British Heart Foundation

# Socioeconomic inequalities in heart and circulatory diseases in England: an analysis

January 2025

## Key Findings

- Health inequalities are a critical priority for the BHF and for the NHS, particularly considering the disparities highlighted by the pandemic. The unfair differences in cardiovascular risk and outcomes are not inevitable. Too often, they are framed as biological or genetic destiny, when we know they are rooted in the systemic inequalities in society and our health and care systems. As part of the BHF's Equality, Diversity and Inclusion strategy, we are committed to better understanding the inequalities that we know exist, so we can make informed decisions and improve our efforts to close the gaps.

- In 2022, we published a report which analysed health inequalities relating to deprivation in England across the cardiovascular disease (CVD) pathway.[1] This report found evidence of significant inequalities across the CVD pathway, consistently to the detriment of the most deprived parts of England. Subsequent reports have examined the same topic in the context of Scotland, Wales, and Northern Ireland.

- Now, in light of two more years of data on CVD in England, including measures of CVD that were not available to us in 2022, particularly age-standardised primary care audit data from CVDPREVENT, we have decided to update our England report. We analysed data on CVD and its risk factors in England from a number of sources, including: the NHS, Office for Health Improvement and Disparities (OHID), and Office for National Statistics (ONS).

### What we found

- When compared to the least deprived areas, the most deprived areas have:
    - Higher rates of smoking, living with obesity or excess weight, and physical inactivity, as well as higher prevalence of high blood pressure and diabetes
    - Higher hospital admissions rates for several cardiovascular diseases
    - Lower confidence amongst patients in their ability to manage their long-term condition(s)
    - Lower uptake of cardiac rehabilitation in more deprived areas
    - Higher death rates from cardiovascular diseases (twice as high for under 75s)

[1] British Heart Foundation. (2022) How inequalities contribute to heart and circulatory diseases

# Introduction

An estimated 6.4 million people are living with cardiovascular diseases in England today. Many millions more have risk factors for these conditions, such as high blood pressure, raised cholesterol, obesity, and type 2 diabetes. Although deaths from cardiovascular diseases declined in the decades leading to the Covid-19 pandemic, since 2019 we have seen increases in both all-age and premature (under-75) death rates. Furthermore, cardiovascular diseases still cause over a quarter (26 per cent) of all deaths in England and remain the leading cause of death globally. [2]

What's more is that cardiovascular diseases are strongly associated with health inequalities, contributing to between one fifth and one quarter of the life expectancy gap between the most and least deprived quintiles in men and women (Figure 1).

There are differences between different population groups in the prevalence, treatment and outcomes of cardiovascular diseases and their risk factors. This is because cardiovascular health is deeply connected to and affected by wider determinants of health. In other words, the disparities seen among people with cardiovascular diseases are driven by factors such as income, housing, education, the environment, and access to health and social care. On average, people in more deprived areas develop multiple conditions 10-15 years earlier than in more affluent ones. They are also more likely to develop multiple conditions in the first place – 28% of people in the most deprived areas have four or more health conditions, compared to 16% in the most affluent. [3]

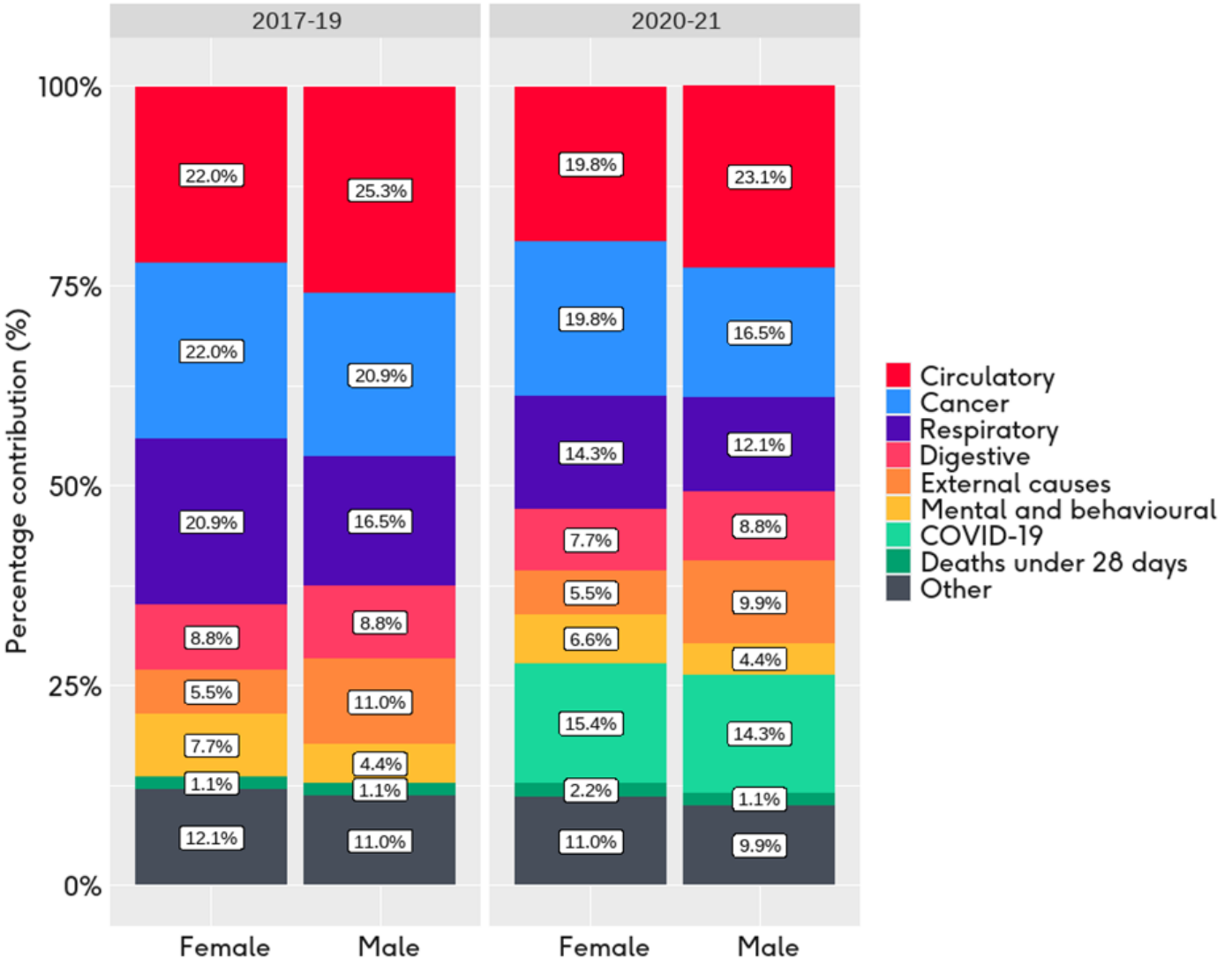
Health inequalities encompass differences in health status, healthcare, and health-related risks between different population groups that are unfair and avoidable. They include:

- Health-related risks: e.g. some people may find it harder to access healthy foods than others.
- Healthcare: e.g. some people may find it harder to access healthcare services than others.
- Health status: e.g. some people may have a shorter life expectancy than others.

The coronavirus pandemic highlighted, and in many cases worsened, health inequalities across the country. This analysis examines the trends of inequalities in cardiovascular disease pre and post pandemic at multiple points on the patient pathway, focusing on risk factors; morbidity; hospital admissions; treatment and management of CVD conditions; and mortality. As with our original report on this topic, this subsequent report provides a holistic view of health inequalities by deprivation across the CVD pathway, giving additional insight into not only where improvement is needed, but also indications of where there are data gaps and opportunities for further analysis.

[2] British Heart Foundation Statistics. (2024) Global Factsheet
[3] The Richmond Group, Health Foundation. (2019) The Multiple Conditions Guidebook.

Figure 1. Life expectancy gap breakdown between the most deprived quintile and least deprived quintiles in England, by cause of death, 2017-2019 and 2020-2021




Source: Office for Health Improvement and Disparities based on ONS death registration data (provisional for 2021) and 2020 mid-year population estimates, and Department for Levelling Up, Housing and Communities Index of Multiple Deprivation, 2019, Breakdown of the life expectancy gap.

# Methods

The Index of Multiple Deprivation (IMD) is an indication of inequality by geography. It is the official measure of relative deprivation in England. We chose to use IMD as it is a well-recognised, validated measure of deprivation that incorporates many of the wider determinants discussed above and is not limited to a simple 'rich – poor' income-based dimension.

The IMD scores measure *relative* deprivation in small areas, called Lower Super Output Areas (LSOAs) in England. This small area data can be aggregated to assign deprivation scores and rankings to larger geographies, including political geographies like local authorities, or health-related geographies like integrated care boards (ICBs) or clinical commissioning groups (CCG). Crucially, they also enable us to divide England into deciles (ten groups) or quintiles (five groups), based on deprivation.[4] This is commonly done by ranking lower tier local authorities (districts), or upper tier local authorities (counties), from most to least deprived, and then dividing these into ten categories (deciles) or five categories (quintiles) containing roughly equal numbers of local authorities. However, deciles and quintiles can also be calculated from LSOAs, to better account for deprivation *within* smaller geographies, like local authorities.

Finally, it is important to reiterate that IMD is a measure of inequality by geography, and that subsequently deprivation levels do not apply to every individual living in an area. Disparities exist within many communities across England, even at postcode level.

[4] Office for Health Improvement and Disparities. (2024) Technical Guide - Assigning Deprivation Categories.

# Results

## Prevention: risk factors for heart and circulatory diseases

Cardiovascular health is determined in part by a range of modifiable factors. In the UK, around 70% of the cardiovascular disease burden can be attributed to modifiable risk factors, such as diet, smoking status, and medically manageable risk factors like high blood pressure.[5] These factors are often influenced by access to health and care services and the social, physical, and economic environments in which people live. This has an impact on people's choices, behaviours, and exposure to risk.

### Hypertension

High blood pressure is the leading modifiable risk factor for heart and circulatory disease in England.[6] An estimated 30 per cent of adults in England have high blood pressure and many are not receiving effective treatment.[7] Around 50% of heart attacks and strokes are associated with high blood pressure.[8]

The following chart (Figure 2) shows age-standardised hypertension prevalence in England by deprivation quintile (data as of June 2024). It displays data from CVDPREVENT, a national audit of GP records with data for the major cardiovascular diseases and a selection of their medical risk factors.

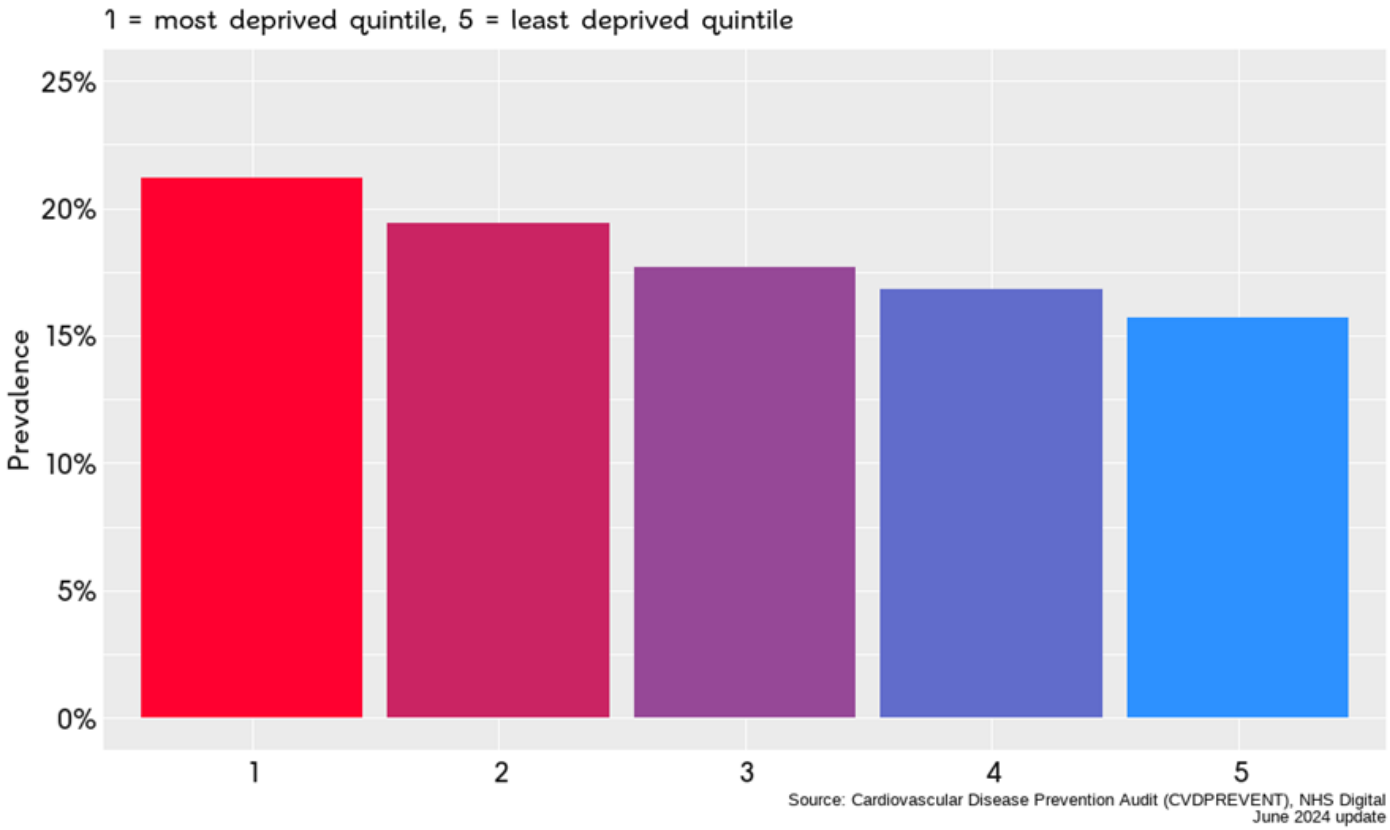
When accounting for differences in age, there is a clear association between deprivation and hypertension prevalence. The most deprived decile has an age-standardised prevalence of 21.2%, whilst the least deprived decile has a prevalence of 15.7%. This is a difference of 5.5 percentage points.

When the previous edition of this report was written, age-standardised prevalence data for hypertension was not publicly available. Instead, we reported on GP-diagnosed prevalence (using data from the Quality and Outcomes Framework), which showed only a 0.1 percentage point gap in diagnosed prevalence between the most and least deprived deciles in England in 2019/20. The latest QOF hypertension prevalence data is contained in the Appendix A.

The difference between these two measures of prevalence highlights the importance of also having access to age-standardised prevalence data.

[5] Global Burden of Disease. (2024) Estimates for 2021.
[6] Global Burden of Disease. (2024) Mortality burden estimate 2021 for England
[7] British Heart Foundation Statistics. (2024) England Factsheet
[8] Global Burden of Disease. (2024) Risk burden estimate 2021 for England

Figure 2. Age-standardised hypertension prevalence, by IMD quintile



Cholesterol

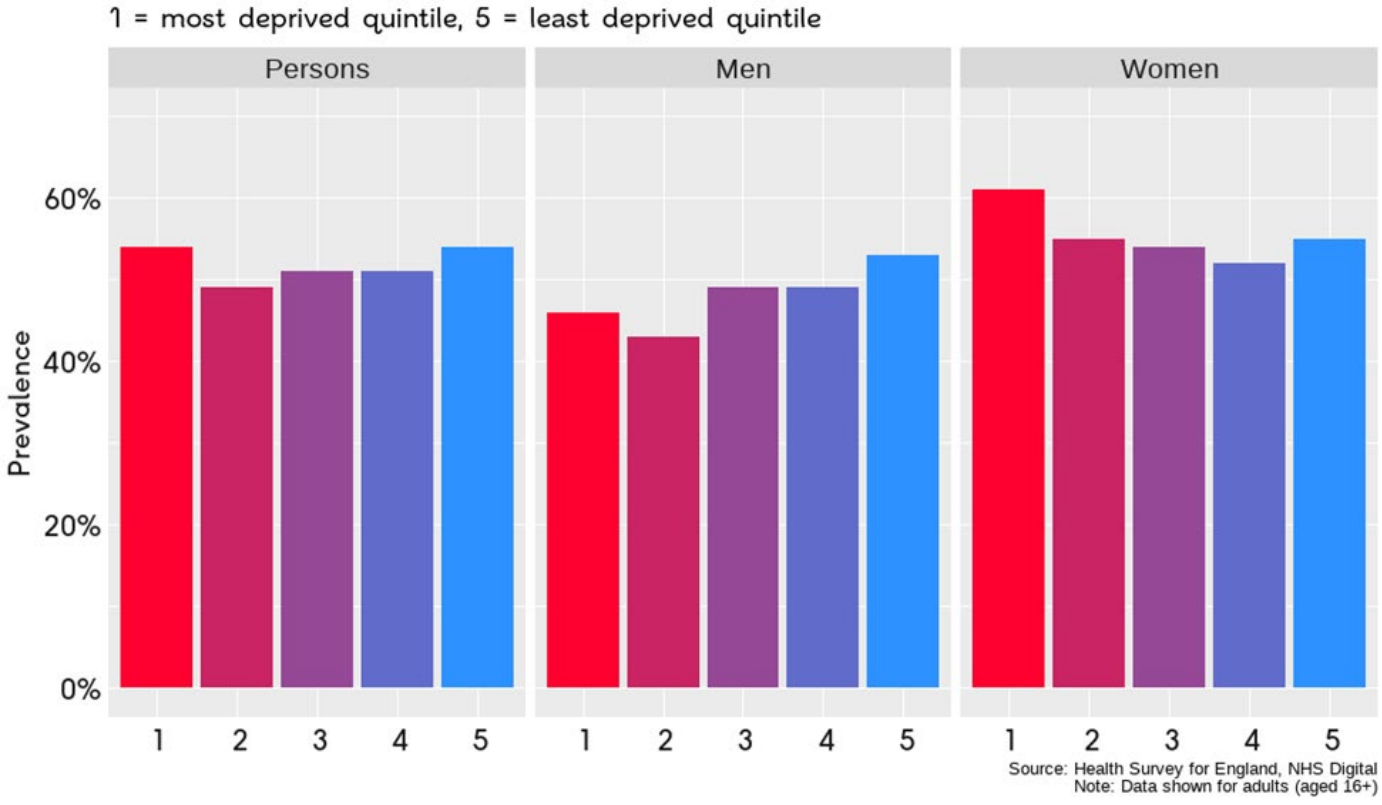
High blood cholesterol is a significant risk factor for developing heart and circulatory diseases – it's estimated that more than half (53 per cent) of adults in England have cholesterol levels above national guidelines (above 5mmol/L).[9]

NHS England commission the Health Survey for England to monitor general health and health behaviour across the country. As part of this survey, participants have a blood sample taken, and cholesterol levels (amongst other indicators) are measured.

As visualised in Figure 3, data for 2022 showed that the most and least deprived areas have the highest age-standardised prevalence of raised total cholesterol (54%). However, this 'U-shaped' association is not apparent when raised cholesterol prevalence data are stratified by gender.

Indeed, amongst men, the age-standardised prevalence of raised total cholesterol was highest amongst people in the *least* deprived areas of England. Conversely, amongst women, the prevalence of raised total cholesterol was highest in the *most* deprived areas. The reasons for this are unclear, but these findings highlight the value of considering how other factors can impact the association between deprivation and CVD (including its major risk factors).

Figure 3. Age-standardised prevalence of raised cholesterol in England in 2022, by IMD quintile




[9] British Heart Foundation. (2024) BHF analysis of Health Survey for England 2022

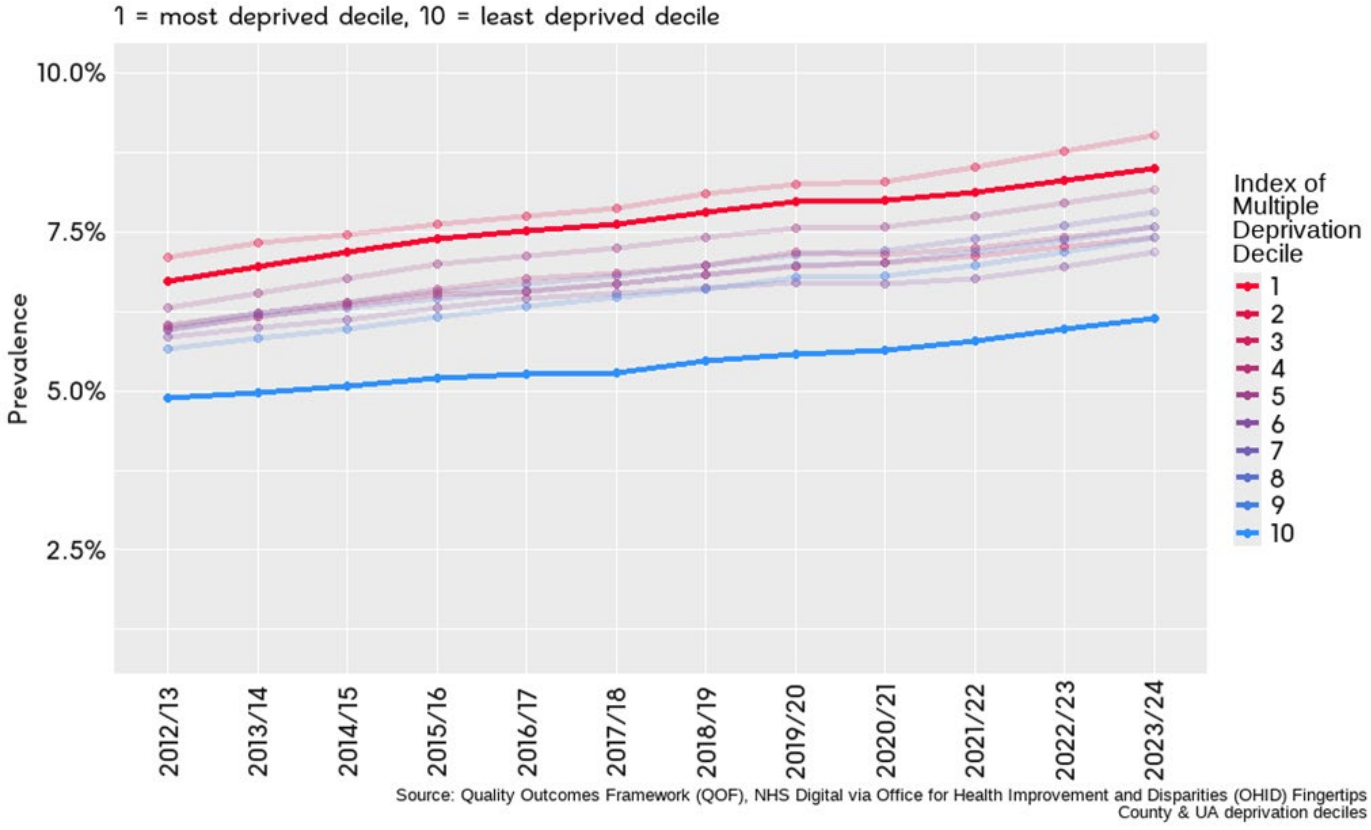
## Diabetes

Diabetes is a condition in which blood sugar levels are elevated over a prolonged period of time. This results in damage to the inner lining of blood vessels. Consequently, diabetes is a significant risk factor for heart and circulatory diseases.

Around 3.9 million adults in England have been diagnosed with diabetes. It's estimated that as many as one million people in England are living with undiagnosed type 2 diabetes.[10] Adults with diabetes are 2-3 times more likely to develop CVD and are nearly twice as likely to die from heart disease or stroke as those without diabetes.[11, 12] In England, one third of adults with diabetes die from a heart or circulatory disease.[13]

The percentage of people living with diabetes has increased across all deciles since 2012/13, with the second most deprived decile (2) having the highest prevalence of diabetes (Figure 4). Despite the consistent increase in all areas, there is around a 2.4 percentage point gap in prevalence between the most and least deprived deciles (8.5% and 6.1%, respectively, in 2023/24).

Figure 4. Diabetes prevalence in England, by IMD decile, 2012/13 to 2023/24




[10] Diabetes UK. (2024) 30% of people living with type 2 diabetes in England are undiagnosed, ONS analysis shows
[11] The Lancet. (2010) Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies
[12] Laakso M. (2010) Cardiovascular disease in type 2 diabetes from population to man to mechanisms: the Kelly West Award Lecture 2008. Diabetes Care
[13] NHS Digital. (2019) National Diabetes Audit - Report 2 Complications and Mortality, 2017-18

## Smoking

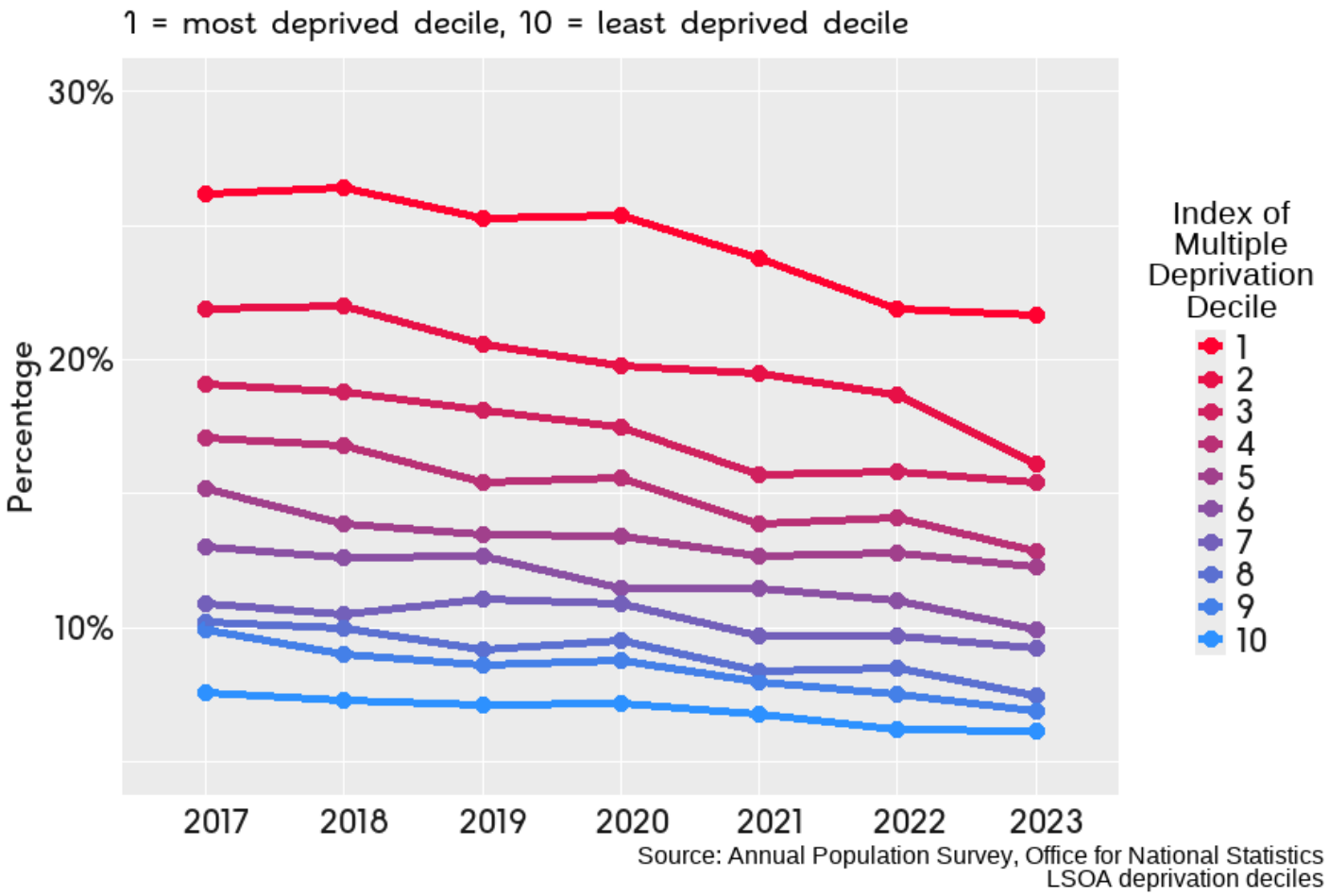
Smoking can lead to a heart attack or stroke. It is estimated that at least 12,000 deaths from cardiovascular diseases in England each year can be attributed to smoking.[14]

The Office for Health Improvement and Disparities (OHID) publish analysis of smoking prevalence, by deprivation, based on data from the Annual Population Survey. However, unlike most data presented in this report, the deprivation deciles used for this dataset are compiled based on stratifying lower super output areas (LSOAs) into deciles, rather than local authorities. This gives a more accurate view of the true association between deprivation and—in this case—smoking. But it does mean this measure of smoking prevalence by deprivation cannot be compared as fairly to other indicators in this report.

As shown in Figure 5, smoking prevalence is higher in more deprived areas. In 2023, 22% of adults in the most deprived decile smoked, compared with only 6% in the least deprived decile – a gap of 16-percentage points. Likewise, whilst smoking prevalence has declined from 2017 to 2023 across all deprivation deciles, a significant gap in prevalence between the most deprived to least deprived areas has remained.

[14] Office for Health Improvement and Disparities. (2021) Local Tobacco Profiles – CVD deaths are an aggregate of heart disease and stroke 2017 to 2019 (36k over three years)

Figure 5. Adult (18+) smoking prevalence in England, by IMD decile, 2017 to 2023



## Overweight and obesity

Having a body mass index (BMI) classed as overweight or obese increases the risk of developing cardiovascular disease.[15,16] An estimated 29% of adults in England are living with obesity, and, in addition, over 35% have a body mass index defined as overweight.[17] Breaking this down by deprivation, the most deprived decile has consistently had the highest proportion of adults classified as overweight or obese from 2015/16 to 2022/23 (Figure 6).

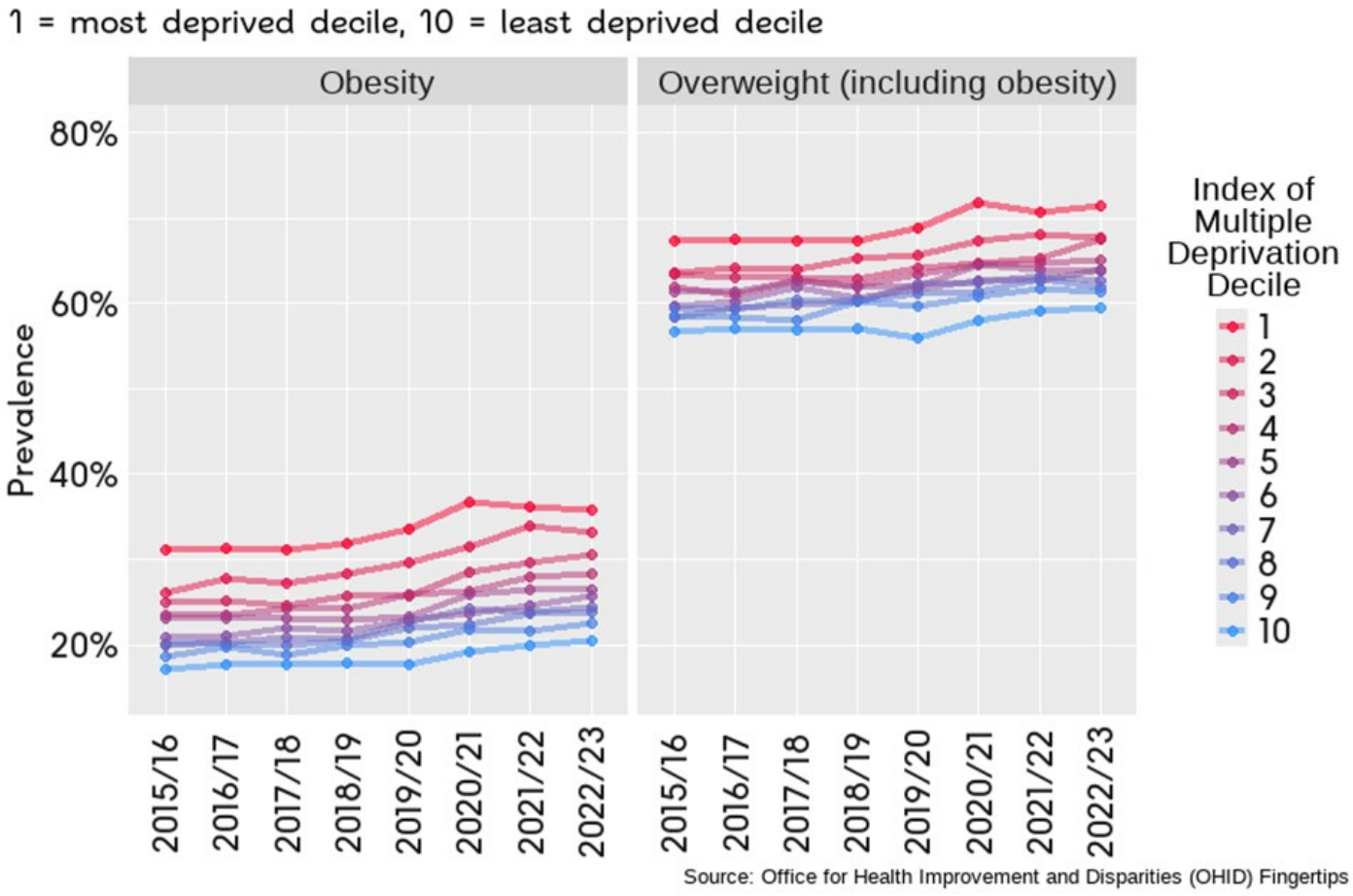
The overall trend of adults who are classified as overweight or obese decreased in 2021/22 in the most deprived decile, but prevalence continued to rise across most deciles for the same period. The gap between the most deprived and least deprived areas has largely remained the same in recent years, aside from 2020/21 to 2021/22, when the gap slightly narrowed. Data for 2022/23 show a difference in overweight or obesity prevalence of around 12 percentage points between the most and least deprived deciles (72% versus 60%, respectively).

[15] Roux et al. (2021) Obesity, cardiovascular risk and healthcare resource utilization in the UK. European Journal of Preventive Cardiology

[16] Opio J, et al. (2020) Metabolically healthy overweight/obesity are associated with increased risk of cardiovascular disease in adults, even in the absence of metabolic risk factors: a systematic review and meta-analysis of prospective cohort studies. Obesity Reviews

[17] British Heart Foundation. (2024) BHF analysis of Health Survey for England 2022

Figure 6. Percentage of adults with a BMI classification denoting patients as overweight or obese, by IMD decile, 2015/16 to 2022/23



## Physical activity

Low levels of physical activity are associated with an increased risk of cardiovascular disease and cardiovascular mortality.[18,19,20,21] The UK's Chief Medical Officers (CMOs) recommend that adults undertake at least 150 minutes of moderate physical activity (or 75 minutes of vigorous activity) each week.[22] Levels of activity below this are classed as 'insufficiently active' (under 150 minutes weekly), or 'inactive' (under 30 minutes weekly).

According to OHID's analysis of Sport England survey data for 2022/23,[23] 67.1% of adults in England are classed as physically active.[24] This means around 33% do not meet physical activity targets, with nearly 23% of adults considered physically inactive.

Physical activity levels are strongly associated with deprivation, with fewer adults meeting physical activity guidelines in more deprived areas (Figure 7). In 2022/23, only 54% of adults in the most deprived decile were classed as physically active, compared to 74% of adults in the least deprived decile – a gap of 20 percentage points. This gap has increased since 2018/19, when the difference was 16 percentage points. This has been driven by a fall in the percentage of adults in the most deprived areas meeting physical activity targets.

There is also a gap between the most and least deprived areas in the prevalence of physical inactivity (<30 minutes weekly activity). In 2022/23, an estimated 35% of adults in the most deprived decile were classed as physically inactive, compared to around 16% in the least deprived decile. This gap, which had previously remained constant until 2018/19, has increased in recent years, rising from 15 percentage points in 2018/19 to 19 percentage points in 2022/23. This has been driven by a higher increase in the prevalence of physical inactivity in the most deprived areas (up by 5 percentage points) than in the least deprived areas (up by 0.4 percentage points).

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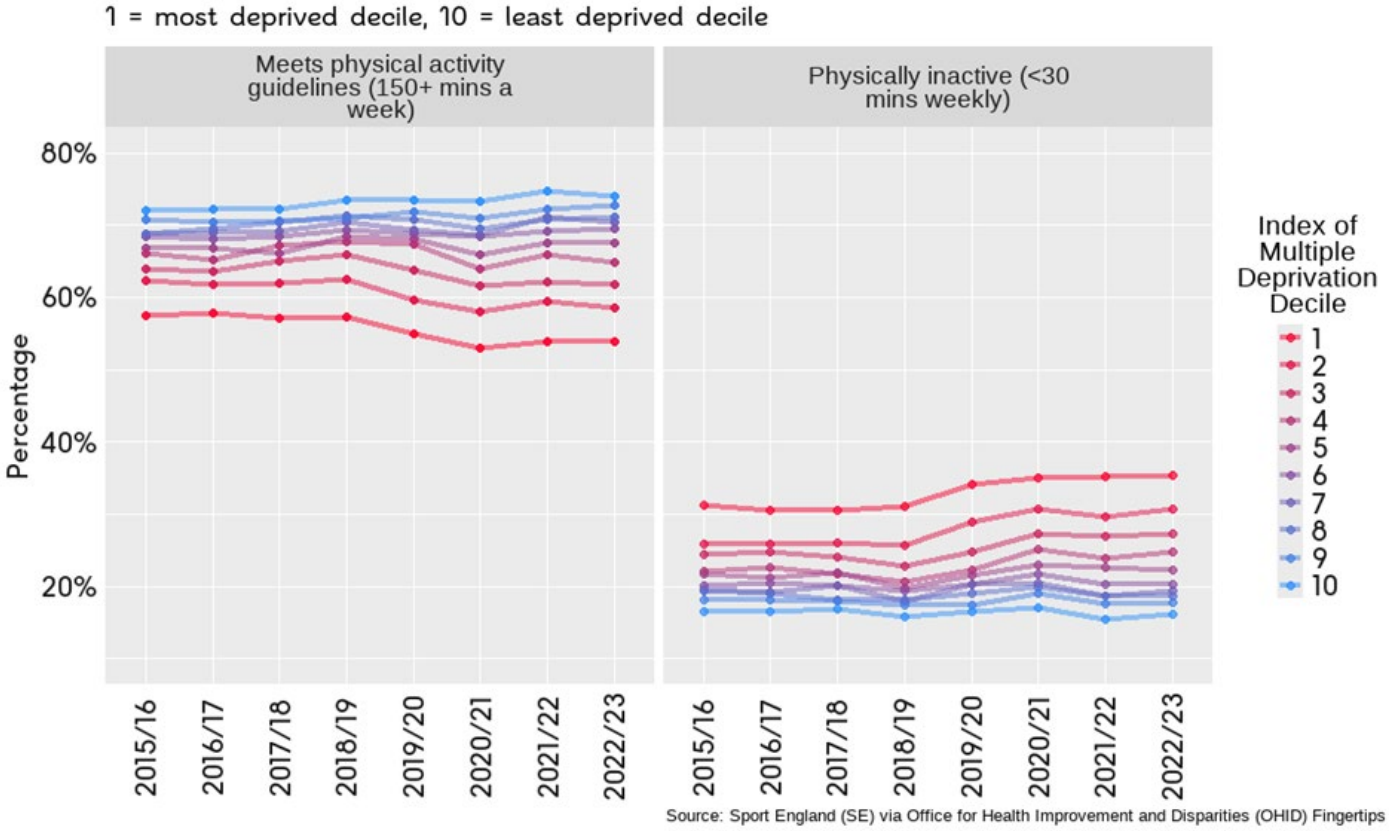
[18] Oguma Y, Shinoda-Tagawa T. (2004) Physical activity decreases cardiovascular disease risk in women: review and meta-analysis. American Journal of Preventive Medicine
[19] Nocon et al. (2008) Association of physical activity with all-cause and cardiovascular mortality: a systematic review and meta-analysis. European Journal of Preventive Cardiology
[20] Cheng W et al. (2018) Associations of leisure-time physical activity with cardiovascular mortality: a systematic review and meta-analysis of 44 prospective cohort studies. European journal of preventive cardiology
[21] Garcia et al. (2023) Non-occupational physical activity and risk of cardiovascular disease, cancer and mortality outcomes: a dose–response meta-analysis of large prospective studies. British Journal of Sports Medicine
[22] GOV UK. (2020) Physical activity guidelines: UK Chief Medical Officers' report.
[23] Health Survey for England data, which is assessed differently, shows a similar trend. Data can be found here.
[24] OHID conduct their own analysis of the raw data collected by Sport England's *Active Lives* survey and present their analysis for adults using a different age range than Sport England (19+ for OHID, and 16+ for Sport England). OHID also classify gardening as a form of being physical active, in line with the CMOs' recommendations. This explains differences in the prevalence of physical activity and inactivity between these two data sources, and we have chosen to align with OHID's definition for the purposes of this report. See here for OHID's explanation of these differences.

Figure 7. Physical activity levels of adults (19+) in England, by IMD decile, 2015/16 to 2022/23



## Prevalence of heart and circulatory diseases and high-risk conditions

This section of the report looks at the diagnosed prevalence of cardiovascular diseases (i.e. how many people are diagnosed with these diseases in a particular area). It analyses data from two data sources: the Quality and Outcomes Framework (QOF), and CVDPREVENT.

QOF holds disease register data for participating general practices across England. OHID present analysis of QOF data stratified by IMD decile, at district and/or county level depending on the indicator. We used deprivation by district level, where available (e.g. coronary heart disease and hypertension). Elsewhere, we used county level IMD deciles (e.g. atrial fibrillation and diabetes).

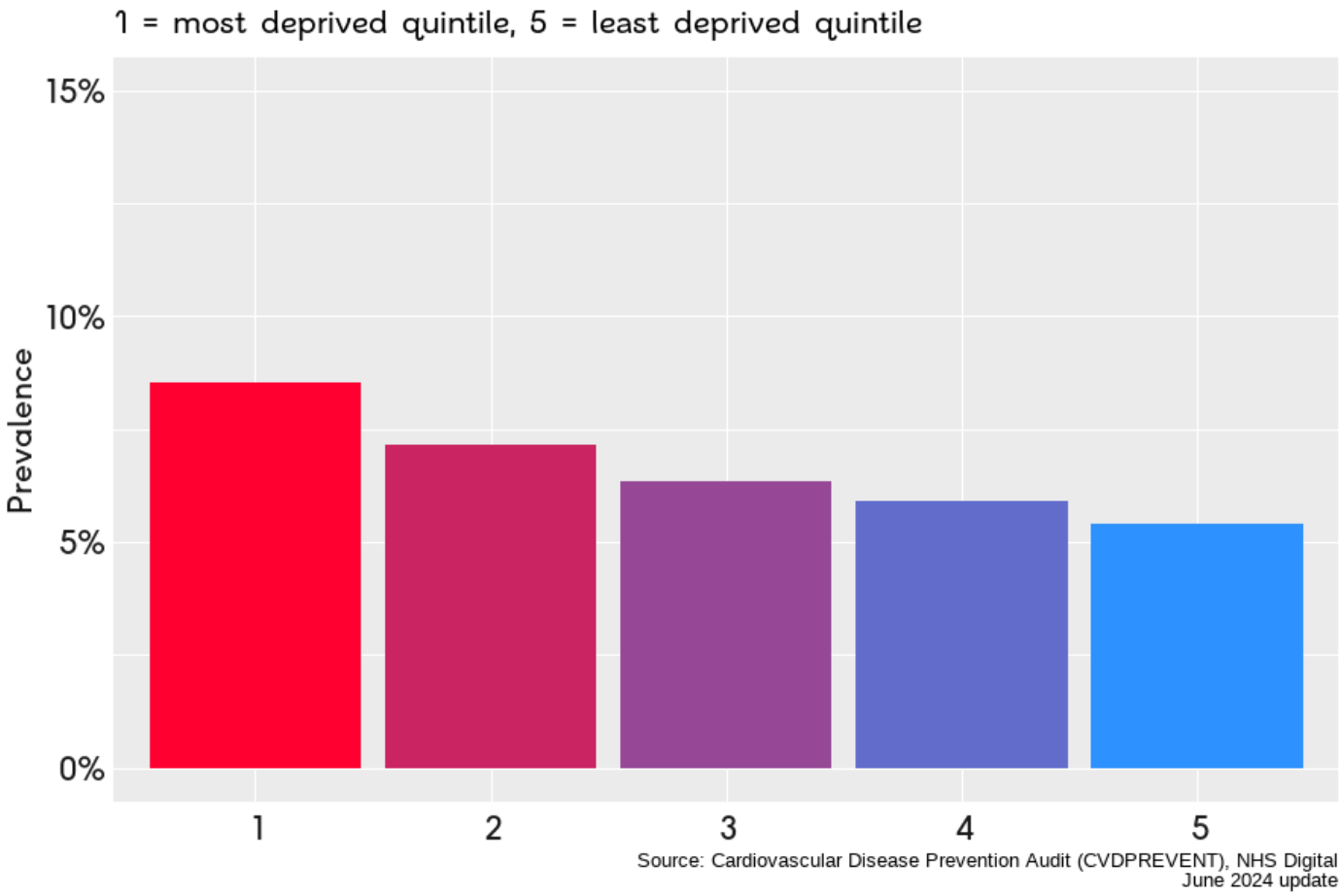
CVDPREVENT is an England-wide audit of general practices, focussed specifically on indicators relating to CVD and its risk factors. Crucially, for our purposes, it presents age-standardised prevalence data for these indicators that was not available at the time of our previous report. Like QOF, CVDPREVENT also make its resulting analysis available stratified by deprivation (albeit by quintile rather than decile).

### Cardiovascular disease (CVD)

Figure 8 shows the age-standardised prevalence for a selection of the main cardiovascular diseases in England, based on data from CVDPREVENT for the quarter ending June 2024. For this indicator, CVD includes patients diagnosed with coronary heart disease, stroke, transient ischaemic attack, peripheral arterial disease, heart failure and abdominal aortic aneurysms.

In England, the most deprived quintile has a higher prevalence of CVD (8.5%) than the least deprived quintile (5.4%). This is a prevalence gap of 3.1 percentage points. In other words, the age-standardised CVD prevalence is around 57% higher in the most deprived quintile than the least deprived quintile.

Figure 8. Age-standardised cardiovascular disease prevalence, by IMD deprivation



## Coronary heart disease

Coronary heart disease is the most commonly diagnosed type of heart disease.[25] It occurs when coronary arteries become narrowed by a build-up of atheroma, a fatty material within their walls. The pain or discomfort felt from such narrowing is called angina and if a blockage occurs it can cause a myocardial infarction (heart attack).

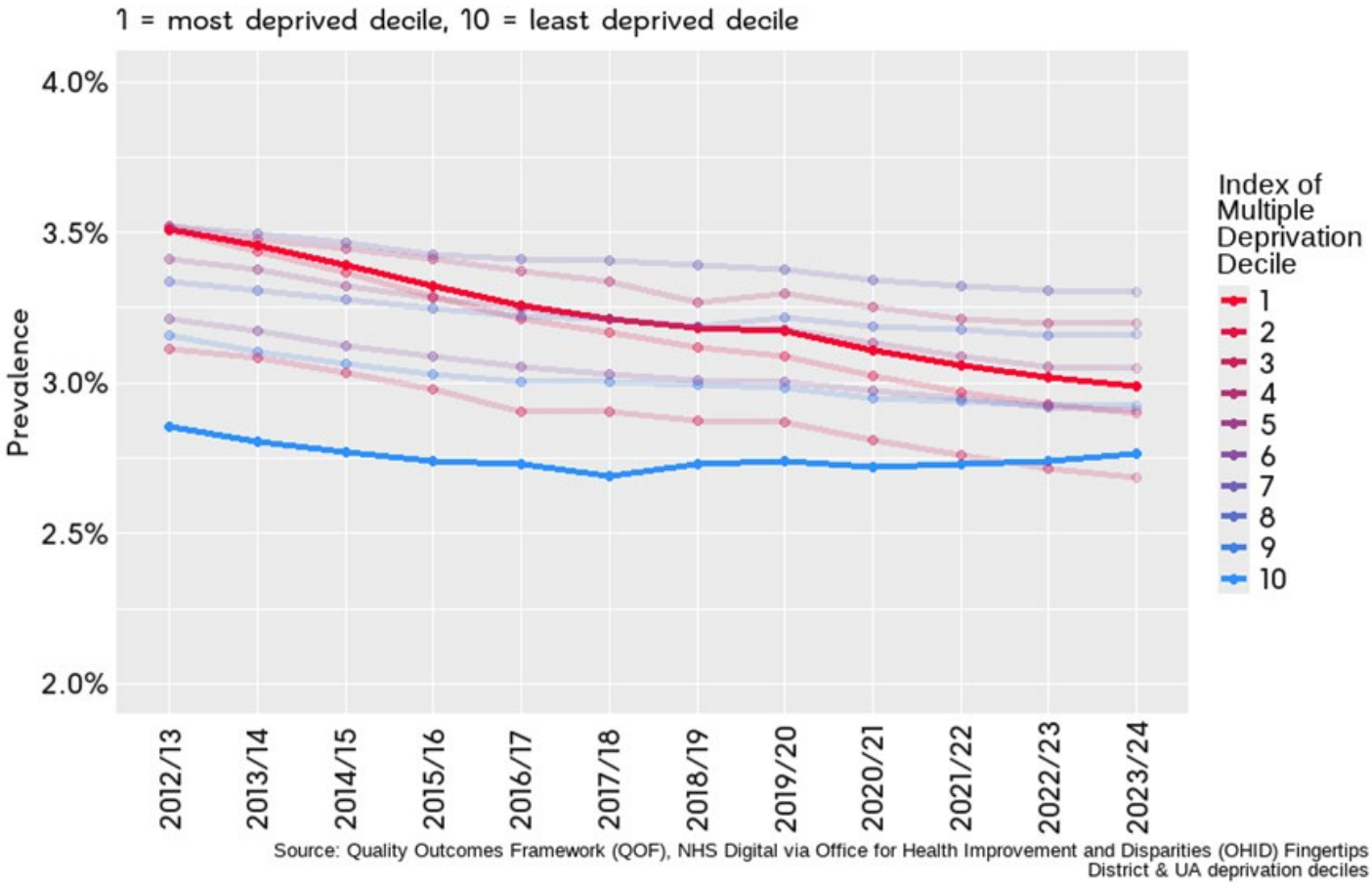
There are 1.9 million people living with coronary heart disease in England.[26] Coronary heart disease is one of England's leading causes of death and the single biggest cause of premature death.[27]

Data from the Quality Outcomes Framework (QOF) show that there is a higher prevalence of coronary heart disease in the most deprived decile than in the least deprived (Figure 9). It should be noted, again, that this prevalence indicator is *not* age-standardised.

According to the analysis, when comparing the most and least deprived deciles alone, around 3% of people had coronary heart disease in the most deprived decile, compared to 2.8% in the least deprived decile. Figure 9 also showed that the gap between the most and least deprived deciles narrowed since 2019/2020. Whilst prevalence has remained fairly constant since 2018/19 in the least deprived decile (around 2.7-2.8%), the proportion of people living with coronary heart disease in the most deprived decile decreased from 2019/2020 to 2023/24 (3.2% to 3.0%).

[25] NHS England. (2024) Quality & Outcomes Framework prevalence data 2023/24
[26] NHS England. (2024) Quality & Outcomes Framework prevalence data 2023/24
[27] Nomis. (2024) Mortality statistics - underlying cause, sex and age

Figure 9. Coronary heart disease prevalence in England, by IMD decile, 2012/13 to 2023/24



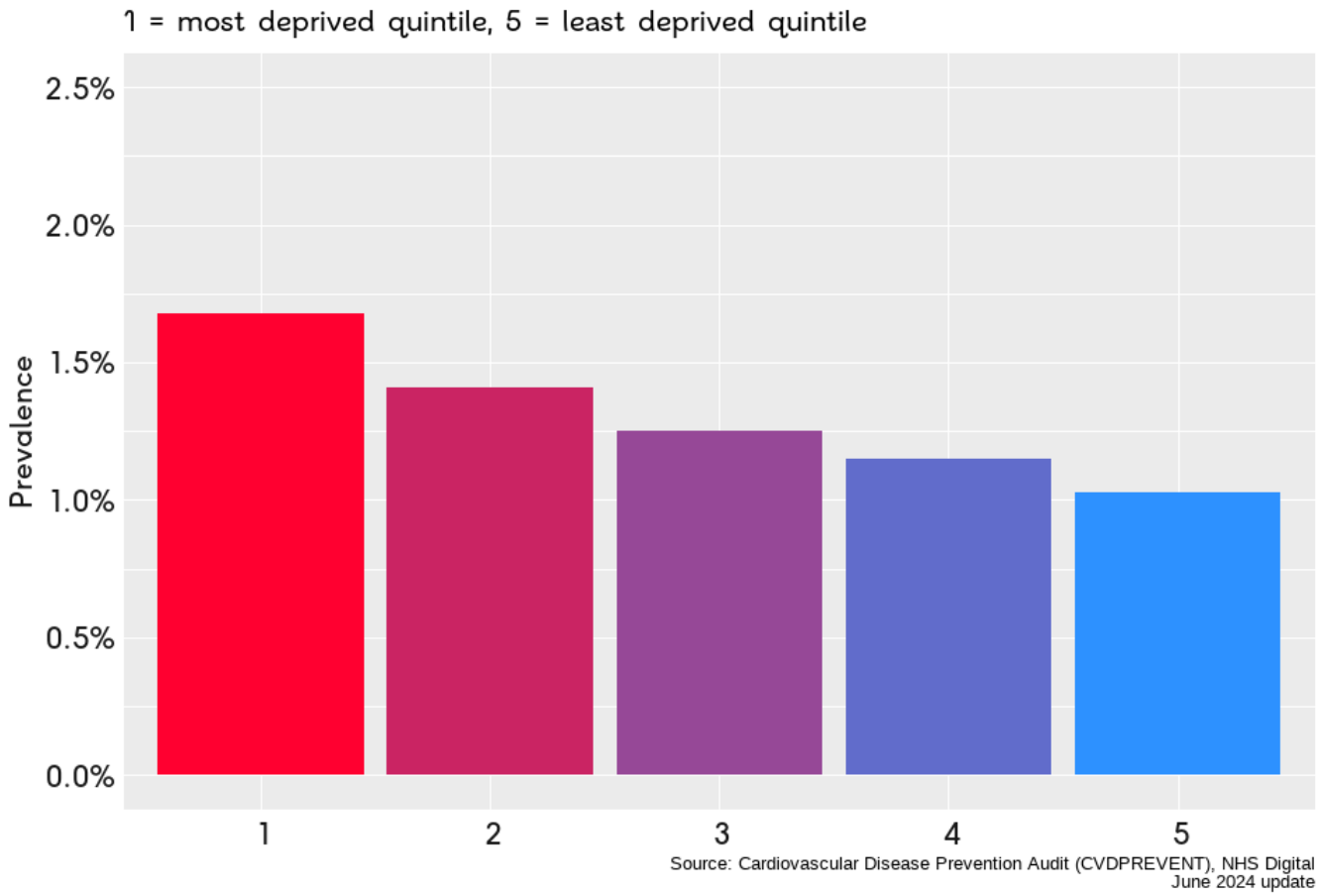
## Heart failure

Heart failure occurs when the heart is not pumping blood around the body as well as it should, most commonly when the heart muscle has been damaged – for example, after a heart attack.[28]

Around 670,000 people in England have been diagnosed with heart failure by their GP.[29] In England, up to 80 per cent of heart failure diagnoses are made in hospital, despite 40 per cent of patients having symptoms that should have triggered an earlier assessment.[30] Estimates which include diagnoses at hospital suggest there are thousands more people with the condition across the country.[31]

Similarly to the cardiovascular disease indicator in CVDPREVENT, the age-standardised prevalence of heart failure is higher in more deprived areas in England (Figure 10). In the most deprived quintile, the prevalence of heart failure is 1.68%, compared to 1.03% in the least deprived quintile. This represents a prevalence gap of 0.65 percentage points between the least and most deprived quintiles in England. In other words, the age-standardised heart failure prevalence is around 63% higher in the most deprived quintile than the least deprived quintile.

Figure 10. Age-standardised heart failure prevalence, by IMD quintile




[28] British Heart Foundation Statistics. (2024) England Factsheet
[29] NHS England. (2024) Quality & Outcomes Framework prevalence data 2023/24
[30] Bottle A et al. (2018) Routes to diagnosis of heart failure: observational study using linked data in England. Heart
[31] British Heart Foundation Statistics. (2024) England Factsheet

## Atrial fibrillation

Atrial fibrillation is one of the most common forms of abnormal heart rhythm (arrhythmia) and a major cause of stroke. People with AF are five times more likely to have a stroke.[32] Nearly 1.4 million people in England have been diagnosed with atrial fibrillation.[33] It is estimated that there are at least 230,000 people aged over 65 with undiagnosed (or silent) atrial fibrillation in England.[34]

Prevalence data for AF illustrates well why having access to both non-standardised *and* age-standardised prevalence data is useful for understanding the *true* association between deprivation and prevalence. Figure 11 shows QOF prevalence data for atrial fibrillation prevalence by deprivation decile. According to this measure, the least deprived decile in England has a higher percentage of patients with AF than the most deprived decile. Since 2019/2020, the prevalence rate of people with atrial fibrillation has increased more in the less deprived deciles compared to the most deprived (Figure 11).

However, the CVDPREVENT *age-standardised* prevalence data (Figure 12) for AF shows that AF prevalence is almost identical across deprivation quintiles. This suggests that differences in the prevalence of AF by deprivation decile in the QOF data (which show higher prevalence in less deprived areas) are likely due to differing age structures between more and less deprived areas.

[32] Marini C et al. (2005) Contribution of atrial fibrillation to incidence and outcome of ischemic stroke: results from a population-based study. Stroke
[33] British Heart Foundation Statistics. (2024) England Factsheet
[34] NHS England. (2024) Quality & Outcomes Framework prevalence data 2023/24

Figure 11. Atrial fibrillation prevalence in England, by IMD decile, 2012/13 to 2023/24

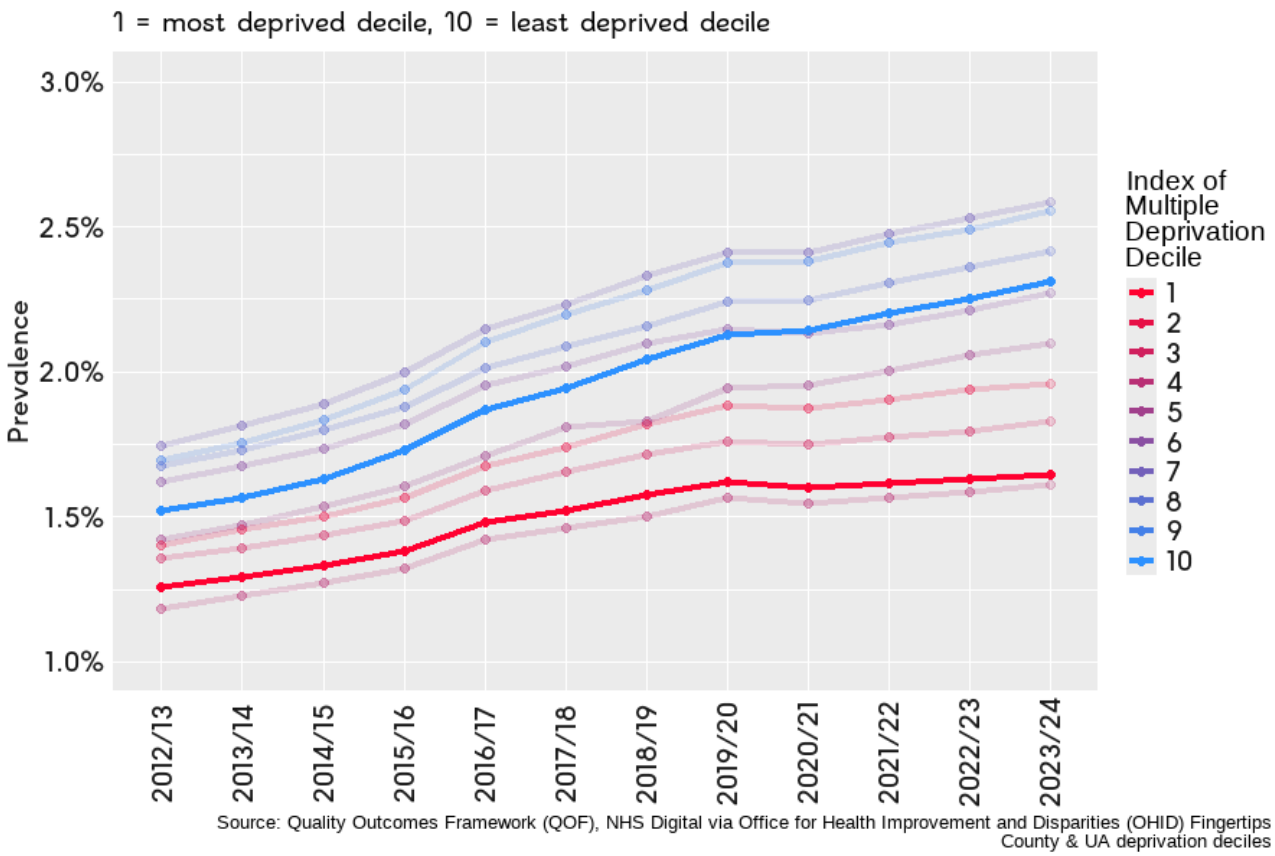
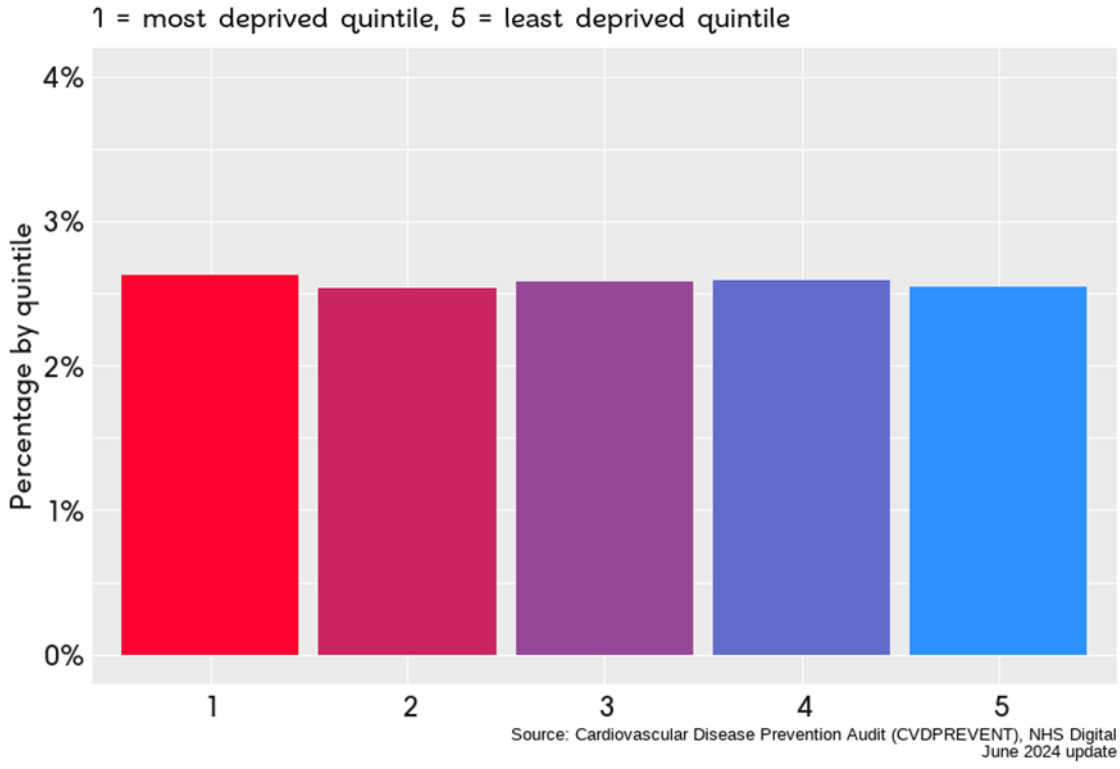



Figure 12. Age-standardised atrial fibrillation prevalence, by IMD quintile



## Primary care

### Prescriptions

Here we present analysis of prescribing rates of cardiovascular drugs from the NHS Business Services Authority (NHSBSA), using the categories outlined by the British National Formulary (BNF). GP practice-level prescribing data was mapped to IMD data for general practices, to assign general practices, and their populations, to deprivation deciles. Prescribing rates shown here (Figure 13) are *not* age-standardised.

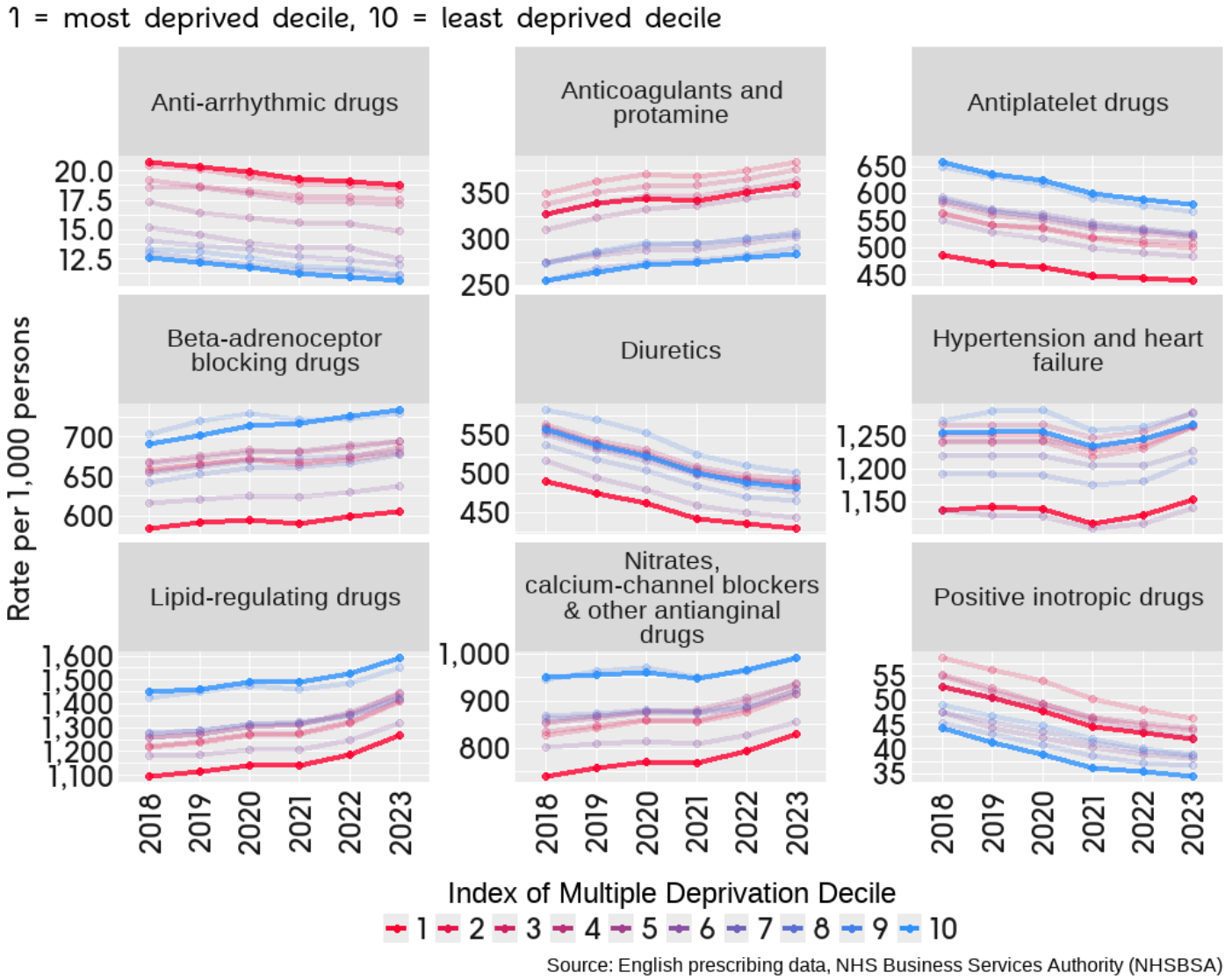
Data show that there has been a consistent increase over time in prescription rates for anticoagulants and protamine drugs, beta-adrenoreceptor blocking drugs, lipid-regulating drugs, and nitrates, calcium-channel blockers and other antianginal drugs (Appendix B). After a fall in prescribing rates for hypertension and heart failure drugs in 2021, rates have increased to around pre-pandemic levels. Prescription rates have decreased for anti-arrhythmic drugs, antiplatelet drugs, diuretics, and positive inotropic drugs.

For anti-arrhythmic drugs, anticoagulants and protamine, and positive inotropic drugs, the prescribing rate was higher in the most deprived decile than in the least deprived decile. For other cardiovascular categories, prescribing rates were higher in the least deprived areas. These included: antiplatelet drugs; beta-adrenoceptor blocking drugs; diuretics; hypertension and heart failure drugs; lipid-regulating drugs; nitrates, calcium channel blockers & other antianginal drugs.

The drugs with the highest prescribing rates were lipid-regulating drugs, and hypertension and heart failure drugs. Both drug categories had higher prescribing rates in the least deprived decile, than in the most deprived. The prescribing rate for lipid-regulating drugs was 26% higher in the least deprived decile (1,595 per 1,000 population) than in the most deprived decile (1,270 per 1,000 population). The prescribing rate for hypertension and heart failure drugs was 10% higher in the least deprived decile (1,267 per 1,000 population) than in the most deprived decile (1,154 per 1,000 population).

The difference in prescribing rates for these two drug categories between the most and least deprived deciles could be attributable, at least in part, to the differences in age structure between more and less deprived areas. Notably, the prevalence of both hypertension and heart failure is higher in less deprived areas, where the prevalence indicator was not age standardised. This suggests that some of the difference in prescribing rates (which are not age-standardised) is a result of genuine differences in *diagnosed* disease burden between the most and least deprived areas. However, more analysis would be needed to better understand the true association between deprivation and the prescribing of CVD medications. It is important, for instance, for us to better understand whether there is any presently unidentified unmet need in more deprived populations.

Figure 13. Prescribing rate of cardiovascular drugs, by BNF drug type and IMD decile, 2018 to 2023




Source: English prescribing data, NHS Business Services Authority (NHSBSA)

## Secondary care

### Hospital admissions

We reviewed hospital admissions for coronary heart disease, heart failure, and stroke, by deprivation decile. Figures 14-16 display the age-standardised hospital admission rates per 100,000 people in the population, for each condition. Both elective and non-elective admissions were included in the data.

For this updated version of our report, we were not able to update the analysis on overall CVD admissions by deprivation that was stratified by elective and emergency admissions. In our previous report on health inequalities in England, we found that the average CVD emergency admission rate was consistently higher for those in the most deprived areas when compared to the least deprived.[35] However, the opposite was true for elective admissions, with the least deprived areas having higher admission rates than the most deprived areas. It is unclear how the trends identified for emergency and elective CVD admissions have evolved since the Covid-19 pandemic.

This apparent inequality in emergency admissions was hypothesised to have been driven, in part, by a lack of access to primary care, informed by past reports of so-called 'under doctoring' in more deprived areas. Notably, the report 'Level or Not?' by The Health Foundation, appears to support this notion of 'under doctoring'. Their analysis found that more deprived areas have fewer general practitioners (GPs) per person (need-adjusted population), but a higher number of nurses. Likely linked to this, patients in less deprived areas were more likely to have an appointment with a GP than a nurse, compared to those in more deprived areas. This research also found that GPs in more deprived areas handled nearly 10% more patients on average, and that practices in these areas also had lower performance scores (QOF).[36]

[35] British Heart Foundation. (2022) How Inequalities contribute to heart and circulatory diseases
[36] The Health Foundation. (2020) Level or not? Comparing general practice in areas of high and low socioeconomic deprivation in England

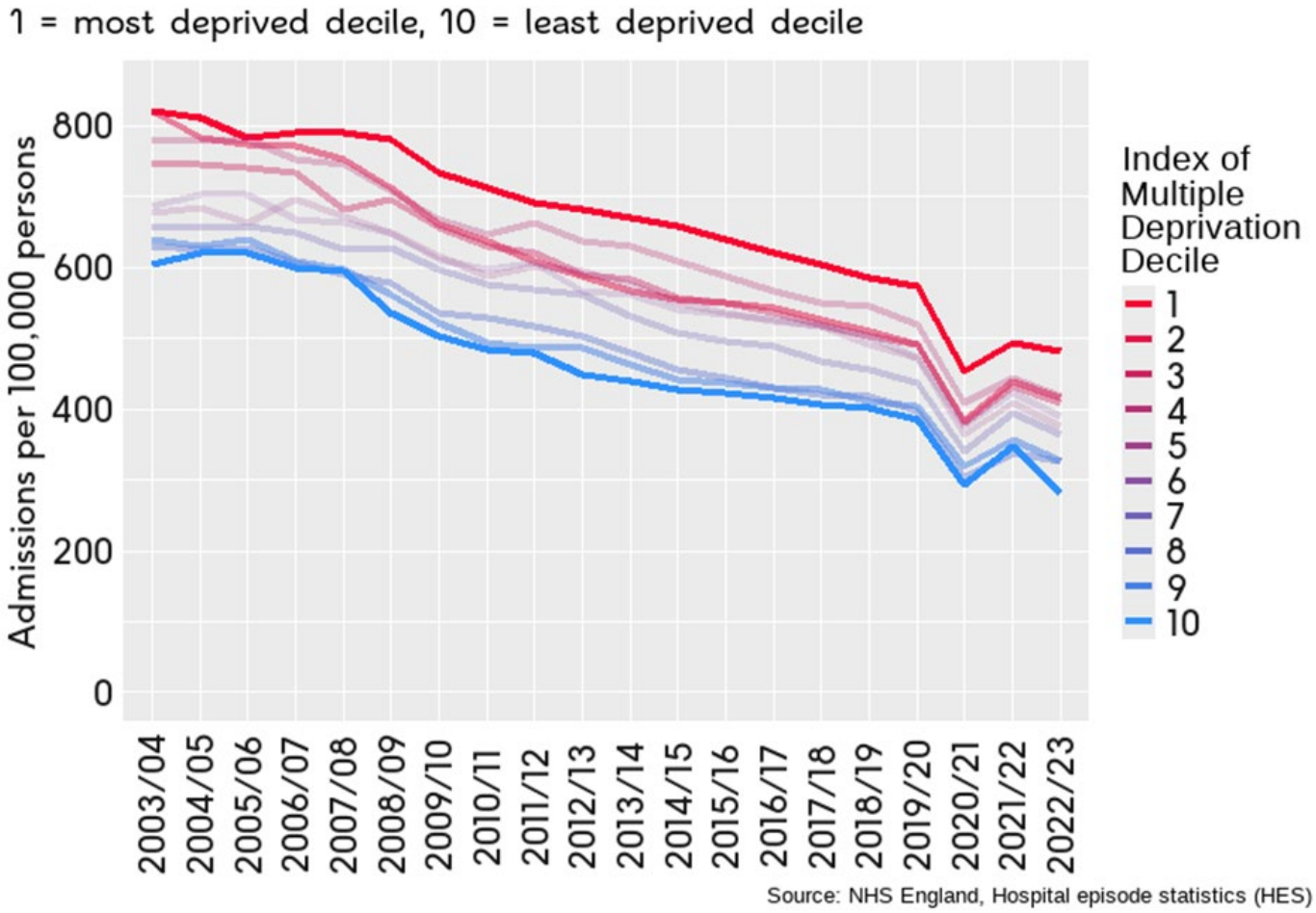
## Coronary heart disease

Hospital admission rates for coronary heart disease (CHD) have been consistently higher in the most deprived deciles than the least deprived (Figure 14). In the fifteen years prior to the Covid-19 pandemic, admission rates for coronary heart disease fell steadily across all deprivation deciles. Rates then fell sharply in 2019/20, due to the Covid-19 pandemic, which affected both elective and emergency admissions.[37] Whilst rates recovered in 2020/21 and 2021/22, they are still below pre-pandemic levels.

In 2022/23, the admission rate for coronary heart disease was 480.6 per 100,000 people in the most deprived decile, compared to 282.6 per 100,000 in the least deprived decile. This represents a gap of 198.0 admissions per 100,000 people. Since the onset of the pandemic, the gap between the most and least deprived deciles has increased by 36.8 per 100,000, rising from 161.2 per 100,000 in 2020/21 to 198.0 per 100,000 in 2022/23.

Notably, whilst the rate of admissions for CHD decreased in 2022/23 relative to 2021/22, in both the most deprived and least deprived deciles, the decrease in coronary heart disease hospital admissions was more pronounced in the least deprived decile.

Figure 14. Hospital admissions due to coronary heart disease, by IMD decile, 2003/04 to 2022/23



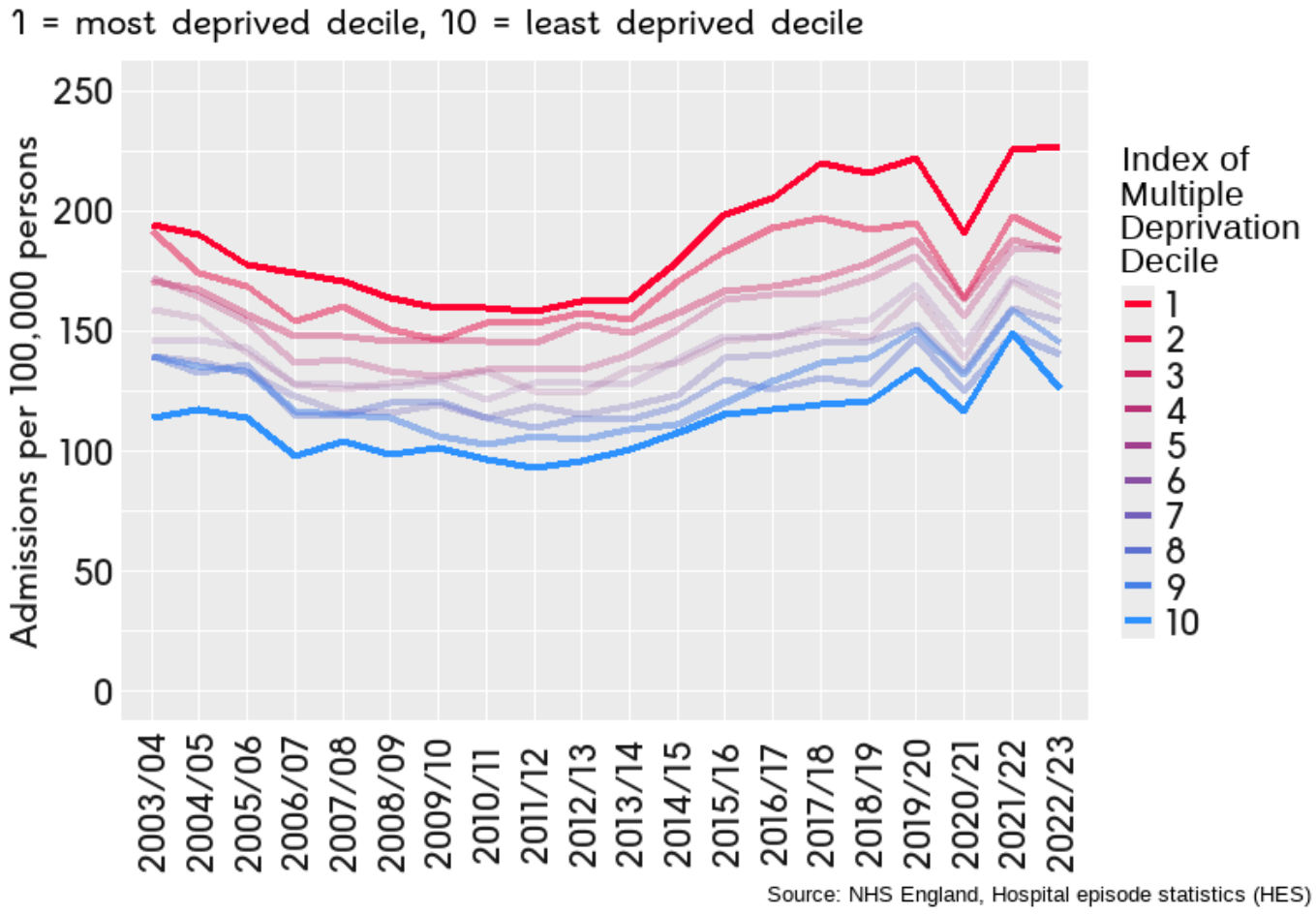

[37] The Health Foundation. (2023) What's driving increasing length of stay in hospitals since 2019?

## Heart failure

Hospital admission rates for heart failure are rising in England. Similarly to coronary heart disease, hospital admission rates for heart failure are higher in the most deprived decile when compared to the least deprived (Figure 15). However, unlike CHD, admissions for heart failure have increased over the last decade – with every decile having a higher admission rate in 2022/23 than in 2013/14.

In 2022/23, the rate of hospital admissions due to heart failure was 226.7 per 100,000 persons in the most deprived decile, compared to 125.6 in the least deprived decile – a gap of 101 admissions per 100,000 persons. This gap has increased significantly since 2013/14, when it was only 62.0 per 100,000 persons.

Figure 15. Hospital admissions due to heart failure, by IMD decile, 2003/04 to 2022/23

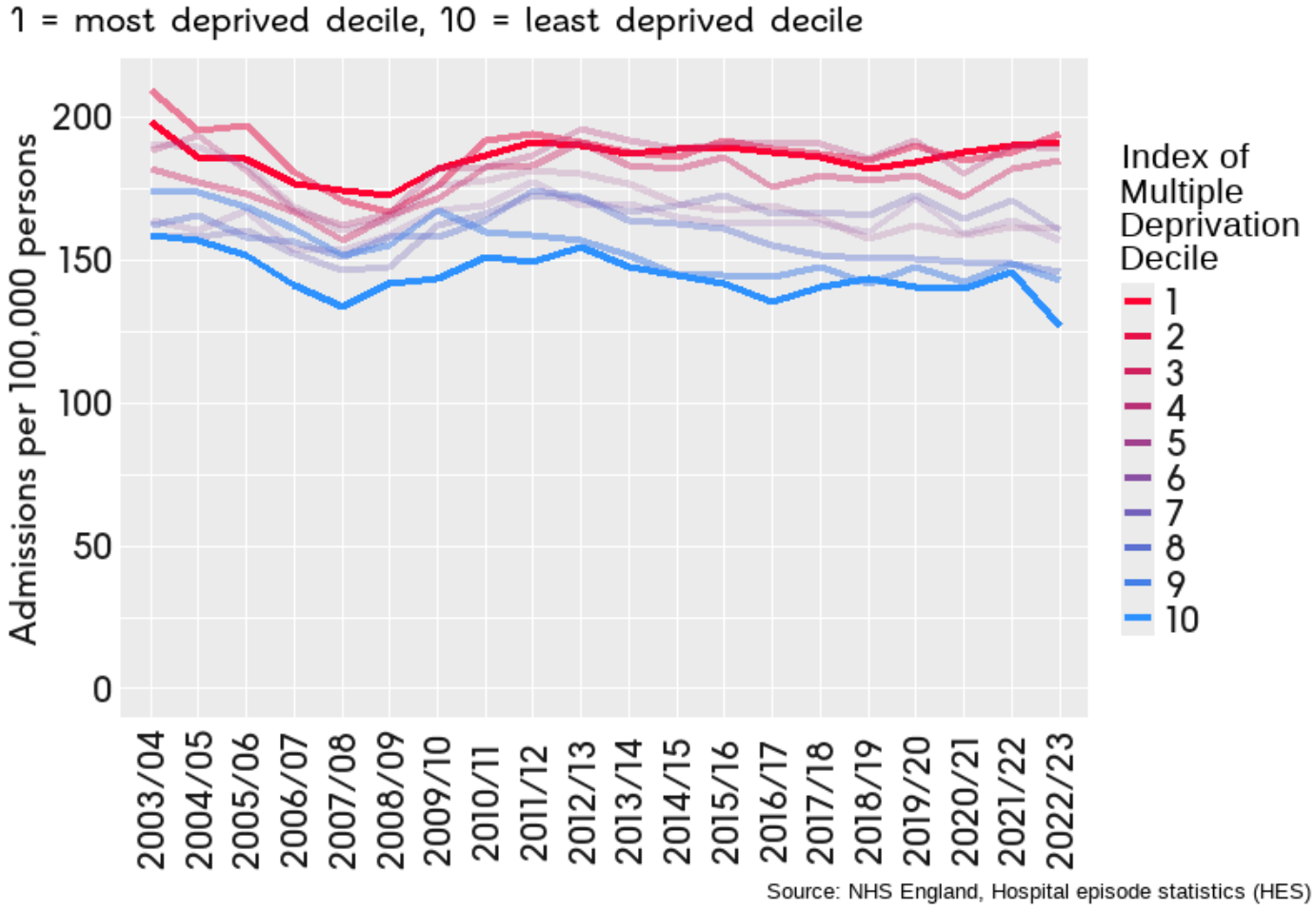


**Stroke**

The overall rate of stroke admissions in England has stayed fairly consistent since 2016/17, like CHD and heart failure, there is a clear association between stroke admission rates and deprivation.

As seen in Figure 16 below, unlike coronary heart disease, admission rates for stroke have continued to slowly rise in the most deprived decile over the past five years (rate of 181.6 in 2018/19 versus 191.3 in 2022/23). Conversely, stroke admission rates in the least deprived decile have decreased in the same period (143.5 in 2018/19 versus 126.6 in 2022/23). Subsequently, the gap in stroke admissions between the most and least deprived deciles has increased from 38.1 to 64.7 admissions per 100,000 persons in the last five years.

Figure 16. Hospital admissions due to stroke, by IMD decile, 2003/04 to 2022/23



## Long-term management and outcomes

Cardiac rehabilitation is an evidence-based intervention, delivered by a multidisciplinary team, proven to be clinically and cost effective for improving physical and health-related quality of life outcomes after a cardiac event.[38,39]The National Institute for Health and Care Excellence (NICE) Clinical Guidance (CG172, CG94 and NG106) and leading British and European cardiovascular professional associations recommend that cardiac rehab is offered to all eligible patients in a timely and appropriate manner, taking the form of group-, home- or web-based sessions, and with a recommended minimum duration of eight weeks.

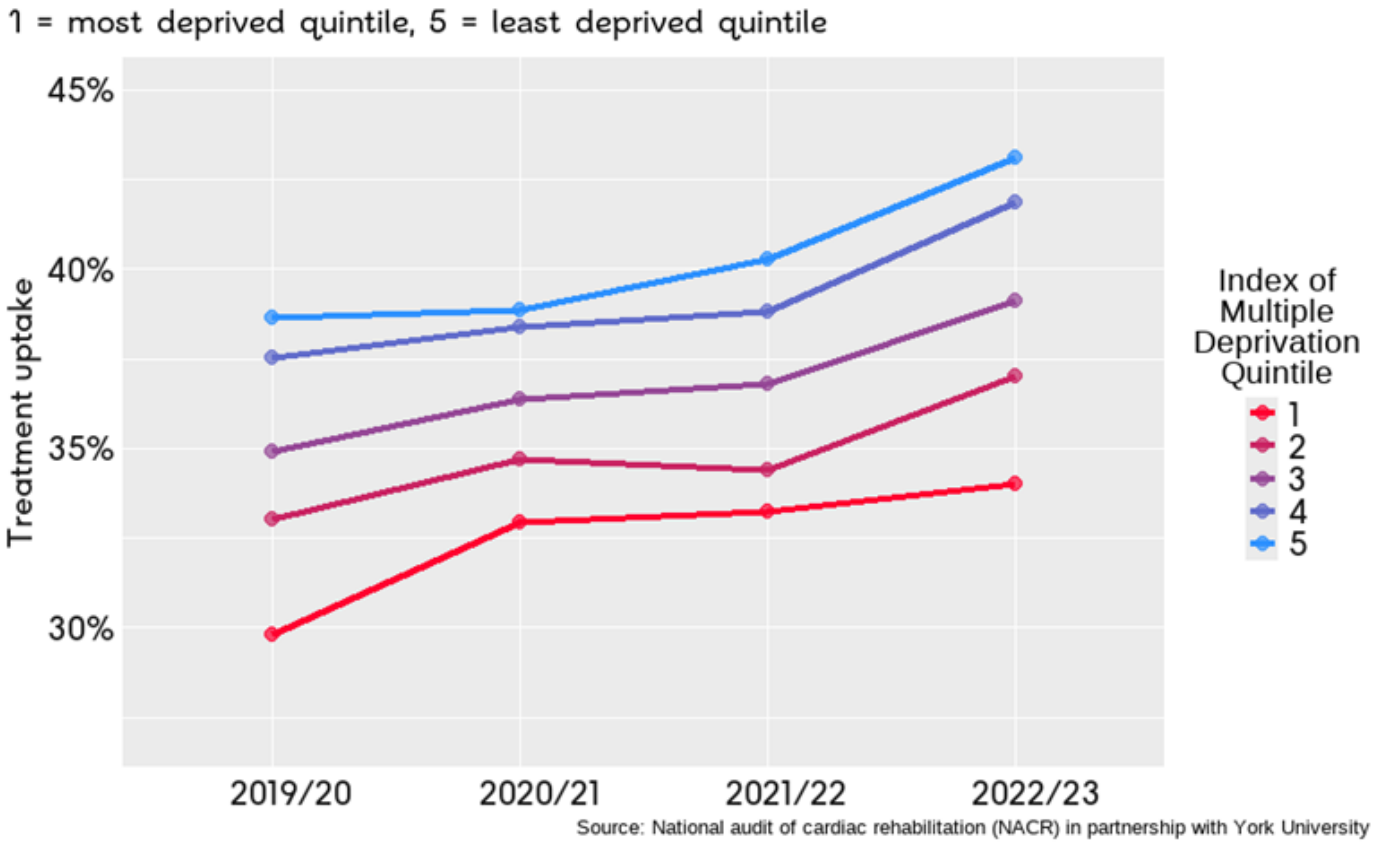
The following chart (Figure 17) displays England-level cardiac rehab data from the National Audit of Cardiac Rehabilitation (NACR). This audit included patients admitted and discharged from hospitals. Data included patients with any of the following conditions: heart failure, myocardial infarction, or myocardial infarction with revascularisation.

When broken down by deprivation, cardiac rehabilitation uptake was higher in less deprived areas. In 2022/23, cardiac rehabilitation uptake was 43% in the least deprived quintile, and 34% in the most deprived quintile – a gap of nine percentage points.

As visualised in Figure 17, this gap in cardiac rehab uptake, between the most and least deprived quintiles, has changed over time. Notably, between 2019/20 and 2020/21, against the backdrop of the first year of the Covid-19 pandemic, the gap shrank by three percentage points, driven by a more significant increase in the uptake of cardiac rehab amongst the most deprived quintile. However, over the subsequent two years, the uptake gap has returned to pre-pandemic levels (around nine percentage points). This has been driven by a larger increase in cardiac rehab uptake in less deprived areas.

[38] Anderson L et al. (2016) Exercise based cardiac rehabilitation for coronary heart disease: Cochrane systematic review and meta-analysis. Journal of the American College of Cardiology
[39] Rauch B et al. (2020) The prognostic effect of cardiac rehabilitation in the era of acute revascularisation. European Journal of Preventive Cardiology

Figure 17. Percentage of cardiac rehabilitation update, by IMD quintile 2019/20 to 2022/23



## GP survey data

Patient activation measures describe the knowledge, skills and confidence a person has in managing their own health. It is widely acknowledged that those who have the confidence and skills to manage their own health are more likely to adopt healthy behaviours, to have better clinical outcomes and lower rates of hospitalisation, and to report higher levels of satisfaction with health services.[40]

This extends to the management of long-term conditions, where higher activation scores are positively correlated with adherence to treatment and condition monitoring, as well as obtaining regular care associated with the condition. The findings appear to be true for patients with a range of conditions and economic backgrounds, including disadvantaged and ethnically diverse groups, and those who have less access to care. [41]

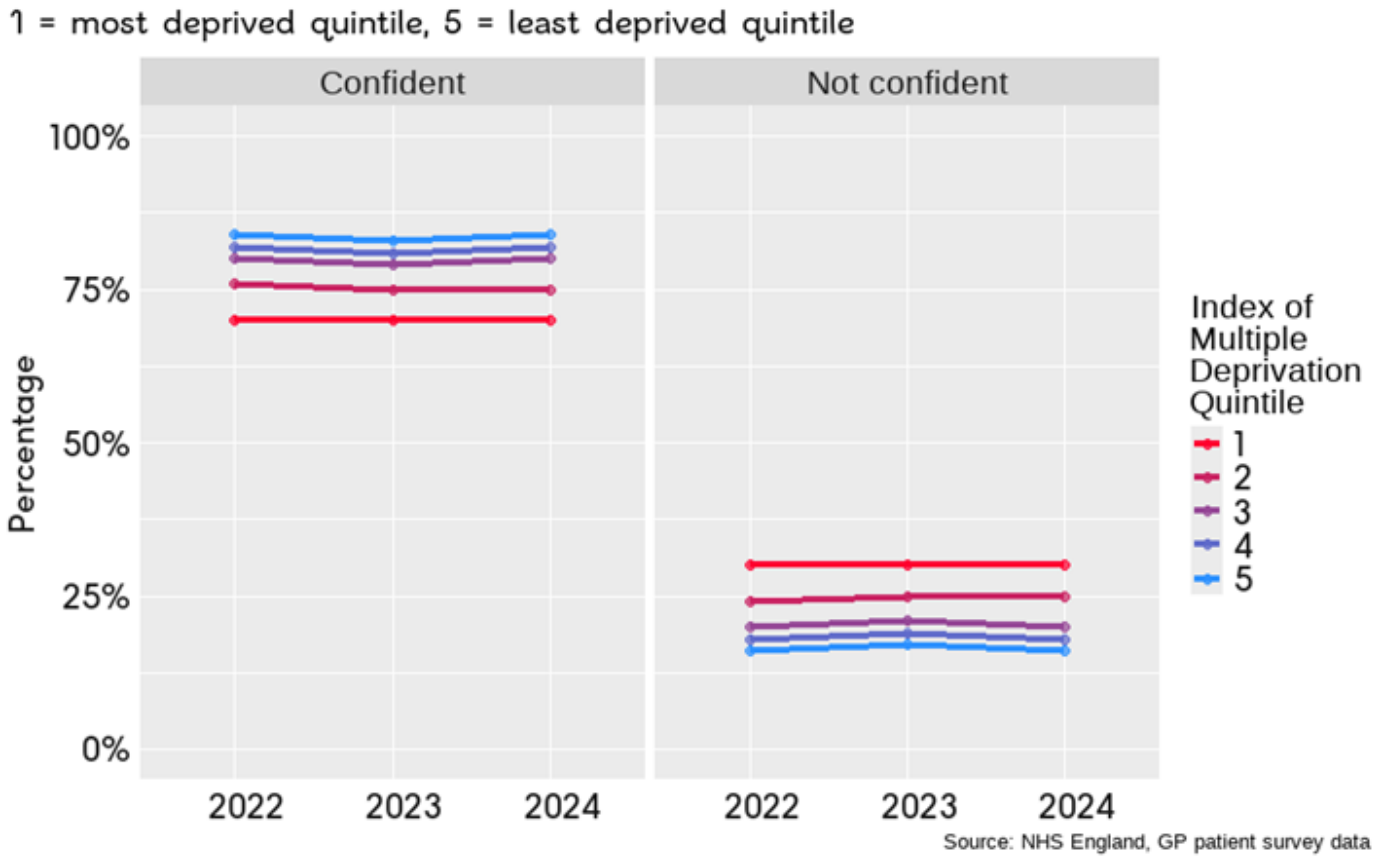
The GP Patient Survey is sent to over 2 million people across the UK and collects some basic patient activation data.[42] It is carried out annually to capture the experience and demographics of patients at their GP practice. It helps monitor the quality of services over time.

The survey captures patients' confidence in managing their condition(s), with four options: very confident, fairly confident, not very confident, or not at all confident. Although this analysis includes people with any long-term condition, rather than CVD only, it is useful to examine this holistically since many people have multiple conditions and do not think of managing them in isolation. They are likely to consider having confidence in managing their conditions overall.

The survey data show a consistent gap in confidence from 2022 to 2024, highlighting that those in less deprived quintiles are more confident in managing their condition. In the least deprived areas, around 84% report feeling confident in managing their condition, whilst in the most deprived areas, this drops to about 70% (Figure 18).

[40] The King's Fund. (2014) Supporting people to manage their health: An introduction to patient activation
[41] *Ibid.*
[42] NHS England. (2024) GP Patient Survey

Figure 18. Reported confidence of adults in managing their health condition(s) in England, by IMD quintile, 2022 to 2024



## Mortality

Cardiovascular mortality rates, as visualised in Figure 19, are strongly associated with deprivation, with rates of both all-age and premature (under-75) mortality consistently higher in the most deprived areas of England.

### All-age mortality

In 2023, the all-age CVD mortality rate was 51% higher in the most deprived decile than in the least deprived decile (284.7 per 100k population, compared to 188.3 per 100k). This represents a gap of 96.4 deaths per 100k, between the most and least deprived areas in England. Whilst the deprivation gap for all-age CVD mortality rates remained constant from 2016 to 2019, since then—and the onset of the Covid-19 pandemic in England in 2020—the gap between the most and least deprived deciles has increased (from 85.7 per 100k in 2019, to 96.4 per 100k in 2023).

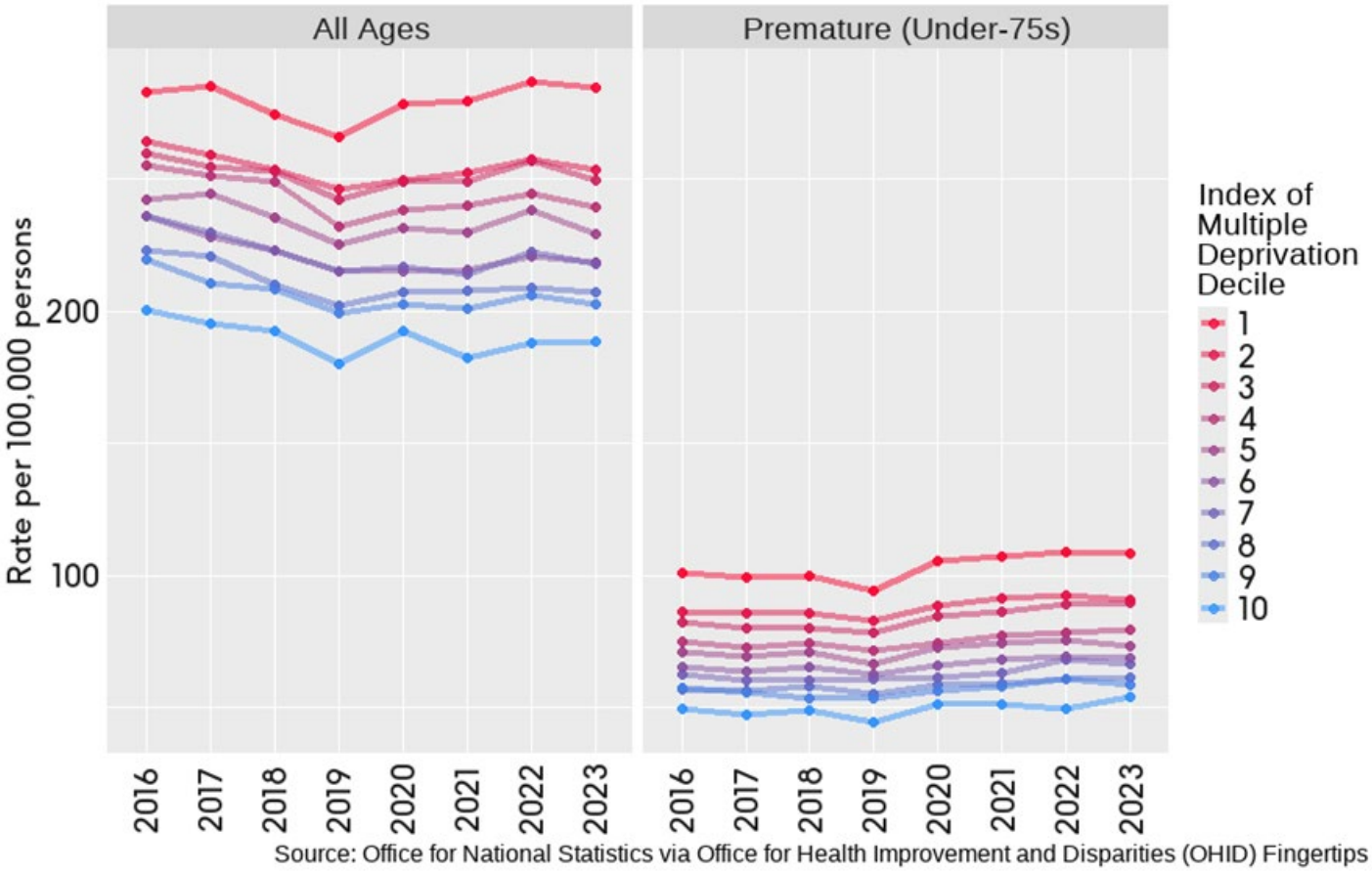
When data for 2023 is compared to 2019, we see that the all-age mortality rate for CVD increased from 180.1 to 188.3 (increase of 8.2 per 100k) in the least deprived decile, and from 265.8 to 284.7 (increase of 18.9 per 100k) in the most deprived decile. In other words, the gap in all-age mortality rates between the least and most deprived deciles has risen by 10.7 per 100k since 2019, driven by a higher increase in mortality in the most deprived decile. The gap has, notably, shrunk slightly since 2022 (when it was 98.9 per 100k), but it remains significantly higher than in 2019, prior to the Covid-19 pandemic.

### Premature (under-75s) mortality

In 2023, the premature rate of death from CVD in England was twice as high in the most deprived decile than it was in the least deprived decile (108.0 per 100k, compared to 54.0 per 100k) (Figure 19). This represents a gap of 54.0 deaths per 100k, between the most and least deprived areas in England.

The gap in premature CVD death rates has grown since 2019, when the difference between the most and least deprived deciles was 49.7 deaths per 100k population. This means the gap has grown by around 4.3 deaths per 100k from 2019 to 2023, which has been driven by the fact that the premature rate of death has increased more in the most deprived areas. Notably, the gap narrowed from 2022 to 2023 (58.9 per 100k, compared to 54.0 per 100k). This was partly driven by an increase in the premature CVD death rate in the least deprived decile in 2023 – which had previously been the *only* decile that had seen premature CVD death rates *decrease* from 2020 to 2022.

Figure 19. Age-standardised mortality rates from cardiovascular disease in England, by IMD decile, 2016 to 2023



### CVD mortality by deprivation and sex

Mortality data for CVD stratified by both deprivation *and* sex shows that the association between deprivation and CVD mortality is apparent for both men and women.

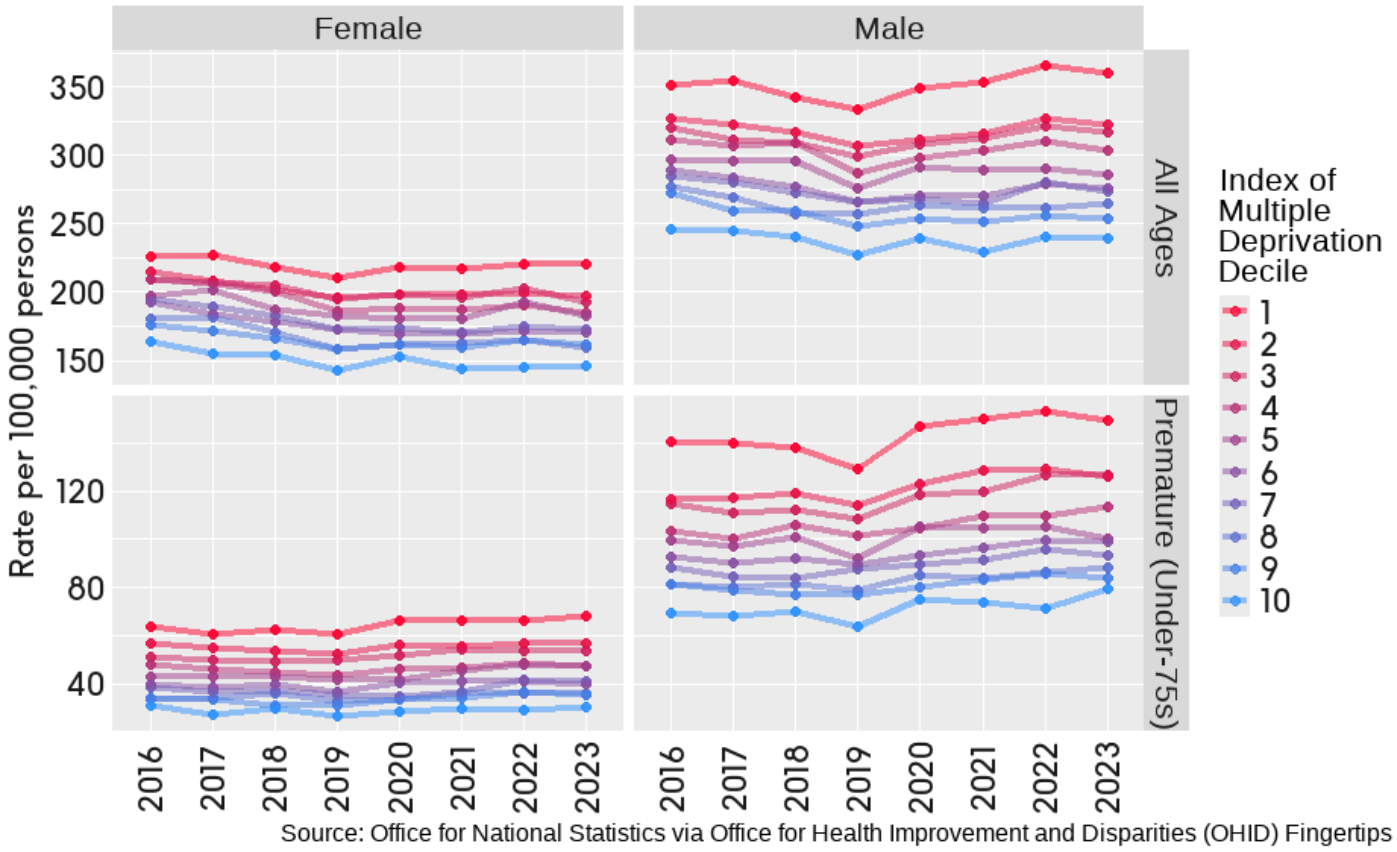
In 2023, the premature age-standardised CVD mortality rate for men in the most deprived decile was 149.5 deaths per 100K population, and 79.5 per 100K in the least deprived decile – a gap of 70.0 per 100K. For all-age mortality, the rate was 360.4 in the most deprived decile, and 239.3 in the least deprived – a gap of 121.0 per 100K.

For women, the premature age-standardised CVD mortality rate in the most deprived decile was 68.3 per 100K and 30.2 per 100K in the least deprived decile – a gap of 38.1 per 100K. For all-age mortality, the most deprived decile had a rate of 221.1 per 100K, and the least deprived had a rate of 146.3 per 100K – a gap of 74.8 per 100K population.

Subsequently, the gap in CVD mortality rates between the most and least deprived areas is larger for males than it is for women. This is true for both premature and all-age mortality rates. Notably, these gaps are also *all* larger than they were in 2019, pre-pandemic – and the widening of inequalities in CVD mortality between the most and least deprived areas in England, have been seen for *both* men and women (Figure 20, and Appendix – Table 1).

The most recent mortality data for 2023 paints a slightly more nuanced picture of trends in CVD mortality. Compared to 2022, for all-ages, the gap between the most and least deprived deciles shrank slightly for women (from 75.4 to 74.8 per 100k) and men (from 125.0 to 121.0 per 100k). For under-75s, the gap grew for women (from 36.9 to 38.1 per 100k) but shrunk for men (81.5 to 70.0 per 100k). However, it remains true that the gaps between the most and least deprived deciles, for men *and* women, for all-age *and* premature mortality, remain higher than they were pre-pandemic (Appendix – Table 2).

Figure 20. Age-standardised mortality rates from cardiovascular disease in England, 2016 to 2023




Source: Office for National Statistics via Office for Health Improvement and Disparities (OHID) Fingertips

# Discussion

Health inequalities are complex, and the patient pathway for CVD patients is no exception. There are clear and—largely—consistent gaps across the pathway, generally to the disadvantage of more deprived areas, particularly in the prevalence of modifiable risk factors, hospital admission rates, and health outcomes (including mortality).

The gaps are clear early in the cardiac pathway, with regards to the differing burden of modifiable risk factors. People in the most deprived areas have the highest prevalence for smoking, physical inactivity, and the highest proportion of people with a BMI classified as obese or overweight.

The picture is somewhat more nuanced when it comes to the prevalence of other medical conditions that can increase people's risk of developing CVD. Notably, the prevalence of hypertension, when accounting for age, is clearly and consistently higher in more deprived areas. For diabetes, prevalence is also significantly higher in the most deprived decile than in the least – but the decile with the highest prevalence is the *second* most deprived. Finally, the prevalence of raised total cholesterol was highest across the most and least deprived quintiles in England. However, whilst amongst women prevalence of raised cholesterol was highest in the most deprived areas, amongst men, prevalence was highest in the least deprived areas. Together, this demonstrates the need for prevention interventions that are targeted at specific groups or areas where the risk factor burden for CVD is higher, as well as interventions aimed at broader groups (where the risk factor burden may be more evenly spread).

The recent availability of age-standardised prevalence data has offered us better insight into the prevalence of cardiovascular diseases than was possible when writing our previous report in 2021/22. This is because the risk of developing many cardiovascular diseases increases with age, and subsequently—without age-standardisation—prevalence indicators can fail to properly describe the association between deprivation and CVD. Instead, they can often merely highlight areas or groups where the average data sources, including age-standardised data, like CVDPREVENT, showed that the most deprived areas had a higher prevalence of CVD and heart failure. Ultimately, both age-standardised and unadjusted prevalence data are important for understanding the factors associated with increased CVD risk or burden (in the case of age-standardised data), *and* where resources for treating patients with established CVD and its clinical risk factors are best directed (in the case of non-standardised data).

Atrial fibrillation (AF) followed a different pattern than other cardiovascular conditions. When accounting for age, prevalence levels for AF were broadly similar across deprivation quintiles. Though, as with most other CVD conditions, unadjusted prevalence data showed that AF prevalence was higher in least deprived areas. Indeed, unadjusted prevalence data is also helpful for understanding differences in prescribing rates for common CVD drugs by deprivation. Many of the most common drugs (including lipid regulating drugs, as well as hypertension and heart failure drugs) were found to have higher prescribing rates in the *least* deprived areas, which is at least partly in keeping with the fact that unadjusted prevalence for their associated conditions is higher in the least deprived areas than the most deprived areas. However, further research is needed to understand if there are any inequalities or inequities in

prescribing rates that disadvantage more deprived areas relative to their disease burden and treatment needs.

For those cardiovascular conditions where there was a *smaller* difference in diagnosed prevalence between the most and least deprived deciles, there were still *pronounced* differences in elective treatment identified in our previous report (for measures we no longer have access to in order to monitor and update). In our previous report, we inferred that this meant there was better access to planned care (arranged in advance, often following a GP referral) in *less* deprived areas. Evidence from primary care data analysed by The Health Foundation still points to under-doctoring in more deprived areas, that could be contributing to this hypothesised *relative* lack of access to elective care.

Finally, there were also clear inequalities in cardiac rehabilitation uptake between the most and least deprived areas in England, to the disadvantage of more deprived areas.

These findings provide further evidence for the areas for potential improvements in CVD care and outcomes, which were identified in our previous report. Namely, that focusing on prevention, education in managing long-term conditions (both in GP settings and cardiac rehab), shifting hospital care from emergency to planned admissions in the most deprived areas, and tackling the low number of GPs in more deprived areas, could improve health outcomes in those populations. Overall, they make a case that inequalities relating to deprivation are pervasive across the entire cardiac pathway, and that these inequalities should be considered when targeting interventions. Finally, the particularly high rates of premature CVD mortality in more deprived areas (that have also seen the largest increases in CVD mortality since the Covid-19 pandemic) offers clear scope for improving *national* CVD mortality rates via targeted upstream interventions to reduce CVD mortality in those areas where it is most pervasive.

# Limitations

There are several limitations to this analysis. Whilst in some cases (namely, smoking prevalence and prescriptions data) we were able to assess associations between CVD and its risk factors at a more granular level, in most cases we had to use deprivation deciles calculated from grouping upper tier local authorities (UTLA). Analysing deprivation-based patterns using UTLA-based deciles makes it harder to identify the *true* association between deprivation and CVD. UTLAs (of which there are around 150) in many parts of England break down into smaller, lower-tier local authorities (meaning there are nearly 300 in total), and then over 33k LSOAs. There can be big disparities in the wider determinants of health even within those much smaller local authorities. We used UTLA-based deprivation deciles, in most cases, to maximise the amount of data that could be mapped across the patient pathway, but by examining inequalities based on deciles composed of larger districts, it is likely that disparities within smaller geographies were hidden.

It should also be acknowledged that deprivation is not static, and that *relative* deprivation changes over time. The most recent measure of deprivation in England is IMD2019, which is now five years old. Since the release of the most recent version of IMD in 2019, there has been the global Covid-19 pandemic, and a 'cost of living' crisis. Whilst in the previous update, the

vast majority of neighbourhoods (i.e. LSOAs) remained in the deprivation decile to which they were assigned in the previous version of IMD, it is possible that there *may* have been more flux in a period of significant societal disruption. Government reported on the results of a consultation on updating IMD2019 in 2022,[43] but an update schedule has yet to be published. Having up-to-date deprivation data is important to enable fair and accurate monitoring of health trends relating to deprivation.

Most of the data used in this analysis did not allow for the exploration of co-morbidities, which is an important contributing factor to overall health and is linked to deprivation.[44] It is important to consider whole individuals across the patient pathway instead of parsing out individual patient characteristics whenever possible.

More generally, we are limited to the data that is collected, and so we reported primarily by deprivation deciles, broken down by sex for ASDRs. The effects of deprivation may be compounded by other social factors, and one limitation of our analysis here is that—for the most part—we were not able to break down our data by more than just deprivation. Intersectionality is a word used to describe how race, class, sex, and other individual characteristics overlap or combine with one another, [45] which can affect health outcomes.

We know that multiple structural, contextual, and individual factors determine social disadvantage and that in turn, this has an impact on health. Therefore, we need health services to collect and be transparent with demographic data in order to evaluate the effects of intersectionality. We also need more inclusive recruitment into research studies and clinical trials to create an evidence base representative of the general population, as outlined in the BHF's strategy for equality, diversity, and inclusion.

# Conclusion

If we look at data across the cardiovascular disease pathway without analysing by deprivation and other individual factors, we risk overlooking important differences in cardiovascular disease and care. Our analysis shows both that inequalities by deprivation are pervasive across the entire cardiovascular pathway, but that the extent of these inequalities vary depending on the measure and section of the pathway. Therefore, a single overarching solution to reduce the gaps in health between the most and least deprived populations would not be effective. Instead, we need to determine the best approaches to reducing inequalities for each part of the cardiovascular disease pathway, as well as the ripple effect those changes could have on the rest of the pathway.

It is key to consider the multi-faceted nature of health inequalities, which varies not just by level of deprivation but also by individual and population characteristics such as age, ethnicity, gender and how intersectionality can compound disadvantage and negatively impact health. BHF remains committed to improving the understanding of health inequalities—including, but not limited to deprivation—and a more holistic report, looking at a broader range of population characteristics, is planned for publication in 2025.

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[43] GOV UK (2022). Indices Futures: Updating the English Indices of Deprivation (IoD) consultation - government response
[44] The Health Foundation (2018). Understanding the health care needs of people with multiple health conditions
[45] An analytical framework coined by Kimberlé Williams Crenshaw.

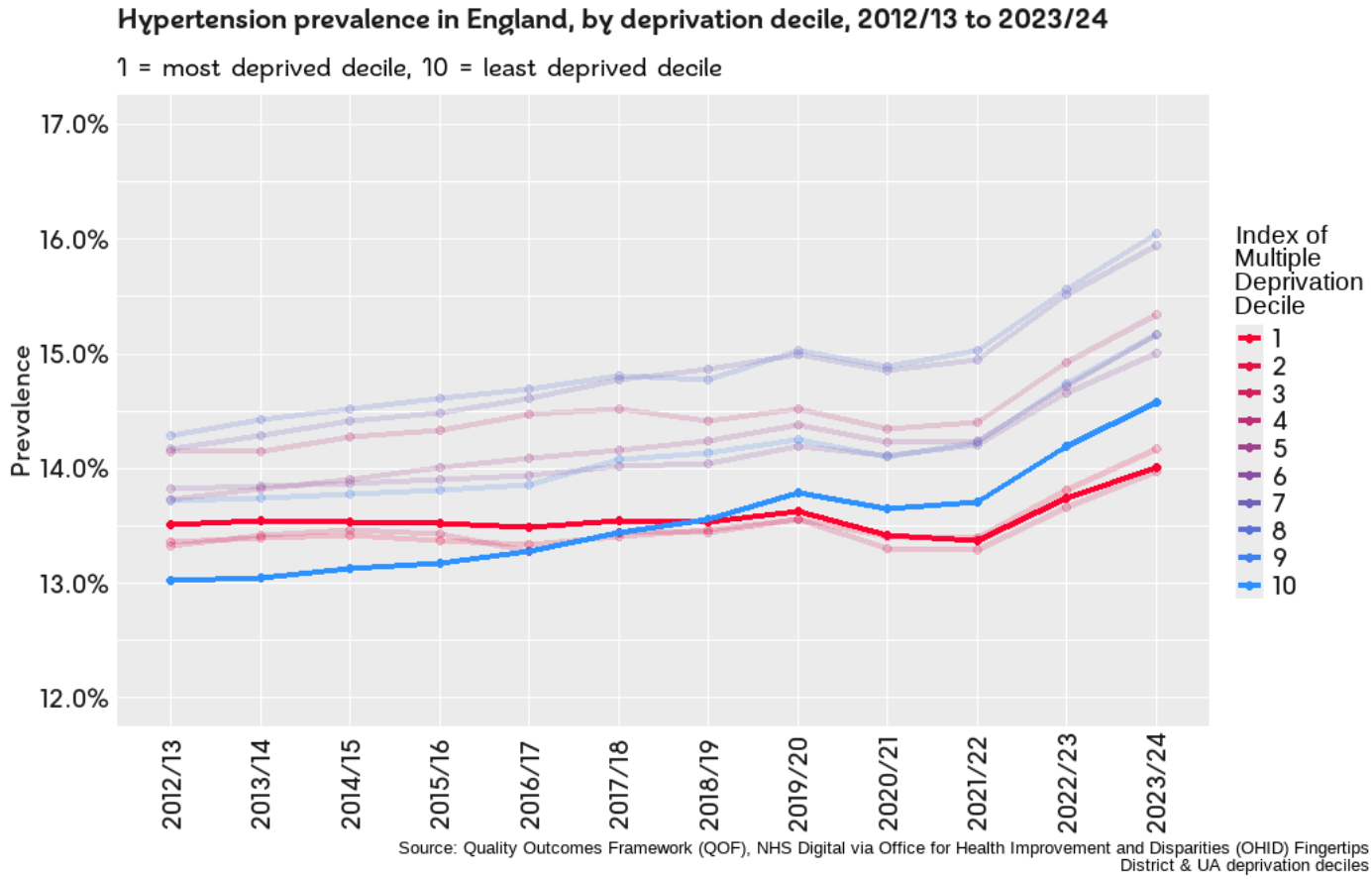
# Appendix

## Appendix A: Hypertension prevalence by deprivation

When measuring mortality, referrals, and admissions, deprivation was measured at a local health board or local authority level. Below are tables listing each local health board or authority and their respective rank. Local authorities were ranked based on the Index of Multiple Deprivation while local health boards were ranked based on the percent of the population that are in the 20% most deprived LSOAs in Wales.

### *Hypertension*

The percentage of people living with hypertension has increased following a small drop from 2019/2020 to 2020/21. Hypertension prevalence was higher in the most deprived decile than in the least deprived decile up to 2018/2019. Data from 2019/2020 onward showed that the percentage of people with hypertension was higher in the least deprived than the most deprived decile. Data for 2023/2024 showed a sharp rise in prevalence across all deciles.



## Appendix B: Prescription rates for CVD drugs in England

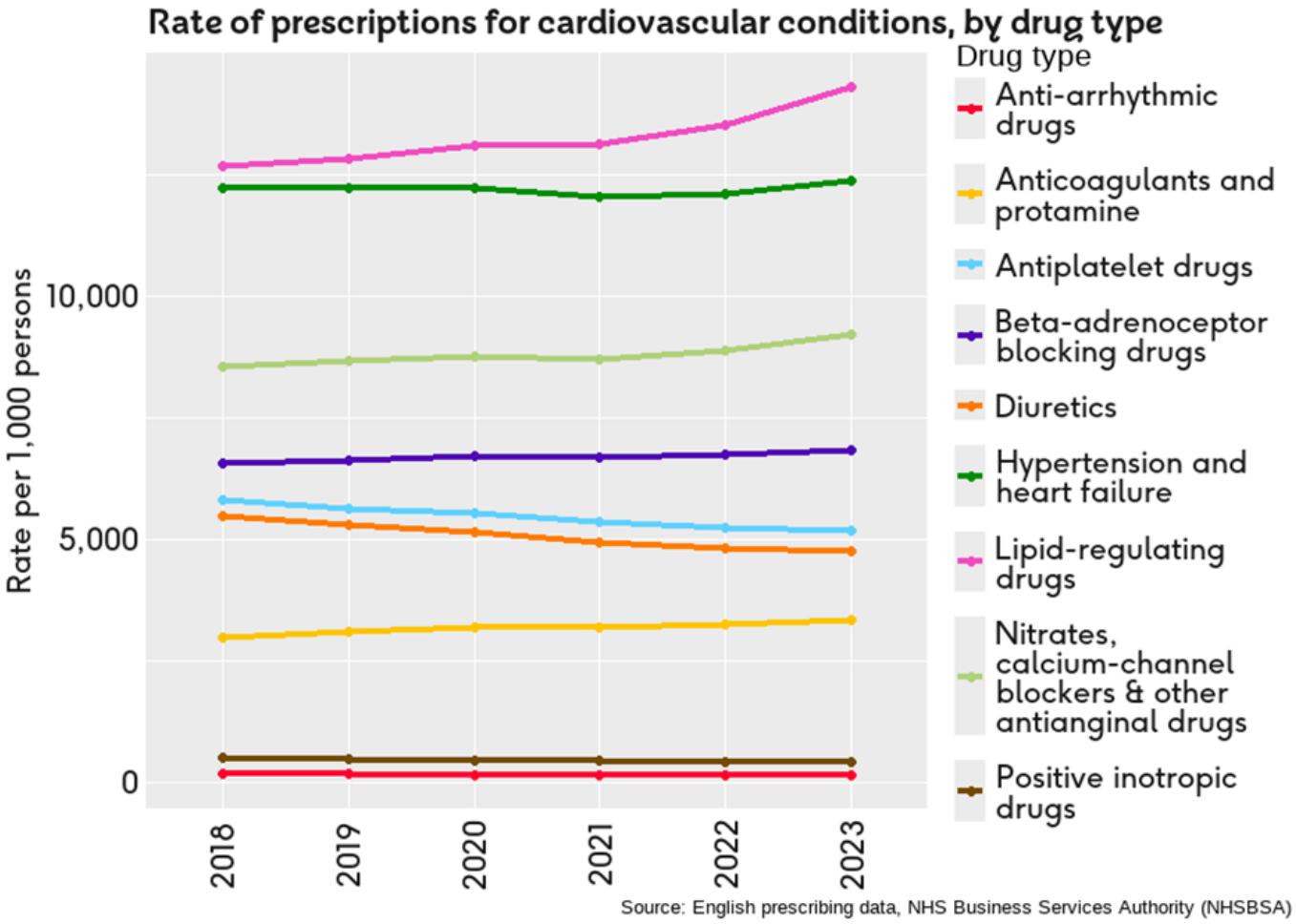


Table 1: All-age mortality rates by gender in England

| Rate of death (per 100K) | | | | |
|---|---|---|---|---|
| All-age | | | | |
| | | Most deprived decile | Least deprived decile | Gap |
| Female | 2019 | 210.5 | 142.5 | 68.0 |
| | 2020 | 218.3 | 152.9 | 65.4 |
| | 2021 | 216.7 | 144.4 | 72.3 |
| | 2022 | 220.8 | 145.4 | 75.4 |
| | 2023 | 221.1 | 146.3 | 74.7 |
| Male | 2019 | 333.4 | 227.1 | 106.3 |
| | 2020 | 349.3 | 239.8 | 109.5 |
| | 2021 | 353.2 | 229.1 | 124.2 |
| | 2022 | 365.7 | 240.7 | 125.0 |
| | 2023 | 360.4 | 239.3 | 121.0 |

Table 2: Premature mortality rates by gender in England

| Rate of death (per 100K) | | | | |
|---|---|---|---|---|
| Under 75 | | | | |
| | | Most deprived decile | Least deprived decile | Gap |
| Female | 2019 | 60.6 | 26.7 | 33.9 |
| | 2020 | 66.1 | 28.5 | 37.5 |
| | 2021 | 66.0 | 29.5 | 36.4 |
| | 2022 | 66.0 | 29.1 | 36.9 |
| | 2023 | 68.3 | 30.2 | 38.0 |
| Male | 2019 | 129.2 | 63.6 | 65.6 |
| | 2020 | 146.7 | 75.2 | 71.5 |
| | 2021 | 149.6 | 73.9 | 75.7 |
| | 2022 | 153.0 | 71.6 | 81.5 |
| | 2023 | 149.5 | 79.5 | 70.0 |