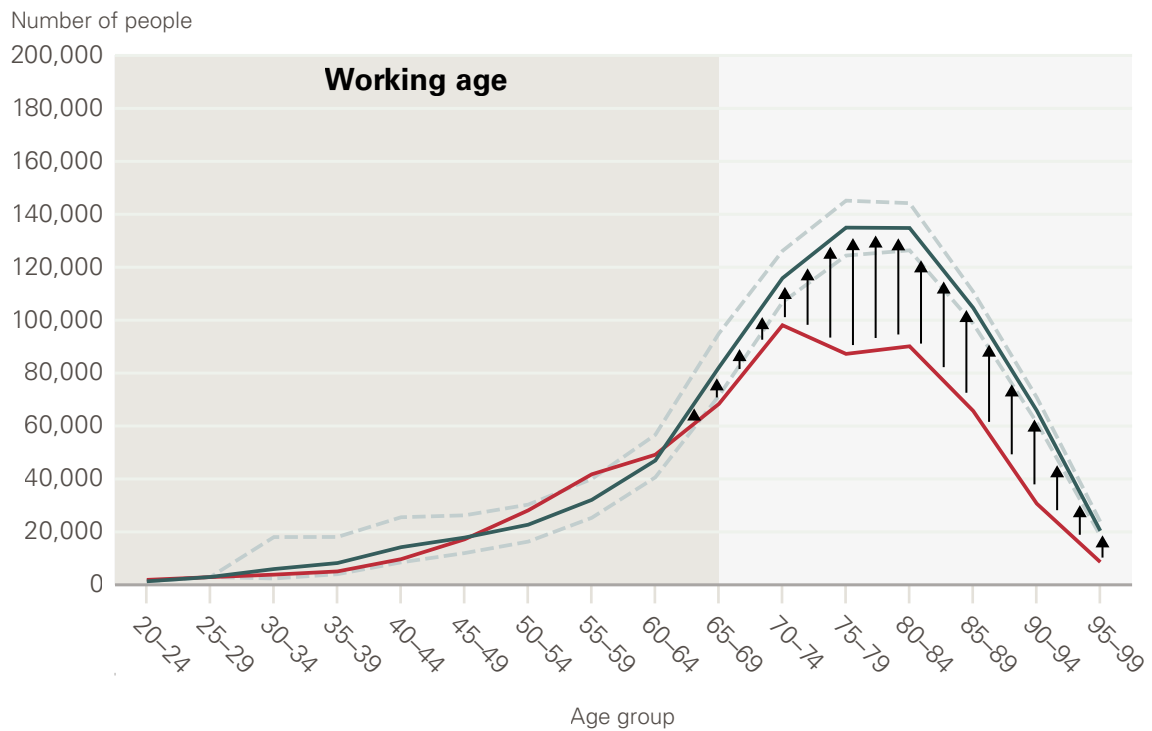
Figure 9: Number of people with major illness by age, 2019 and projected for 2040, 10% most and least deprived areas, England

10% most deprived areas

— 2019 — 2040



10% least deprived areas



Note: The dashed lines represent uncertainty intervals.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

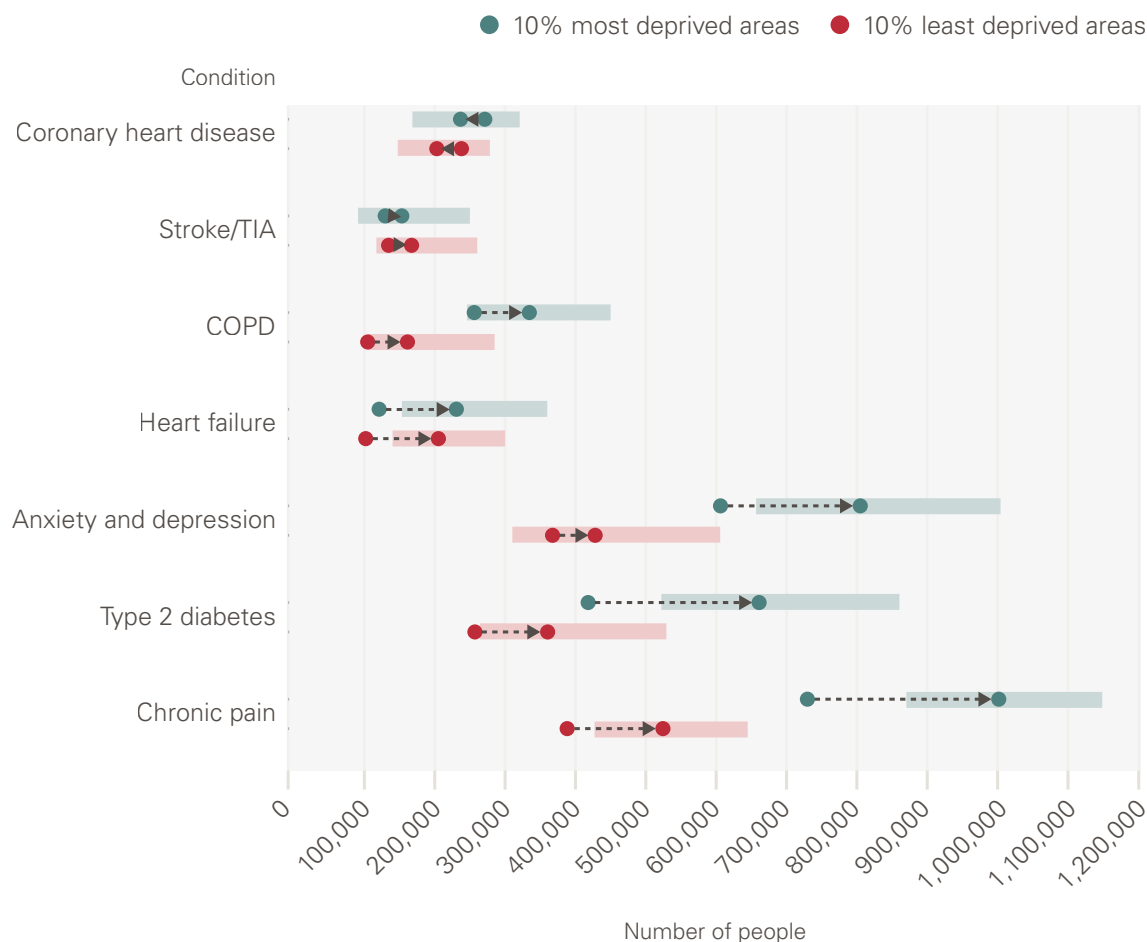
In the most deprived areas, the increase in the number of people living with major illness is more evenly distributed among the adult population, with 43% of the increase projected to occur below the age of 70, compared with 3% in the least deprived areas. This is driven by the higher proportion of people living with major illness in those ages and the projected population growth in those ages.

Among those aged 90 years and older, just 5% of the increase in major illness in the most deprived areas is projected to occur among people of this age group compared with 23% in the least deprived areas. As in Figure 1, this is because many of the people with the poorest health in the most deprived areas have already died by this age.

How will the conditions that contribute to health inequality change when population change is included?

The increase in the number of people living with major illness is not equally distributed and, as discussed in Chapter 2, the conditions people develop differ by deprivation. Our projections show how the number of people with specific conditions is projected to increase by level of deprivation. Figure 10 shows the number of cases for the key contributing conditions to health inequality and how this is projected to change between 2019 and 2040 in the 10% most and least deprived areas.

Figure 10: Projected change in the number of people living with a specific diagnosed condition between 2019 and 2040, 10% most and least deprived areas, England



Note: The shaded bars represent uncertainty intervals. TIA is transient ischaemic attack and COPD is chronic obstructive pulmonary disease.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

The chart shows the conditions that contribute the most to health inequality. Of these, chronic pain, anxiety and depression and type 2 diabetes are projected to affect the greatest number of people in 2040 across both the most and least deprived areas (similar to 2019). The number of cases of these will increase fastest in the most deprived areas. This is because population growth is higher in the most deprived areas in people aged 20–69 years and these conditions are more common in these age groups.

Between 2019 and 2040, in the most deprived areas we project 270,000 (or 37%) more people living with chronic pain, 240,000 (or 58%) more people with type 2 diabetes and 200,000 (or 33%) more people living with anxiety and depression. The corresponding numbers for the least deprived areas are 140,000 (or 35%) more people diagnosed with chronic pain, 100,000 (or 40%) more for type 2 diabetes and around 60,000 (or 16%) more for anxiety and depression.

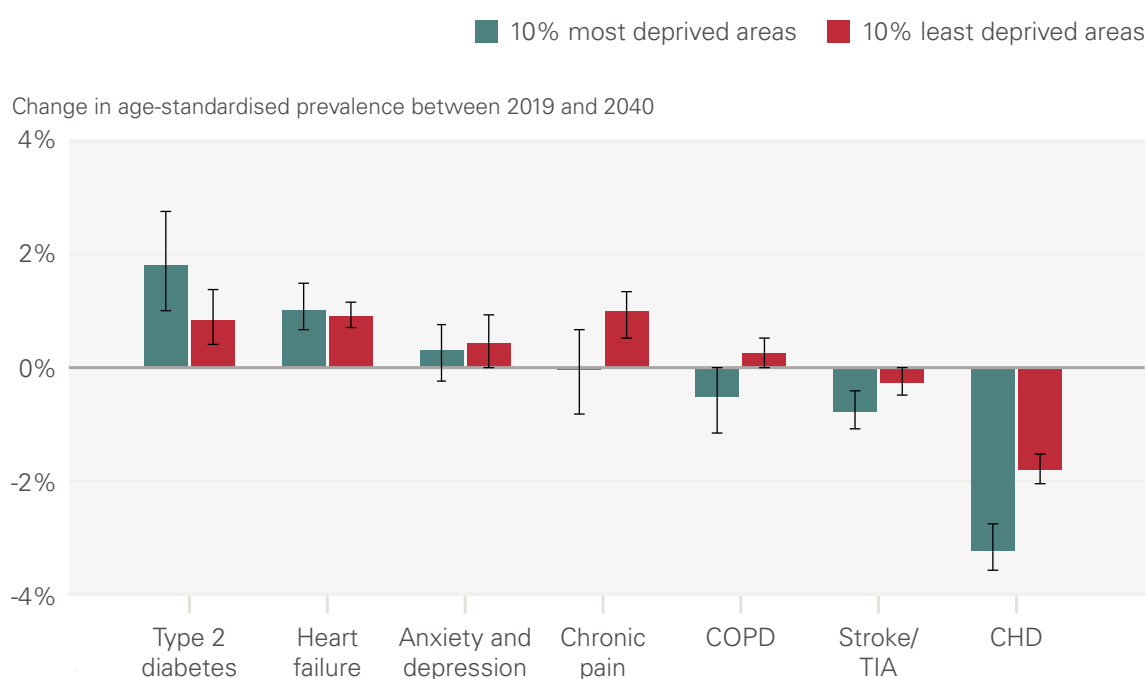
How will the prevalence of conditions change if we exclude the effect of population change?

The majority of the projected increase in the number of people living with major illness and specific conditions is due to population ageing as presented in Figures 8, 9 and 10. Trends in the prevalence (share) of individual conditions when we exclude the effect of population ageing are much smaller and linked to changes in incidence rates (new cases). This is due in part to the relationship between incidence of specific conditions and their exposure to key risk factors such as smoking and obesity. Here we explore how projected trends in risk factors affect projected trends in the prevalence of conditions.

Figure 11 shows the projected change in the share of the population living with each condition after taking into account changes in population size and structure. This is to understand whether there are changes to the prevalence of conditions at a given age.

In the context of the prevalence and inequality in 2019 presented in Figure 2, the projected changes to 2040 are relatively small. They exhibit a slight widening of inequality for type 2 diabetes and a narrowing for CHD. The drivers of trends in individual conditions, and how they are modelled in this research, are set out in detail in *Health in 2040* and the associated technical appendices.^{3,22,32}

Figure 11: Change in age-standardised prevalence for the key contributing conditions to health inequality, 10% most and least deprived areas, England, 2019 to 2040



Note: Capped bars represent confidence intervals. COPD is chronic obstructive pulmonary disease; TIA is transient ischaemic attack and CHD is coronary heart disease.

Source: Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool.

The chart shows that by 2040, the prevalence of coronary heart disease (CHD) and stroke is projected to decrease across England, with a larger reduction in the 10% most deprived areas. The key driver of this is the reduction in smoking and better management of systolic blood pressure especially in the most deprived areas.^{33,34} We also project the age-standardised prevalence of COPD, a condition also related to smoking, to fall in the most deprived areas (although it increases in the least deprived areas).

These improvements are not replicated in the other conditions, notably in type 2 diabetes. People in more deprived areas have a higher risk of obesity, which is associated with a significant increase in the risk of type 2 diabetes.^{35,36} We project obesity to increase in England.³ As a result, there will be a projected increase in type 2 diabetes across the country and a larger increase in the most deprived areas.

In the case of chronic pain, age-standardised prevalence is projected to increase slightly across the country, but at a faster rate in the 10% least deprived areas. This is technically a slight reduction in inequality but is caused by more illness in less deprived areas, which is not a good outcome. Chronic pain is strongly linked to age and the presence of other coexisting conditions.²²

As we saw in Figure 3, chronic pain and anxiety and depression affect large shares of the working-age population. It is also worth noting that in 2019 each of these conditions had an age-standardised prevalence at least 1.5 times greater in the 10% most deprived areas compared with the least (see also Figure 2). Given the scale of existing inequality in 2019, these projected changes up to 2040 are very small.

Summary, implications and conclusion

Summary

In this report we present evidence of the extent of health inequality in England in 2019 and how this could change by 2040, based on current trends. This is based on estimates of future population growth, the prevalence of risk factors that lead to long-term illness and current trends in diagnosed illness. There is projected to be significant growth in the number of people living with major illness and this is largely due to the projected change in the size and age structure of the population. In 2019 there were 3.6 million people aged 70 years and older living with diagnosed major illness; by 2040 this is projected to increase to 5.5 million.

In addition to well-known inequalities in life expectancy, there are significant inequalities in the age at which people can expect to be diagnosed with major illness. Our findings are particularly stark for people of working age. We find that in the 10% most deprived areas of England, almost 15% of people aged 20–69 years were living with major illness in 2019, more than double the rate in the 10% least deprived areas (6.3%). Health inequality gets wider as people age: 10% of people in the most deprived areas of England have diagnosed major illness in their 40s in 2019 rising to 38% of people in their 60s. This compares with 4% of people in the least deprived areas who had major illness in their 40s, rising to 18% in their 60s.

These existing inequalities are projected to persist up to 2040. The gap in major illness-free life expectancy between the 10% most and least deprived areas will remain static at around 10 years. Over the same period, the number of people aged 20–69 years is projected to grow by 11%, with around 1 in 10 of them living with major illness. With population change, 80% of the increase in working-age ill health is expected to be in the more deprived half of England (deciles 1–5). This will perpetuate existing limits to labour participation and economic growth in these areas.

Implications

The current state of health inequality in England, and the prospect it will persist makes for sobering reading. In addition to the implications for people's quality of life, the growing health needs of a population living longer will present challenges for our ability to fund and deliver care: the number of people with major illness is projected to grow by 39%, three and a half times faster than the growth in the working-age population (11%).³

A small group of long-term conditions contribute to most of the health inequality, some of which can be linked to inequality in exposure to known risk factors, but others cannot be so easily explained. These health inequalities are also stubborn and government efforts to reduce them so far have been found wanting. Our report points to the need for cross-government action to ensure everyone has access to the building blocks of good health³⁷ as a means of reducing health inequality, improving economic activity and relieving pressure on health and care services.

Increasing economic prosperity requires a productive working-age population and better health is key to achieving that objective. As of January 2024, 2.7 million working-age people were out of the workforce – neither working nor seeking work – due to a long-term health condition or disability.³⁸ The rise in working-age ill health risks further exacerbating economic inequality because, as this report shows, the majority of the increase in major illness in that age group will be among people living in the more deprived areas.

National policy implications

Government action will need to include policies at a population level, particularly to address the biggest risk factors that shape health outcomes – smoking, alcohol use, poor diet and physical inactivity – including bolder use of tax and regulation, and a focus on addressing the commercial determinants of health (the pricing and advertising of food and drink known to cause obesity, for example). Where governments take bold and decisive action to improve public health, there are some promising signs in improved health outcomes. For example a reduction in illnesses linked to smoking following the UK government's adoption of a range of policies, information campaigns and support services to discourage and limit smoking over the past decades.³⁹ On the other hand, over the past 30 years, rates of obesity in adults and children have grown and are projected to continue growing: obesity is both an impediment to improving health and a key feature and driver of health inequality.

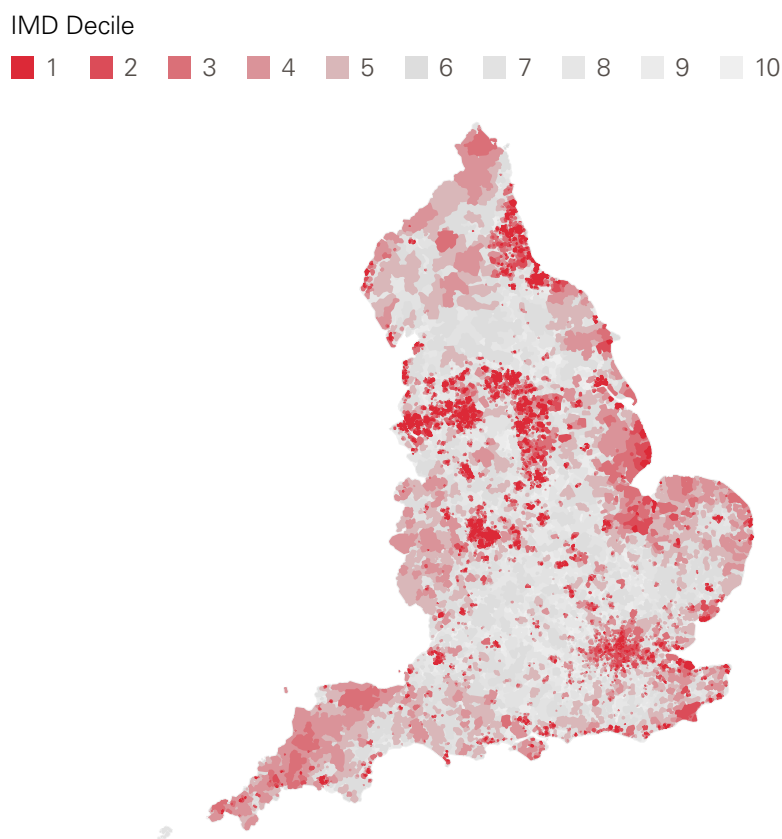
The circumstances in which we live have a greater role in shaping our health. Much of the growth in major illness and inequality is not explained by the major, modifiable risk factors, ie smoking, diet, alcohol use, physical activity, cholesterol, blood pressure and obesity. Government action will need a concerted focus on the wider determinants of health. The number of people living in the most deprived areas who are diagnosed with anxiety and depression and chronic pain is projected to increase by 33% and 37% respectively over the next 20 years. These trends are not directly explained by the leading modifiable risk factors in our model. This points to a wider set of factors at play, such as poverty, quality of work and housing. Addressing these wider issues is complex but will need to include longer term national and regional policies to boost the economy, and social and cultural capital. This requires investment in the wider public services that influence health, including education, housing, crime, public health and preventive health.

Existing inequality in diagnosed illness is both wide and entrenched. Healthier lives through prevention and improving the wider determinants of health will take time to bear fruit. In the meantime, the health system must work to limit the negative impacts of illness for those with the greatest need. This will require investment in health and care services in the right parts of the country and the right service areas. Chronic pain, type 2 diabetes and anxiety and depression, our largest projected growing conditions, are all largely managed in primary care which will need significant investment. We know that primary care in more deprived areas has fewer GPs according to health need,²⁵ and this imbalance needs to be corrected. Ensuring a resilient health and care system will prepare policymakers to meet this growth in demand with effective, quality services.

Regional policy implications

Areas of high deprivation can be found all over the country, in rural, urban and coastal areas, as shown in Figure 12. Areas of high deprivation are shown as dark purple, indicating that these areas are often clustered together geographically. This is particularly true in coastal areas in the East Midlands, Kent and the South West, the North East, the metropolitan areas in London, Birmingham and the North West.

Figure 12: Distribution of the deciles of the Index of Multiple Deprivation (IMD) by Lower Layer Super Output Areas (LSOA) in England, 2015*



Source: Lower Super Output Area assigned decile of the Index of Multiple Deprivation, mapped using Tableau.

* Our data uses IMD2015 deciles.

These groups of areas have dramatically different economic and employment opportunities for people of working age, education attainment and access to higher education.^{40,41} This inequality can also be seen at the regional level, where differences in the economic opportunities and industrial development in the past has led to different infrastructure, skills and opportunities for the people living there now.

Policies to address the underlying socioeconomic inequality in England should take into account the need to improve health both to better people's wellbeing and as a means to improving prosperity, and policies to address inequalities in health should take into account action on socioeconomic inequality.

Conclusion

This report uses new analysis to demonstrate how people living in more deprived areas are diagnosed with life-limiting, long-term conditions earlier and die younger. It adds to existing evidence by projecting patterns of major illness and their impact on health inequalities. It clearly shows that on current trends health inequality is not narrowing but stubbornly persistent.

This has important implications for the life chances of people in more deprived areas. But it also has implications for the wider economy, in terms of employment and productivity. There is no doubt that public finances are going to be tight over the next decade. The detail that we provide here should be used to focus preventive health policy and investment on good health and wellbeing.

Improving long-term economic growth and prosperity will require a redoubling of efforts to improve the health of the working-age population. In the medium term reducing ill health in people of working-ages will be vital for the sustainability of good-quality, affordable health and care services. This means a greater focus on the health of working-age people in more deprived areas, which is projected to have the highest increase in ill health.

Good health is an asset to society. The health inequality we describe in this report need not exist. The healthier, longer lives of people in more affluent areas proves this. As in the past, we continue to limit both the lives of those in more deprived areas and the country's assets through avoidable and preventable ill health. If we focused on health inequality, it would bring benefits to all, not only those living in more deprived areas. This report adds to the evidence that tackling health inequality cannot wait until we have economic prosperity; it is one of the key areas of national and local policy focus on which prosperity depends.

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It doesn't have to be like this. Our mission is to help build a healthier UK by:

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- supporting radical innovation and improvement in health and care services
- providing evidence and analysis to improve health and care policy.

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