British Heart Foundation

SOCIOECONOMIC INEQUALITIES IN HEART AND CIRCULATORY DISEASES IN SCOTLAND

November 2023

1 Key findings

Risk factors for heart and circulatory diseases

- People living in the most deprived areas of Scotland are significantly more likely than those in the least deprived areas to have a risk factor for heart and circulatory diseases (including having excess weight/obesity, low levels of physical activity, and being more likely to smoke).
- They are also more likely to have a high-risk condition (like hypertension or diabetes) that increases their chance of developing a heart or circulatory disease.

Morbidity and mortality from heart and circulatory diseases

- People living in Scotland's most deprived areas are more likely to have experienced a major cardiovascular event (such as a heart attack or a stroke), and are significantly more likely to be admitted to hospital for a heart attack before the age of 75 than people from the least deprived areas.
- The rate of premature mortality from heart and circulatory diseases is significantly higher in the most deprived areas of Scotland. People living in Scotland's most deprived local authority are almost twice as likely to die from a heart or circulatory disease before the age of 75 as those in the least deprived authority.
- Higher rates of morbidity and mortality from heart and circulatory diseases in Scotland's more deprived areas undoubtedly contribute to the stark—and growing—differences in both life expectancy and healthy life expectancy between the most and least deprived parts of Scotland.

Need for better cardiovascular socioeconomic inequalities data

- There is a general lack of publicly available, cardiology-specific data about deprivation and its association with numerous measures that might help us better understand inequalities within secondary care for people with heart and circulatory diseases.
- Non-specialty data for elective and emergency care highlights a clear association between patient deprivation and inpatient and outpatient episodes. Access to specialty-level data would help us understand whether this association is also true for cardiology services.
- As recognised in the 2021 Heart Disease Action Plan, there is a lack of data on cardiac rehab in Scotland. When this is addressed, this should include data on uptake by deprivation.

2 Introduction

An estimated 700,000 people are living with heart and circulatory diseases in Scotland today. Many thousands more have risk factors for these conditions such as high blood pressure, raised cholesterol, obesity, and type 2 diabetes. Although the death rate from heart and circulatory diseases has declined over the last several decades, they still cause 29% of deaths in Scotland[1] and remain the leading cause of death globally.[2]

What's more is that heart and circulatory diseases are strongly associated with health inequalities in Scotland, with data presented in this report highlighting the degree to which this association is apparent across the cardiac pathway, from prevention to treatment, as well as differing rates of mortality. In Scotland, people living in the

[1] British Heart Foundation, Heart and Circulatory Diseases Statistics – 2023. https://www.bhf.org.uk/what-we-do/our-research/heart-statistics/heart-statistics-publications/cardiovascular-disease-statistics-2023.

[2] World Health Organization, 2023. Cardiovascular diseases. https://www.who.int/health-topics/cardiovascular-diseases.

most deprived local authority are almost twice as likely to die from heart and circulatory diseases before the age of 75 as those in the least deprived authority. These inequalities in cardiovascular outcomes contribute to the stark differences in life expectancy between the least and most deprived areas of Scotland.[3]

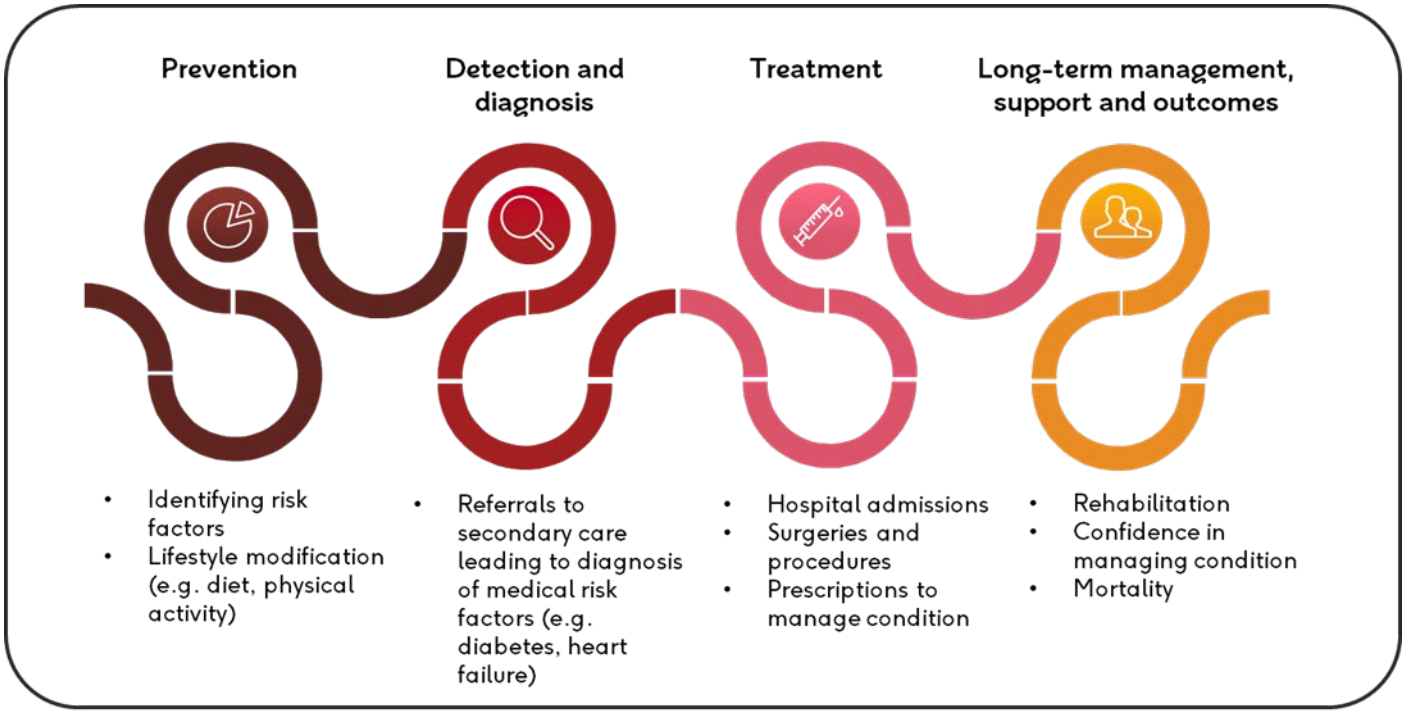
Cardiovascular health is deeply connected to and impacted by wider determinants of health. In other words, the disparities seen among people with heart and circulatory diseases are driven by factors such as income, housing, education, the environment, and access to health and social care. On average, people in more deprived areas develop multiple conditions 10-15 years earlier than in more affluent areas. People in more deprived areas 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.[4]

Health inequalities are differences in health status, healthcare, and health-related risks between different population groups that are unfair and avoidable.[5] 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 has highlighted, and likely exacerbated, health inequalities across the country, and that includes cardiovascular disease. This analysis examines the trends of inequalities in cardiovascular disease prior to the pandemic at multiple points on the cardiac pathway (Figure 1) focusing on prevention, detection & diagnosis, treatment, and outcomes. This provides for the first time a holistic view of socioeconomic health inequalities across the CVD pathway, giving additional insight into not only where improvement is needed, but also indications of where Scotland has 'got it right' and highlighting data gaps and opportunities for further analysis.

Figure 1 - The CVD Pathway



[3] For a broader look at the drivers of health inequalities in Scotland, a useful starting point is The Health Foundation's 2023 report 'Leave no one behind'.

[4] The Richmond Group, Health Foundation (2019) The Multiple Conditions Guidebook.

[5] This definition of health inequalities is based on similar definitions provided by organisations including: Public Health Scotland, NHS England, The King's Fund, and the World Health Organization.

3 Methods

The main indication of inequality by geography is the Scottish Index of Multiple Deprivation (SIMD).[6] It is the official measure of relative deprivation in small areas in Scotland. The index ranks 6,976 neighbourhoods (called 'data zones') in Scotland by looking at 7 distinct domains: income, employment, health, education/skills training, crime, geographic access to services, and housing. We chose to use the SIMD as a well-recognised, validated measure of deprivation that incorporates many of the wider determinants discussed above and is not limited to simple 'rich – poor' income-based dimension. The SIMD scores measure *relative* deprivation, and it is important to note that the deprivation level does not apply to each individual living in an area.

For the purposes of this report, the neighbourhood SIMD ranks have been mapped to larger geographies, including local authorities and NHS Health Boards. To calculate SIMD ranks for these two geography types, we combined population-weighted SIMD scores (for LAs) and ranks (for Health Boards) for their composite data zones.

In some instances, data provided by the Scottish Government is stratified by the Income Employment Index (IEI). This narrower indicator of deprivation is used for data sourced from the Scottish Government's 'Long-term Monitoring of Health Inequalities' report, where it is used as the primary means of analysing area-based socioeconomic differences.[7] The full details for how this index was calculated is provided in the appendix of their report but, in short, the IEI is an equally-weighted combination of the Income and Employment domains of the SIMD, under which the data zones are grouped into deciles based on their score.

For national data, this analysis primarily uses deprivation deciles and quintiles for both the SIMD and IEI, dependent on the data available. However, in some instance, for NHS Health Boards, deprivation has been represented as the percentage of patients living in the 20% or 40% most deprived areas of Scotland (SIMD).

We used the following data sources:

- Scottish Health Survey, Scottish Government
- Long-term Monitoring of Health Inequalities March 2023, Scottish Government
- NHS waiting times - stage of treatment, Public Health Scotland
- Prescriptions in the Community, Public Health Scotland
- General Practice - GP workforce and practice list sizes (2012 – 2022), Public Health Scotland
- Heart & Circulatory Disease Statistics 2023, British Heart Foundation (Age-standardised mortality rates calculated in partnership the National Records of Scotland)
- Life Expectancy, Scottish Government
- Life Expectancy in Scotland 2019-2021, National Records of Scotland
- Healthy Life Expectancy, Scottish Government
- Healthy Life Expectancy in Scotland 2019-2021, National Records of Scotland

Where data was not already mapped to SIMD or IEI, each dataset was mapped to population-weighted local authority (LA) and health board (HB) SIMD ranks and deciles using:

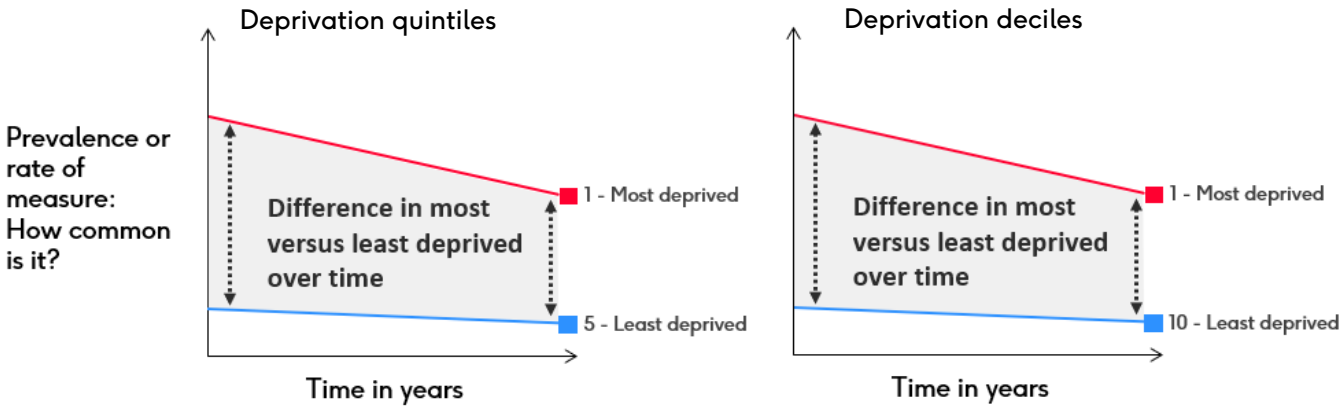
- Scottish Index of Multiple Deprivation 2020, Scottish Government

[6] Scottish Government, Scottish Index of Multiple Deprivation 2020. https://www.gov.scot/collections/scottish-index-of-multiple-deprivation-2020/.

[7] Scottish Government, 2023. Long-term Monitoring of Health Inequalities.

Data presentation: how to interpret the graphs

Most of this analysis is presented in graphs showing the trend in each deprivation decile or quintile over time. You can see whether the prevalence or rate is increasing or decreasing over time, and the variation between each decile or quintile. To look at the most versus least deprived, you can focus on their corresponding lines, as shown below, to see how the gap has changed over time.



4 Results

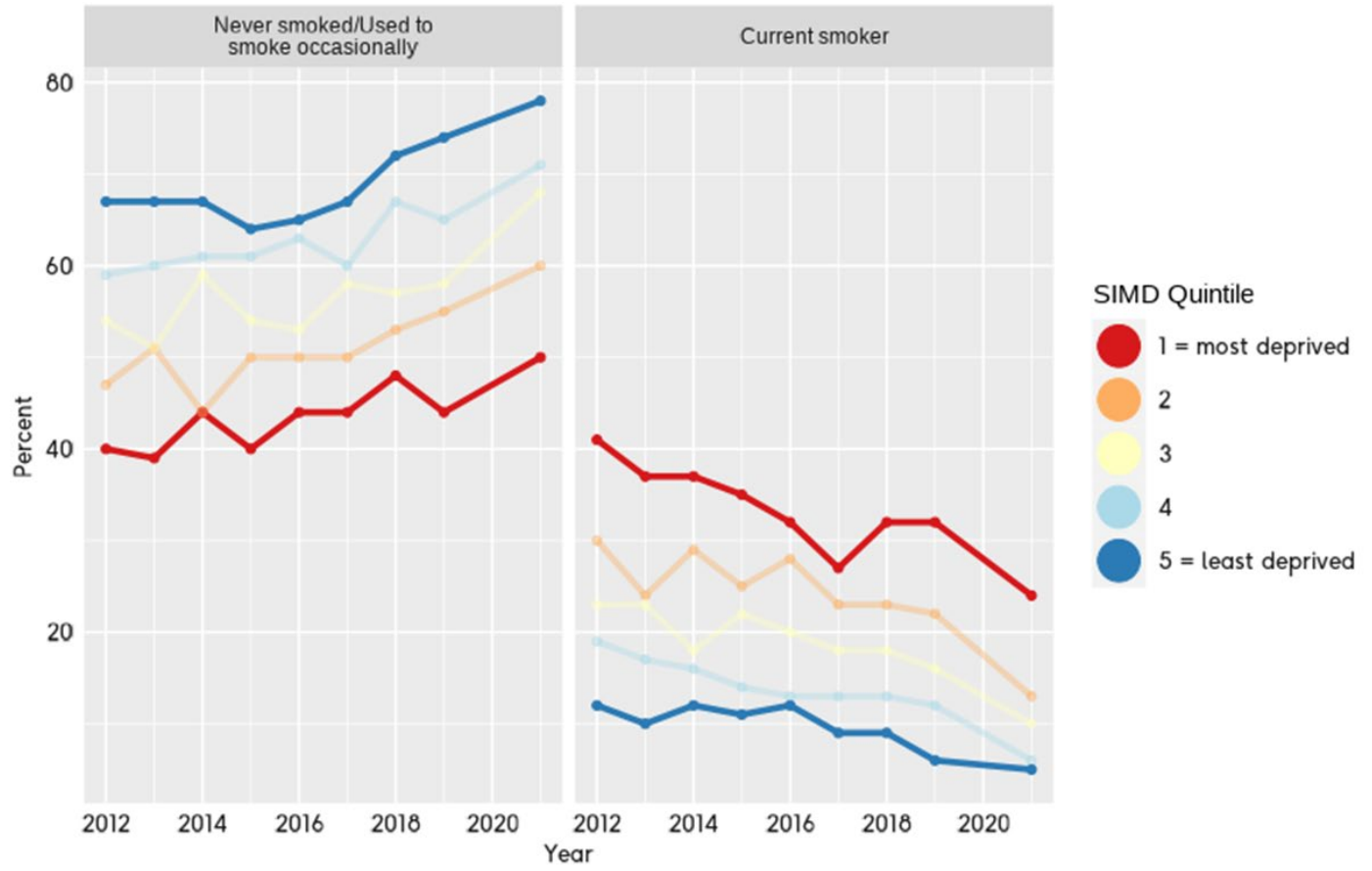
4.1 Prevention: modifiable risk factors for heart and circulatory diseases

Cardiovascular health is determined in part by a range of modifiable factors. In Scotland, an estimated 83% of heart and circulatory disease deaths, and 84% of disability-adjusted life years (DALYs)[8] from heart and circulatory diseases, can be attributed to modifiable risk factors, such as diet, smoking status, and medically manageable risk factors like high blood pressure.[9] 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 their choices, behaviours, and exposure to risk.

Smoking

We know that smoking can lead to a heart attack or stroke. It is estimated that around 2,000 deaths from heart and circulatory diseases in Scotland each year can be attributed to smoking.[10] Like the prevalence of adults classified as overweight or obese and physically inactive, smoking prevalence in adults also varies by deprivation quintile. The trend of smoking has decreased from 2012 to 2021 across deprivation quintiles, and the gap between the percentage of people in the most and least deprived areas reporting being current smokers has fallen from 29% in 2012 to 19% in 2021 (Figure 2). The closing of this gap has been driven by a particularly sharp decrease in the percentage of current smokers in the most deprived areas, which has fallen from 41% people in 2012 to 24% in 2021. However, whilst the gap in smoking prevalence between the most and least deprived areas has decreased, the prevalence of smoking in 2021 was almost five times higher amongst the most deprived areas (24%) than in the least deprived areas (5%).

Figure 2 - Smoking status of Scottish adults in 2012-2021, by Scottish Index of Multiple Deprivation



Source: Data from Scottish Health Survey

*Please note there is no data for 2020, as the Scottish Health Survey was suspended due to the Covid-19 pandemic

[8] DALYs are a measure of how much disease is estimated to affect the life of a population. The following article by the Nuffield Trust provides a good introduction to DALYs: https://www.nuffieldtrust.org.uk/resource/using-dalys-to-understand-young-people-s-health.

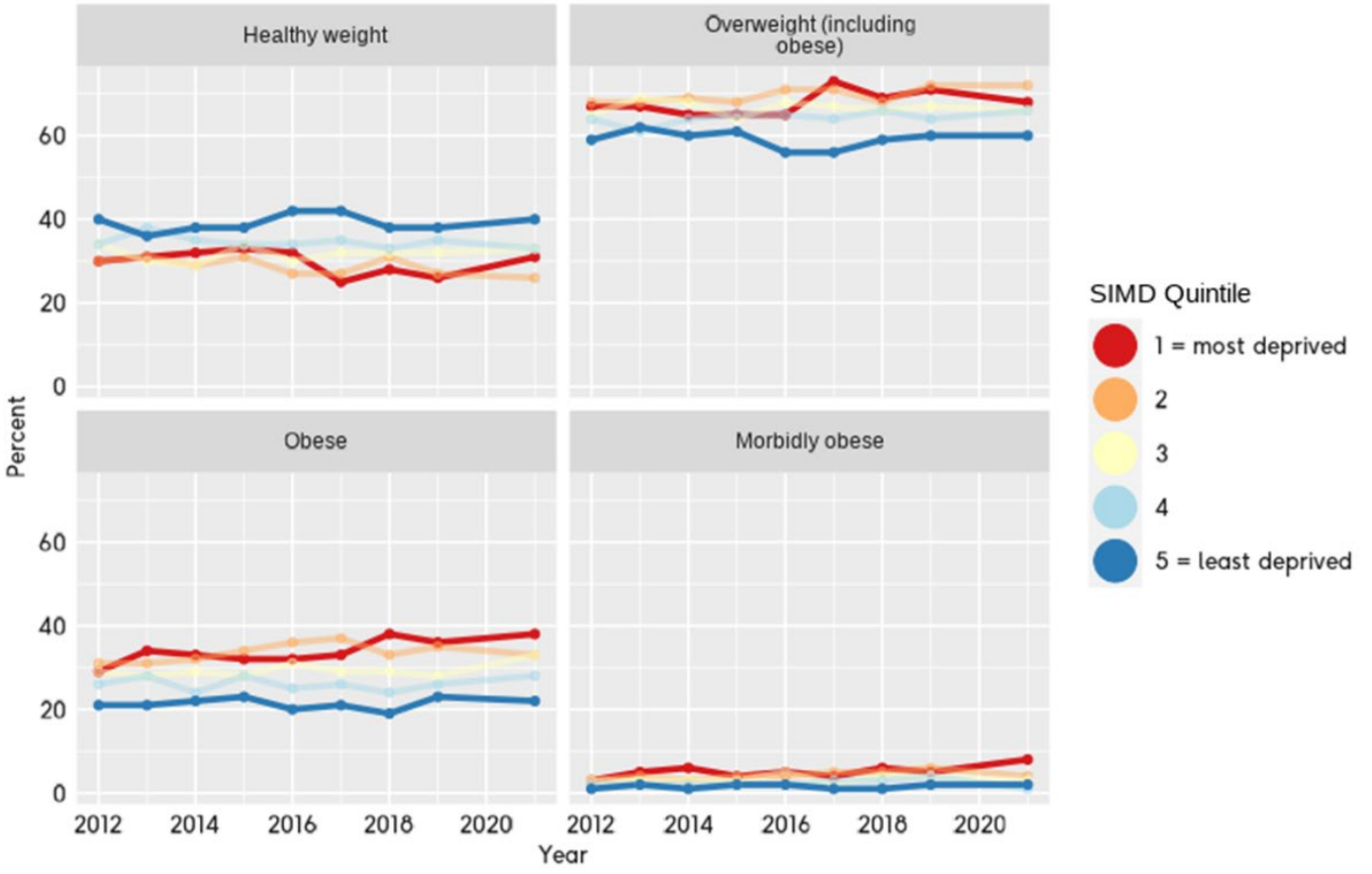
[9] British Heart Foundation, Heart & Circulatory Disease Statistics 2023 – Chapter 5 (Risk Factors).

[10] British Heart Foundation, 2023. BHF Statistics Factsheet – Scotland.

Overweight and obesity

An estimated 30% of adults in Scotland have obesity and a further 37% have a body mass index (BMI) defined as overweight. Breaking this down into deprivation quintiles, the two most deprived quintiles (40% of adult population) consistently had the highest proportion of adults classified as overweight or obese from 2012 to 2021 (Figure 3). Comparing the most and least deprived areas also highlights the differing trends regarding obesity according to area deprivation. The prevalence of obesity in the most deprived areas increased from 29% in 2012 to 38% in 2021, whereas in the least deprived area it increased from 21% in 2012 to 22% in 2021. Therefore, across this period the obesity prevalence gap between Scotland's most and least deprived areas doubled from 8% to 16%. A similar trend can be seen in the prevalence of morbid obesity, the prevalence for which increased from 3% in 2012 to 8% in 2021 in the most deprived areas (5% point increase), compared to an increase from 1% in 2012 to 2% in 2021 in the least deprived areas.

Figure 3 - BMI category of Scottish adults in 2012-2021, by Scottish Index of Multiple Deprivation (SIMD)



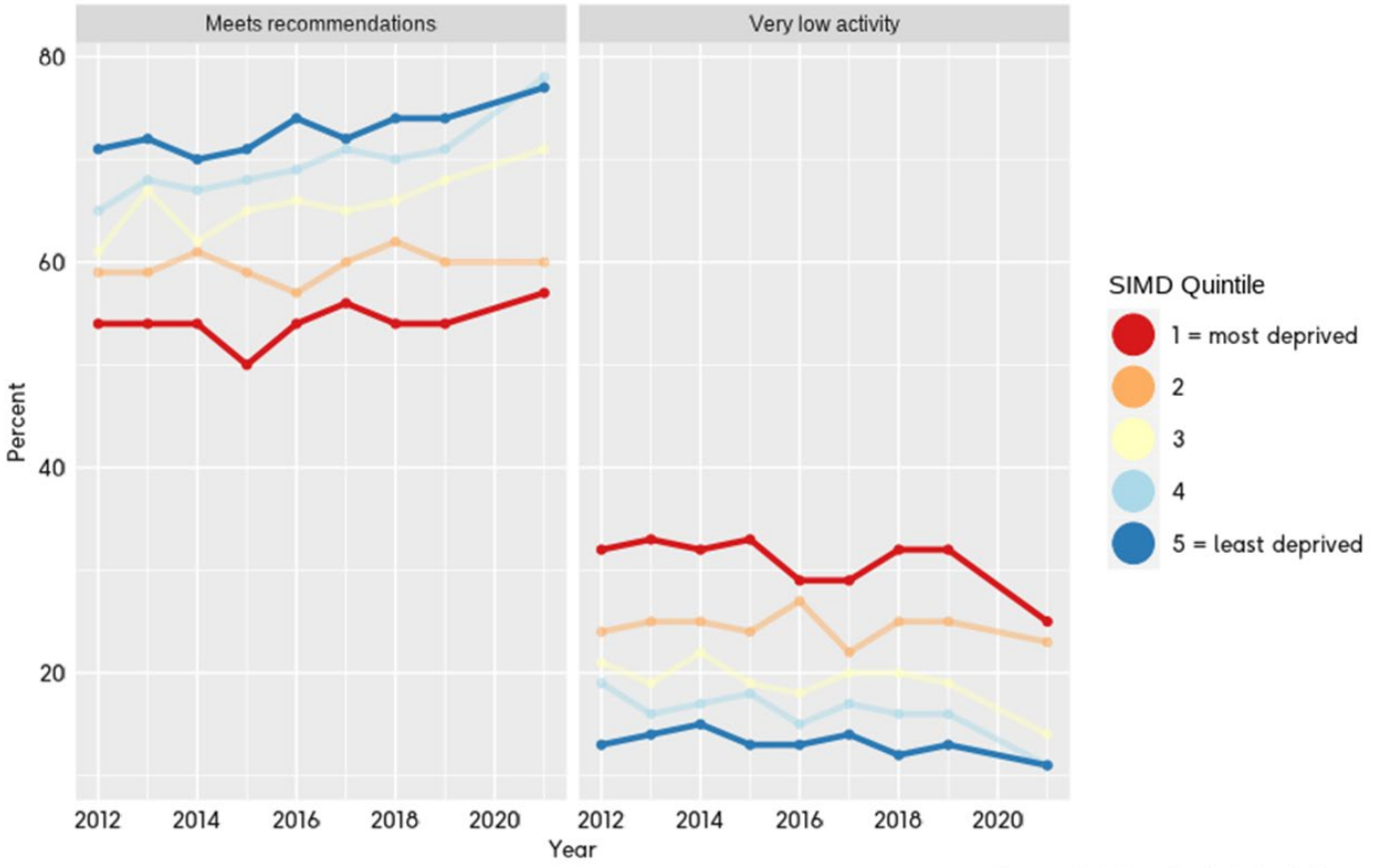
Source: Data from Scottish Health Survey

*Please note there is no data for 2020, as the Scottish Health Survey was suspended due to the Covid-19 pandemic

Physical activity

Low levels of physical activity are associated with an increased risk of cardiovascular disease and cardiovascular mortality.[11,12,13] Overall, around 31% of adults in Scotland do not meet current physical activity recommendations (at least 150 minutes of moderate, or 75 minutes of vigorous, activity each week). The prevalence of physical inactivity is again higher in more deprived quintiles, with 43% of adults in the most deprived quintile in 2021 not meeting the recommended levels of physical activity, compared only 23% of adults in the least deprived quintile (a gap of 20%) (Figure 4). This deprivation gap is also stark for adults reporting the lowest levels of weekly physical activity (0 to <30 minutes), for which the prevalence in 2021 was 25% in the most deprived areas compared to only 11% in the least deprived areas (a gap of 14 percentage points).

Figure 4 - Activity levels of Scottish adults in 2012-2021, by Scottish Index of Multiple Deprivation (SIMD) quintile



Source: Data from Scottish Health Survey
Physical activity weekly guidelines: Recommended 150+ mins, Some = 60 to <150 mins, Low = 30 to <60 mins, Very low = 0 to <30 mins

*Please note that there is no data for 2020, as the Scottish Health Survey was suspended due to the Covid-19 pandemic

[11] Oguma Y, Shinoda-Tagawa T. Physical activity decreases cardiovascular disease risk in women: review and meta-analysis. American journal of preventive medicine. 2004 Jun 1;26(5):407-18. https://doi.org/10.1016/j.amepre.2004.02.007.

[12] Nocon M, Hiemann T, Müller-Riemenschneider F, Thalau F, Roll S, Willich SN. Association of physical activity with all-cause and cardiovascular mortality: a systematic review and meta-analysis. European Journal of Preventive Cardiology. 2008 Jun 1;15(3):239-46. https://doi.org/10.1097/HJR.0b013e3282f55e09.

[13] Cheng W, Zhang Z, Cheng W, Yang C, Diao L, Liu W. 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. 2018 Nov;25(17):1864-72. https://doi.org/10.1177/2047487318795194.

Fruit and vegetable consumption

Evidence also indicates that a low consumption of fruit and vegetables is associated with an increased risk of both cardiovascular morbidity and mortality.[14,15,16] As with the other outlined risk factors for CVD, fruit and vegetable consumption amongst adults is also associated with area deprivation (Figure 5). As displayed in Figure 5, in 2021 whilst 31% of people in the least deprived quintile reported consuming at least five portions of fruit or vegetables in the previous 24 hours, this figure was only 12% for people living in the most deprived quintile. This represents a difference of 19 percentage points between the least and most deprived quintiles in 2021, which itself represents an increase from the 11 percentage point difference observed between the least and most deprived quintiles in 2012. Whilst there is a less clear association between area deprivation and the percentage of adults reporting consuming between 1-4 portions of fruit and vegetables in the previous 24 hours, there is a clear association between area deprivation and the percentage of adults reporting that they consumed no portions of fruit or vegetables in the same period. In 2021, only 3% of people in the least deprived quintile reported that they did not consume any fruit or vegetables in the previous 24 hours, compared to 9% in the most deprived quintile.

Figure 5 - Fruit and vegetable consumption in previous 24 hours by Scottish adults in 2012-2021, by Scottish Index of Multiple Deprivation(SIMD) quintile

Source: Data from Scottish Health Survey

*Please note there is no data for 2020, as the Scottish Health Survey was suspended due to the Covid-19 pandemic

[14] Zhan J, Liu YJ, Cai LB, Xu FR, Xie T, He QQ. Fruit and vegetable consumption and risk of cardiovascular disease: A meta-analysis of prospective cohort studies. Critical reviews in food science and nutrition. 2017 May 24;57(8):1650-63. https://doi.org/10.1080/10408398.2015.1008980.

[15] Wang X, Ouyang Y, Liu J, Zhu M, Zhao G, Bao W, Hu FB. Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies. Bmj. 2014 Jul 29;349. https://doi.org/10.1136/bmj.g4490.

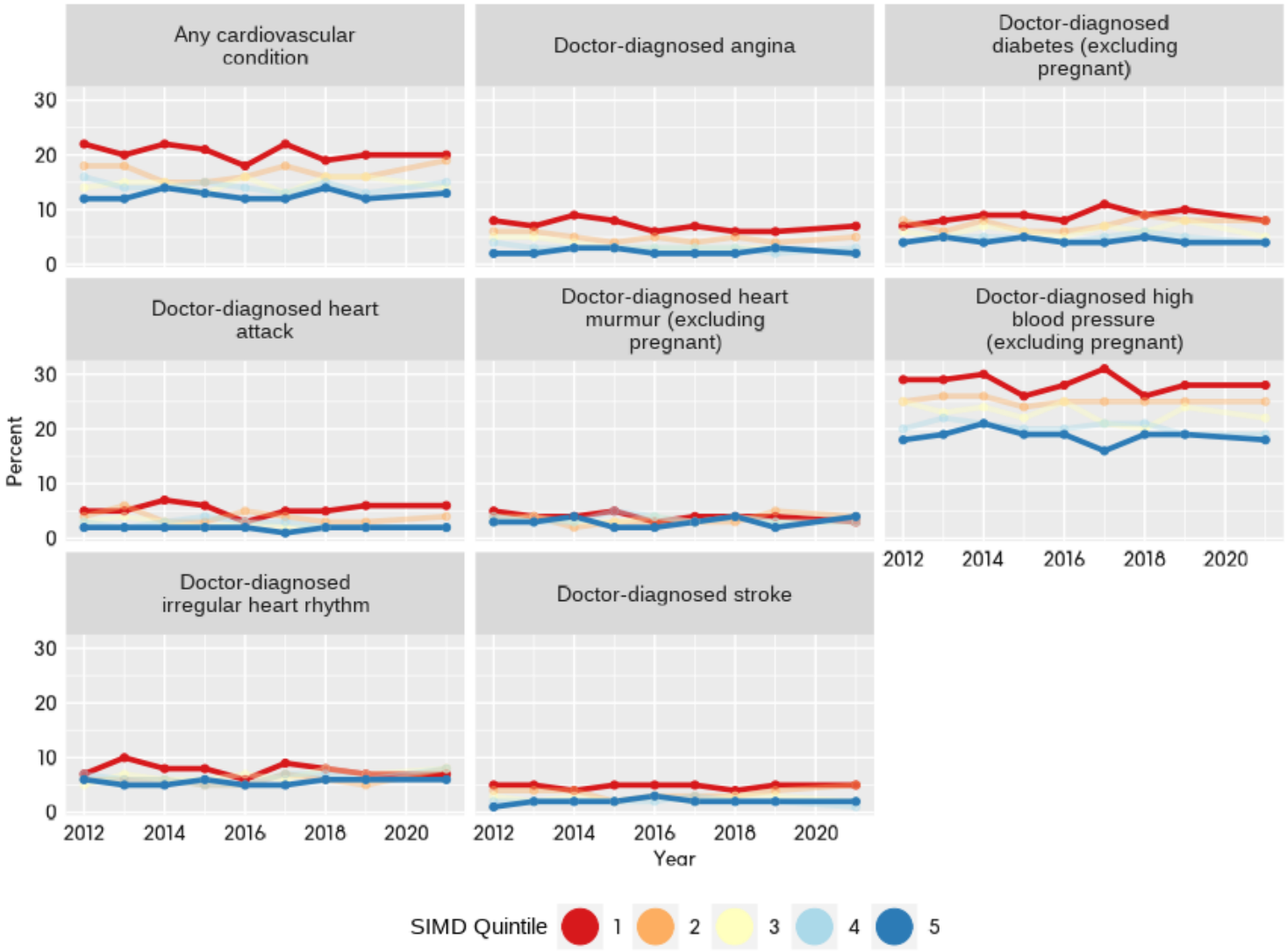
[16] Aune D, Giovannucci E, Boffetta P, Fadnes LT, Keum N, Norat T, Greenwood DC, Riboli E, Vatten LJ, Tonstad S. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality—a systematic review and dose-response meta-analysis of prospective studies. International journal of epidemiology. 2017 Jun 1;46(3):1029-56. https://doi.org/10.1093/ije/dyw319.

4.2 Detection, diagnosis, and cardiovascular morbidity

Data sourced from the annual Scottish Health Survey from 2012 to 2021 enables an analysis of doctor-diagnosed cardiovascular disease (CVD), along with CVD risk factors, by area deprivation. In this case, 'doctor-diagnosed' cases are ascertained by the questioner explicitly asking respondents whether they were told by a doctor that they had a particular condition. An analysis of this data (Figure 6) reveals a strong association between area deprivation and doctor-diagnosed CVD[17], with significantly more adults in the most deprived quintiles reporting having conditions that put them at increased risk of CVD (high blood pressure and diabetes), along with several cardiovascular diseases (angina, heart attack, and stroke). This association was apparent for these conditions across the entire period covered by the data (2012-2021). There was, however, a less clear association across this period between area deprivation and several other cardiovascular diseases (including heart murmur, and irregular heart rhythm).

Figure 6 - Self-reported doctor-diagnosed prevalence of cardiovascular diseases and risk factors amongst Scottish adults in 2012-2021, by Scottish Index of Multiple Deprivation (SIMD) quintile

1 = most deprived, 5 = least deprived



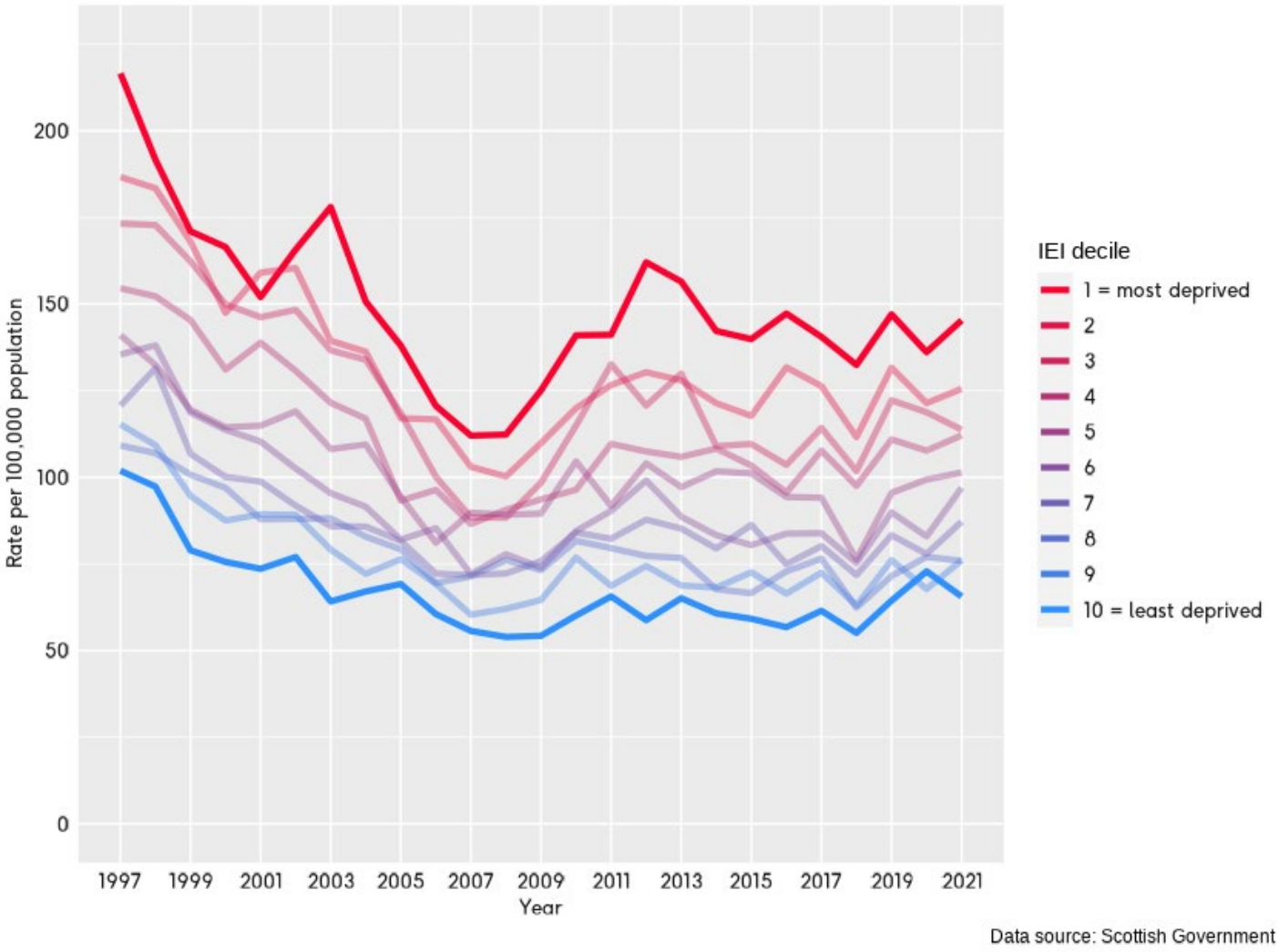
Source: Data from Scottish Health Survey *Please note that there is no data for 2020, as the Scottish Health Survey was suspended due to the Covid-19 pandemic **'Any cardiovascular condition' is derived from respondents being asked if they have ever had high blood pressure, angina, heart attack, heart murmur, abnormal heart rhythm or other heart trouble.

[17] It is worth highlighting that the Scottish Health Survey categorises 'Any cardiovascular condition' as follows: *'Cardiovascular conditions include ischaemic heart disease (heart attack or angina), stroke, heart murmur, abnormal heart rhythm or 'other heart trouble'. Diabetes and high blood pressure are excluded.'*

First-time heart attack admissions amongst under-75s

Scottish Government make data available on the rate of under-75s first ever hospital admissions for a heart attack, by Income Employment Index (IEI) decile. This data reveals a clear association by which more deprived areas have higher rates of admissions amongst under-75s for first ever heart attacks (Figure 7). This association has persisted since 1997, across a period of a significant decline in first-time heart attack hospital admissions from 1997 to 2008, and through a period of subsequent increase and relative plateauing of the admissions rate from 2009 to 2021. Over this period, the difference in admissions rate between the most and least deprived deciles has varied, declining from a peak of 114.6 per 100k in 1997, to a low of 56.4 per 100k in 2007, with the difference most recently at 79.7 per 100k in 2021.

Figure 7 - Inequalities in first ever hospital admission for heart attack aged under 75 (rate per 100,000 population), by Income Employment Index (IEI) decile



Data source: Scottish Government

4.3 Treatment

Secondary care

There is a clear gap, in the cardiac pathway, when it comes to the availability of deprivation data for cardiology services in secondary care. As far as this report has been able to ascertain, there is no publicly available data for cardiology service metrics in Scotland that are broken down by patients' SIMD. It is possible to do some limited analysis of acute hospital indicators for cardiology and their association with deprivation, based on data made available by Public Health Scotland (PHS) at a health board level. This requires matching these datasets to other datasets that quantify the percentage of health board populations that fall within the 20% and 40% most deprived parts of Scotland, and/or creating a weighted average of the health board's constituent SIMD 'neighbourhood' scores/ranks. Such approaches, however, are limited in the sense that they could easily obscure *actual* associations between area deprivation and secondary cardiology service metrics that might exist, by virtue of using large geographies that could obscure local variation. This should be considered during the ensuing discussion of what data *is* available.

Analysis of quarterly-reported waiting list data from March 2019 to June 2023, for instance, indicates that there appears to be no strong, consistent association between the percentage of health board residents in the 20% and 40% most deprived parts of Scotland and median waiting times for outpatient cardiology appointments (Figures 15-16). The presence or absence of such an association in narrower, more specific time periods, however, has varied over time. In 2019, there was no apparent association, whereas during the first six months of the pandemic median waiting times were *generally* higher in health boards with a larger percentage of residents from deprived areas. Since the end of 2020, however, there has been no clear, consistent association between median cardiology waiting times and health board deprivation.

In other areas there is also no clear association between health board deprivation and acute hospital indicators for cardiology. This is the case for the crude rate of continuous inpatient stays (CIS) where the main diagnosis was cardiovascular disease in health boards, and the percentage of health board residents in the 20% and 40% most deprived parts of Scotland. However, this pertains to a crude—rather than age-standardised—rate, and it is possible that this measure disguises a potential association. It should also be highlighted that the PHS data on CIS by main diagnosis *does* include volume and rate data for various sex and age combinations. The formatting of this data, however, is not conducive to comprehensive analysis, and thus a full analysis of this data would require more resource than that available for the purposes of this report.

PHS also make a broader set of deprivation data available for acute hospital activity (specifically, about outpatient and inpatient episodes across elective and emergency care), but this is not provided at a specialty level. A more detailed analysis of this, including plots, is provided in the Appendix (Figures 17-25). However, in summary, within secondary care as a whole, there is an association between patients' area deprivation and both emergency and elective care episodes, for inpatients, outpatients, and day cases. Across all these areas, in each year from 2018 to 2022, there were more episodes amongst the most deprived quintile than the least deprived quintile. The gap between the number of inpatient episodes between the most and least deprived quintiles is also notably larger for emergency than elective care, which lends weight to the argument that more patients from deprived areas are presenting to emergency care because of difficulties accessing other areas of healthcare (e.g. primary care and elective secondary care services).

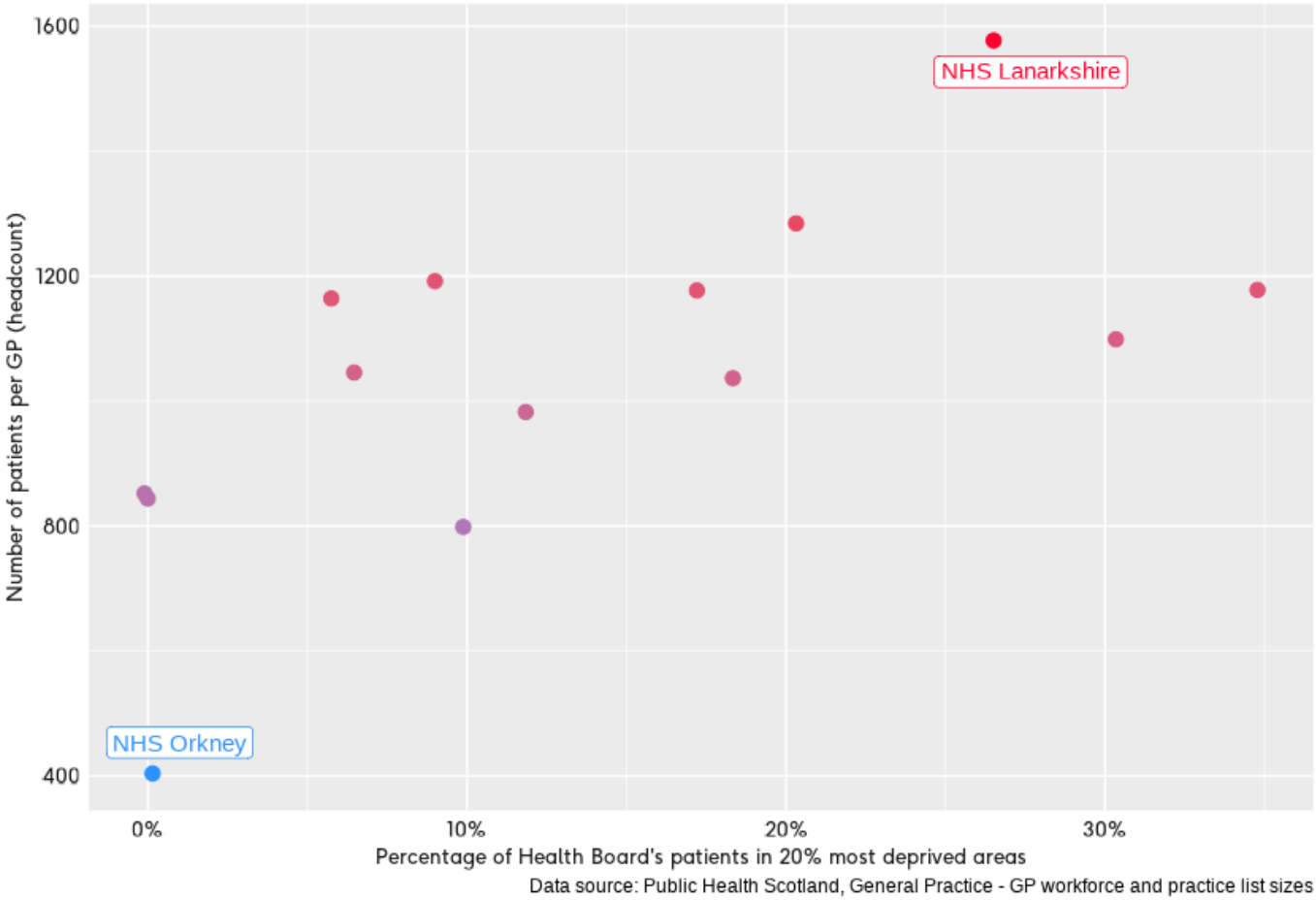
Primary care

One reason there may be a larger gap between the most and least deprived areas for the number of emergency admissions, compared to elective admissions, could be driven by a lack of access to primary care and previous research supports the notion that there is so-called 'under doctoring' in more deprived areas.[18] One way we can examine the degree to which this may be the case is looking at then number of patients per GP in health boards, compared to how many patients they have from the most deprived areas. This is possible using data supplied by Public Health Scotland, analysis of which is presented in Figures 8-9.

Figure 8 shows the number of patients per GP in Scottish health boards in 2022, compared to the percentage of patients in the 20% most deprived areas.[19] It shows that there appear to be more patients per GP in health boards with a higher proportion of patients in the 20% most deprived areas nationally. This trend is also apparent if we look at the association between the number of patients per GP in Scottish health boards and the percentage of patients in the 40% most deprived areas nationally (Figure 9). Further time series analysis, presented in the Appendix (Figures 26-27), shows that this association has been apparent since at least 2014.

This analysis does, therefore, support the notion of 'under doctoring' in more deprived areas in Scotland, at least within primary care.

Figure 8 - Number of patients per GP (headcount) in Scottish Health Boards in 2022, by percentage of patients in 20% most deprived areas (SIMD)



[18] Blane, David N., Gary McLean, and Graham Watt. 'Distribution of GPs in Scotland by age, gender and deprivation.' Scottish Medical Journal 60, no. 4 (2015): 214-219. https://journals.sagepub.com/doi/10.1177/0036933015606592.

[19] Note, three health boards (Orkney, Shetland, and Western Isles), have no areas classed as being in the 20% most deprived areas nationally. This explains the clustering of points in the far left of the plots. However, it should be recognised that this does not mean that these areas have no people living in what would be considered 'deprivation'.

Figure 9 - Number of patients per GP (headcount) in Scottish Health Boards in 2022, by percentage of patients in 40% most deprived areas (SIMD)

Prescriptions

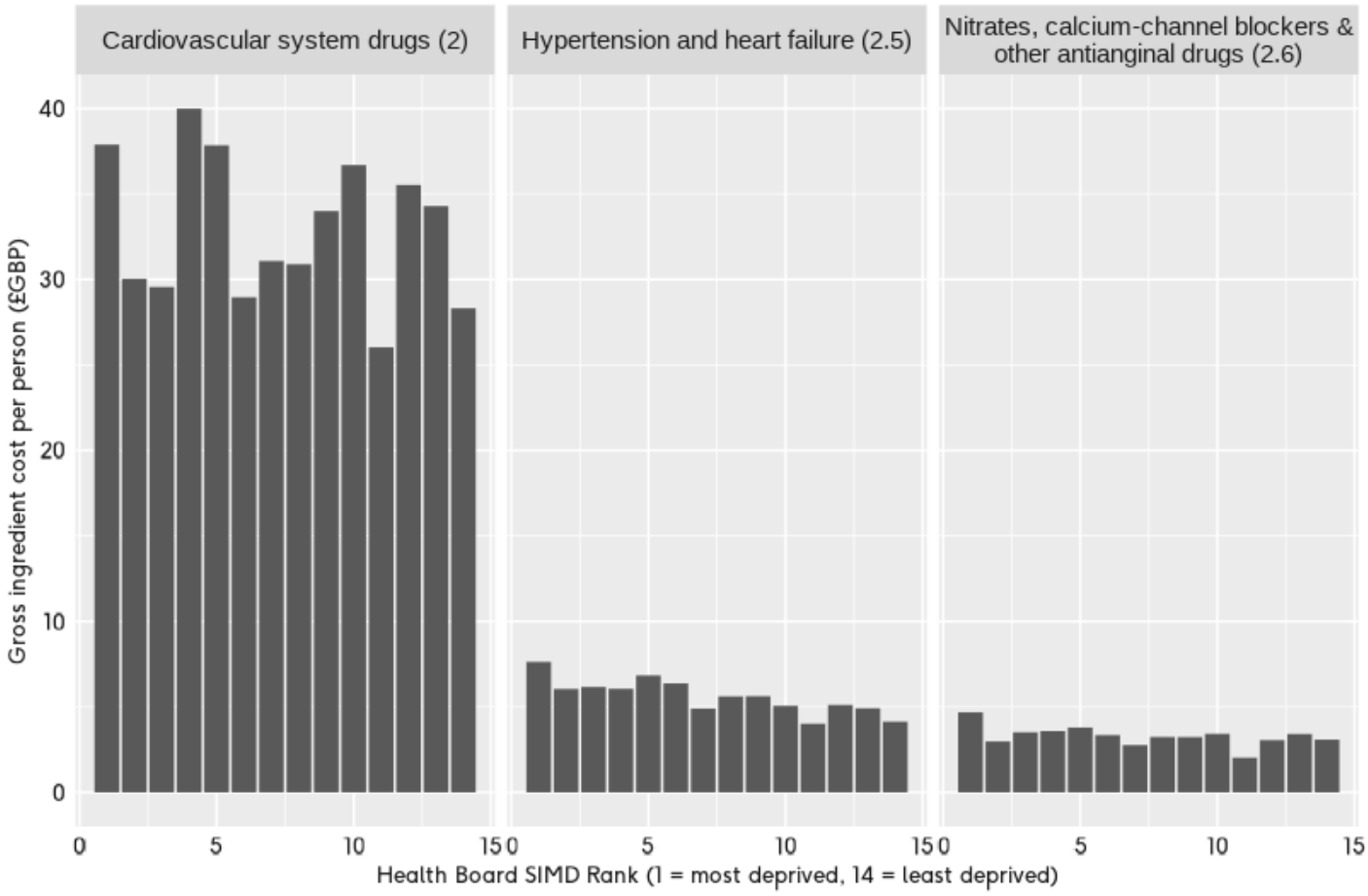
Public Health Scotland make data on community-dispensed prescription cardiovascular drugs in Scotland available at GP practice and Health Board level. This data refers to prescriptions dispensed within community (i.e. non-hospital) settings, the majority of which will be written by GPs, with the remainder written by other authorised prescribers, such as dentists and nurses. Prescriptions written in hospitals but dispensed in the community are also included in this data. Drugs are categorised in the data according to the British National Formulary (BNF) system, under which cardiovascular drugs fall within BNF section 2.

Whilst Public Health Scotland do not provide the data with any deprivation data attached, we have mapped the Health Board level data for the most recent 12-month period available (May 2022 to April 2023) to custom Health Board SIMD rankings (as described in the Methods section) and the most recent mid-year population estimates, to gauge whether there this an association between area deprivation and community dispensed CVD drugs.

Figure 10 visualises the gross ingredient cost (GIC) of community-dispended prescription CVD drugs, by Health Board SIMD rank and BNF section and sub-section, for the main BNF CVD drug category (section 2), and three of the main CVD BNF subsections (2.5. Hypertension and heart failure; and 2.6. Antianginal). It shows that there does appear to be an association between the GIC per person of community dispensed CVD drugs and Health Board SIMD rank, with the per person GIC of CVD system drugs (BNF section 2) higher in more deprived areas, and the same association also apparent for hypertension and heart failure drugs, and antianginal drugs. This finding would appear coherent with the data presented in section 3.3 which highlighted the higher prevalence of both doctor-diagnosed angina and hypertension in more deprived areas.

Notably, there does not appear to be any clear association between per person GIC and Health Board SIMD rank when it comes to anticoagulants and protamine. This may reflect the less clear association between deprivation and conditions like heart rhythm disorders highlighted in section 3.3, but it should also be highlighted that anticoagulants are given to patients to treat a range of disorders, as well as after surgeries that inhibit movement temporarily, such as hip and knee replacements.

Figure 10 - Gross ingredient cost (GIC) per person for community prescribed cardiovascular drugs in Scotland, by Health Board SIMD rank and BNF section/sub-section (May 2022 - April 2023)



4.4 Long-term management, support, and outcomes

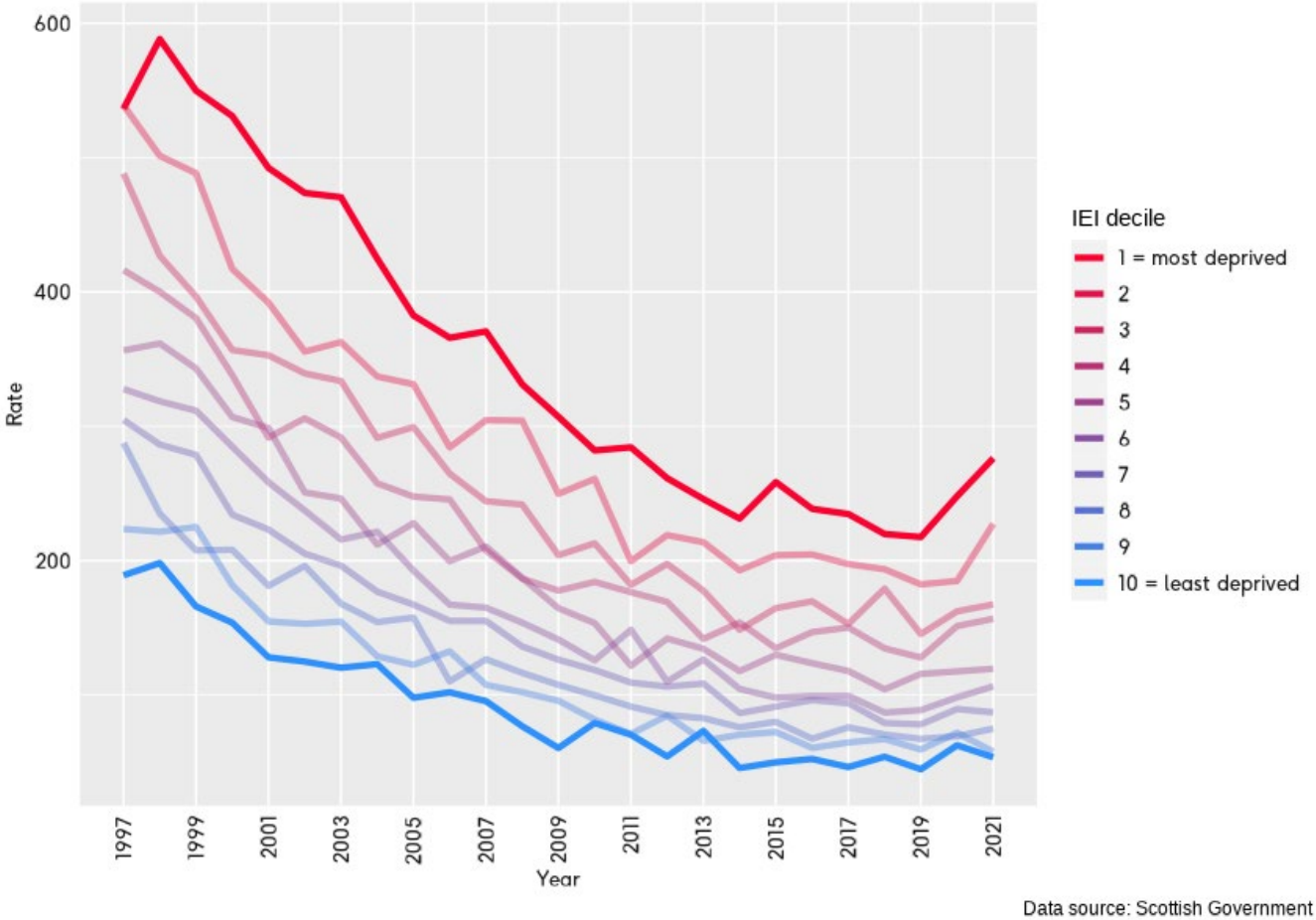
Outcomes: mortality rates

Inequalities in CVD outcomes are also apparent in mortality indicators. At the level of the entire Scottish population, national data is available by IEI decile for coronary heart disease (CHD) mortality rates for adults aged 45-74. Analysis of this data reveals a strong association between premature CHD mortality and area deprivation, with more deprived areas experiencing higher rates of premature mortality than less deprived areas across 1997 to 2021 (Figure 11).

The rate of premature mortality from CHD in Scotland has declined across deciles in the period 1997 to 2021, along with the difference in death rate between the most and least deprived areas. In 1997 the rate of death in the most deprived areas from CHD was 536.3 per 100k compared to 189.1 per 100k in the least deprived areas. By 2021, the CHD death rate amongst 45- to 74-year-olds had fallen to 276.3 per 100k in the most deprived decile, compared to only 53.6 per 100k in the least deprived decile. What this means for the difference between the most and least deprived areas is nuanced. In *absolute* terms, the difference has shrunk from 1997 to 2021 (falling from a difference in the rate of 347.3 to 222.6 deaths per 100k between the most and least deprived areas). However, in *relative* terms the difference has actually increased, with the rate of premature CHD mortality 5.2 times higher in the most deprived areas in 1997, having been only 2.8 times higher in 1997.

The reduction in the premature CHD mortality rate across all deprivation deciles in 1997-2021, and the shrinking of the absolute gap between the most and least deprived deciles across the same period, are both significant and should be celebrated. However, it should also be recognised that a significant difference in CHD outcomes remains. Notably, the rate of premature CHD mortality in the *most* deprived areas in 2021 (276.3 per 100k) is still higher than the rate of premature CHD mortality in the *least* deprived decile in 1997 (189.1 per 100k). That this is the case, despite more than 20 years of advances in the treatment of CHD, speaks to just how much the prevalence and outcomes for CHD are influenced by socioeconomic circumstances in Scotland.

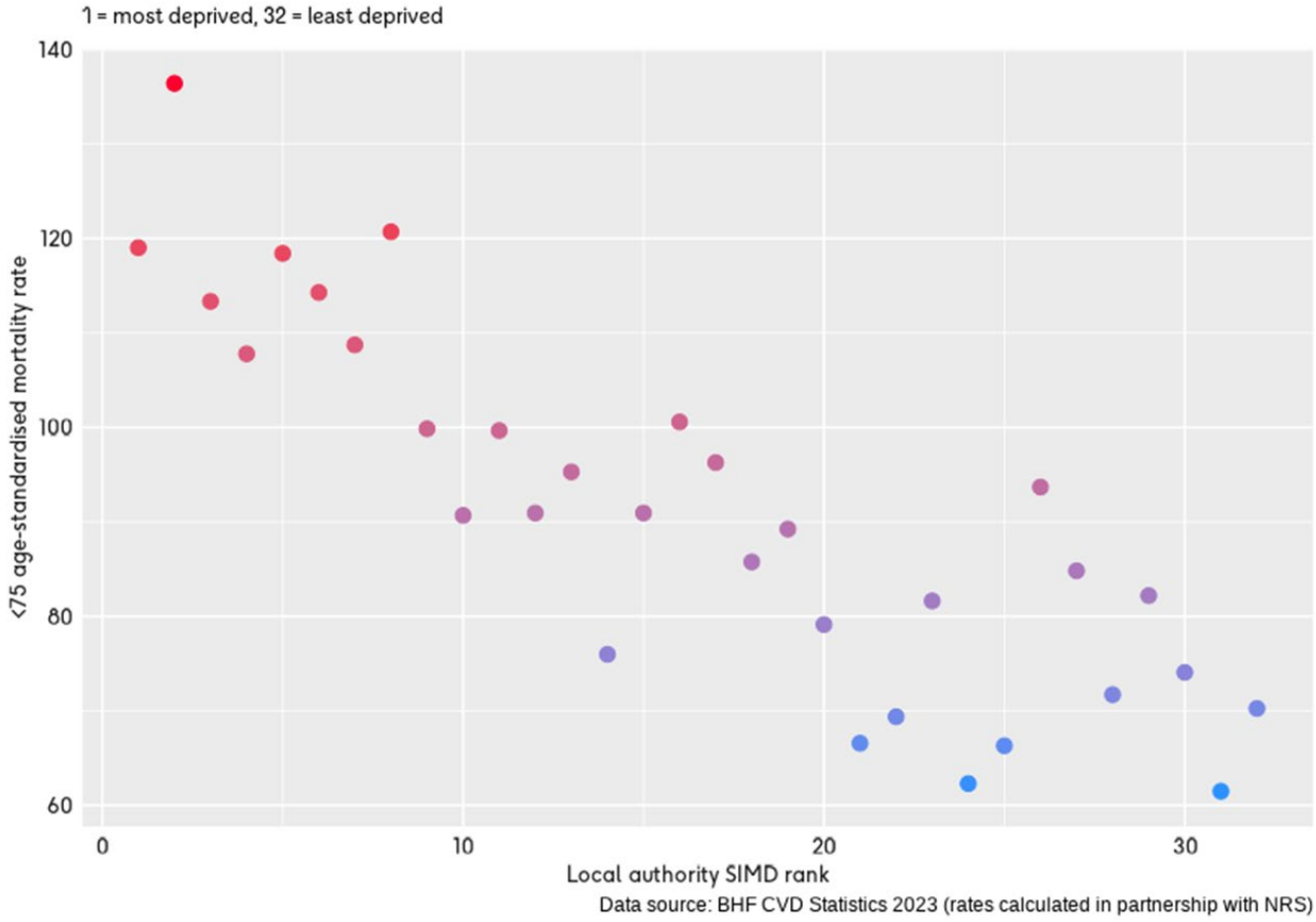
Figure 11 - Inequalities in coronary heart disease mortality aged 45 to 74 (rate per 100,000 population) by Income Employment Index (IEI) decile



Data source: Scottish Government

It is also possible to examine the association between deprivation and premature mortality rates at a local authority level (this time, using SIMD). In Figure 12, premature (under-75) CVD mortality rates for local authorities (LA) are mapped against local authority SIMD rank. This visualisation displays a clear association between how deprived local authorities are, and their rate of CVD mortality, with more deprived LAs having significantly higher premature CVD mortality rates than less deprived areas. Indeed, in the most deprived LA (West Dunbartonshire), the premature CVD mortality rate in 2019-21 was 59% higher than the rate the in the least deprived LA (119 compared to 70 per 100k population). In the second most deprived LA (Glasgow City) the premature CVD mortality rate in 2019-21 was more than double the rate in the second least deprived LA (136 compared to 61 per 100k).

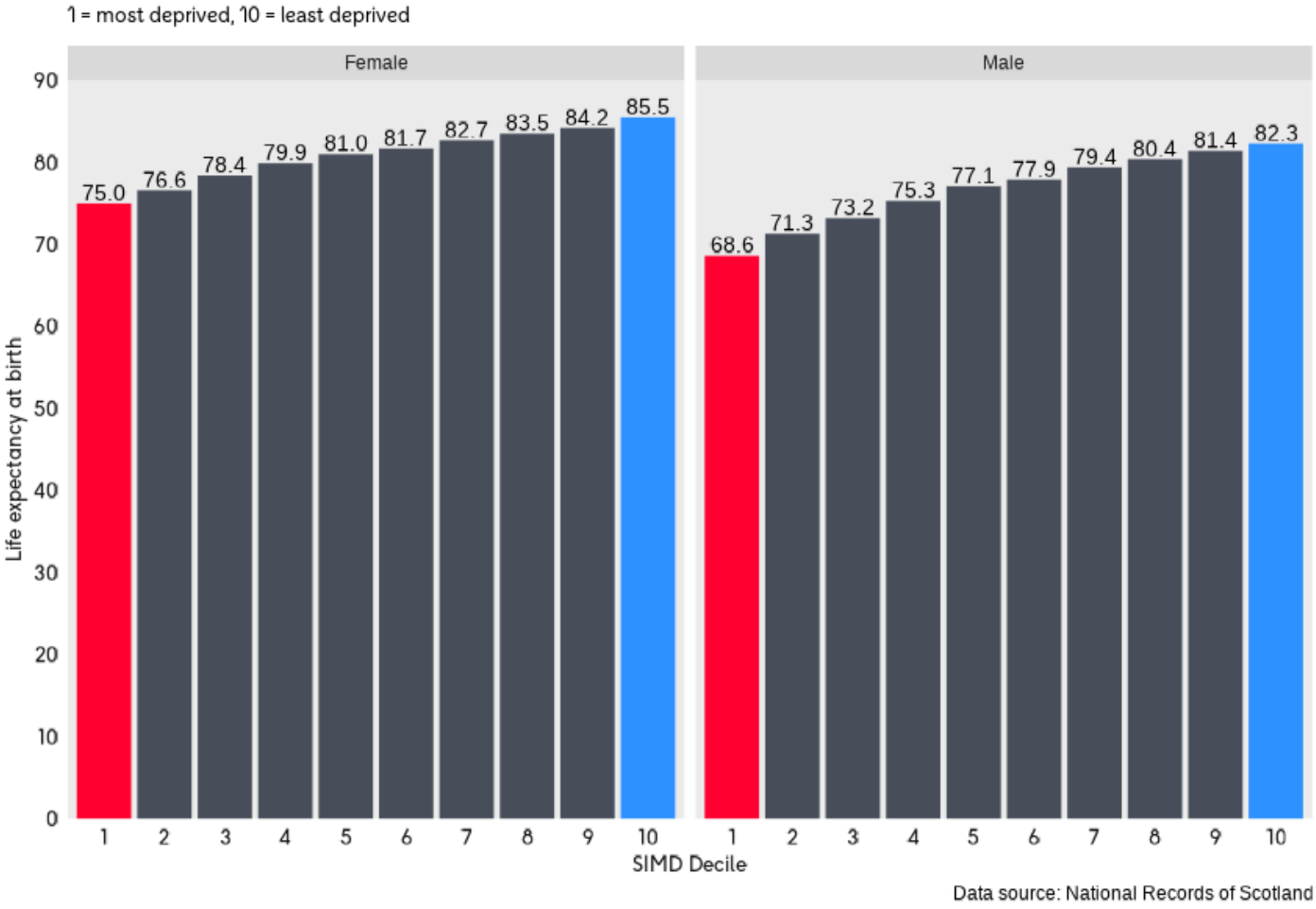
Figure 12 - Age-standardised premature (<75) CVD mortality rate per 100,000, annual average (3-year), 2019-2021, by local authority SIMD rank



Life expectancy at birth

Inequalities in the burden of cardiovascular disease (particularly differing premature mortality rates) undoubtedly factor into the stark differences in life expectancy in Scotland between people living in the least and most deprived areas. Based on the most recent data for 2019-21, women in the least deprived decile have a life expectancy at birth of 85.5 years compared to only 75 years in the most deprived decile (a gap of 15.5 years), whilst men in the least deprived decile have a life expectancy at birth of 82.3 years compared to only 68.6 years in the most deprived decile (a gap of 13.7 years) (Figure 13). Further analysis, presented in more detail in the Appendix, also shows how the gap between people living in the most and least deprived quintiles has increased over the last decade (Figure 28).

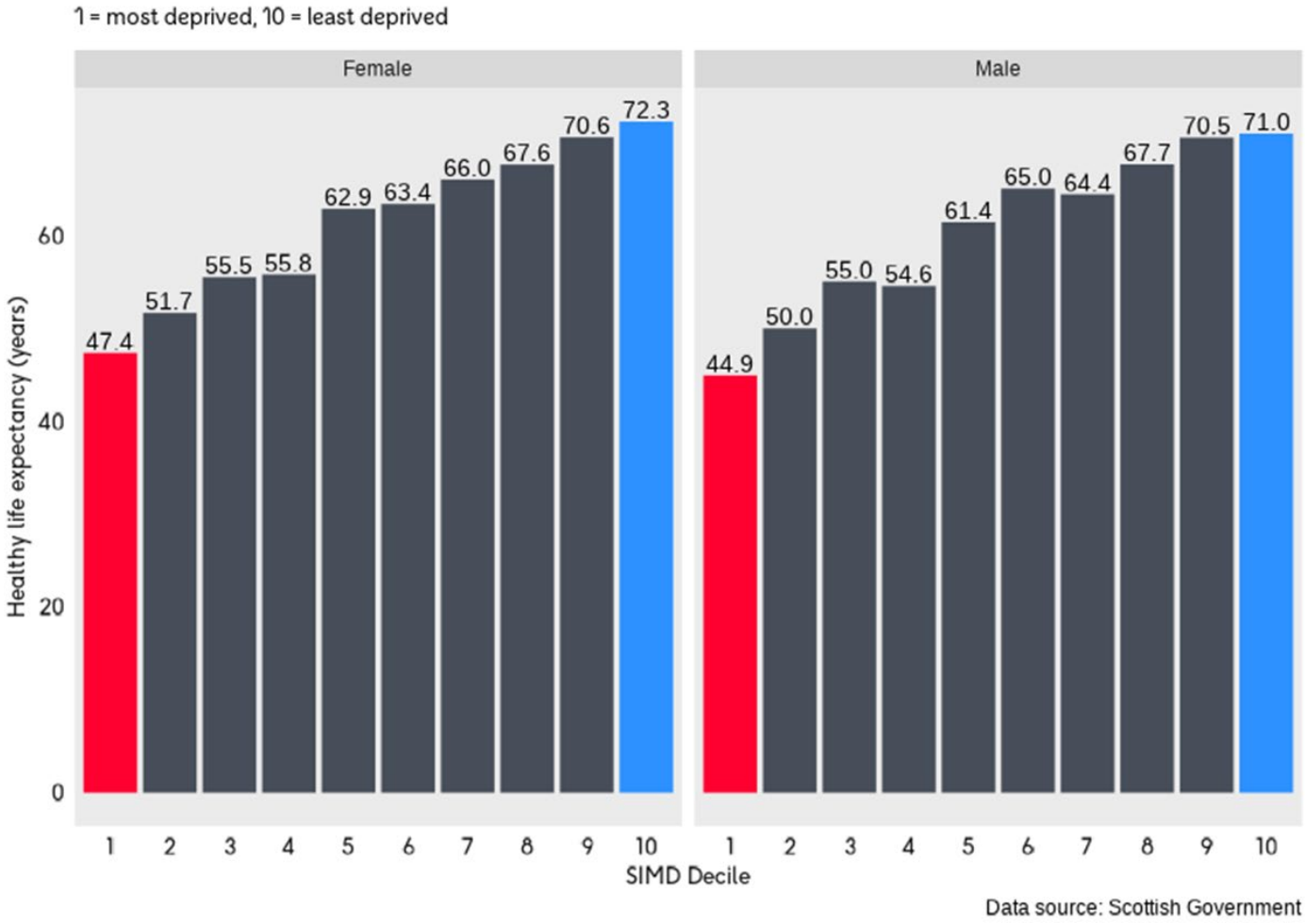
Figure 13 - Life expectancy at birth in Scotland (2019-21) by Scottish Index of Multiple Deprivation (SIMD) decile



Healthy life expectancy

Inequalities in the incidence and prevalence of CVD also undoubtedly contribute to stark differences in healthy life expectancy between the most and least deprived areas in Scotland. 'Healthy life expectancy' is an estimate of how many years people might live in a 'healthy' state. It is calculated by NRS, and estimates are based on the five-point response general health question in the annual population survey (APS) conducted for the entire UK by the Office for National Statistics (ONS). Figure 14 displays the healthy life expectancy at birth by SIMD. It shows that in 2019-21, women living in the most deprived areas had a healthy life expectancy of 47.4 years, compared to 72.3 years in the least deprived areas (a gap of 24.9 years). For men, the healthy life expectancy was 44.9 years in in the most deprived areas, compared to 71.0 in the least deprived areas (a gap of 26.1 years). Further analysis of healthy life expectancy, including time series analysis and an examination of healthy life expectancy as a percentage of life, is presented in the Appendix (Figures 29-30).

Figure 14 - Healthy life expectancy at birth in Scotland, 2019-21, by Scottish Index of Multiple Deprivation decile



5 Discussion

Health inequalities are complex and the pathway for heart and circulatory disease patients is no exception. In Scotland, there are clear and consistent gaps between the most and least deprived areas across the cardiovascular pathway. This is the case from the differing presence of risk factors, to admissions for people's first heart attack, and stark differences in premature CVD mortality that contribute to a significantly lower life—and healthy life—expectancy for people in the more deprived parts of Scotland.

The higher prevalence of risk factors such as obesity and hypertension undoubtedly contribute to higher levels of CVD morbidity in Scotland's more deprived areas. This is apparent both in self-reported doctor-diagnoses of major cardiac conditions (including previous heart attack and stroke) from the Scottish Health Survey, but also from the stark differences displayed in the Scottish Government's data on the rate of hospital admissions for first-time heart attack. Indeed, except for self-reported doctor-diagnosed heart murmurs and irregular heart rhythms, the fact that the prevalence of *every* CVD risk factor and condition was significantly higher in the most deprived areas emphasises the deep relationship between socioeconomic deprivation and cardiovascular disease in Scotland.

Beyond the data from the Scottish Government on rates of first-time heart attack admissions to hospital, the lack of speciality-level *and* deprivation data for much of inpatient and outpatient data care means that it is not possible to draw specific conclusions about how deprivation impacts the experience of people with heart and circulatory diseases more broadly in these care settings. However, there is clearly an association between deprivation and both outpatient and inpatient (including both elective and emergency) care, with more inpatient episodes stemming from the most deprived areas. By looking holistically at the data for primary and secondary care, there does appear to be evidence that more deprived areas may be 'under doctored' or face more barriers to earlier-stage care than less deprived areas. This is evident both in the association between higher health board deprivation and having fewer GPs per population, and the fact that there is a larger gap between the most and least deprived areas for emergency and elective care, which suggests more patients from deprived areas may be ending up in emergency care for conditions that could have been dealt with by elective care.

Finally, differences in the deprivation-based prevalence of CVD translate into different mortality outcomes between the most and least deprived areas. Indeed, perhaps the most disturbing statistic presented in this report, is that the rate of death amongst 45-74 year-olds due to CHD in Scotland is more than five times higher in the most deprived decile than it is in the least deprived decile. Likewise, inequalities in premature CVD mortality due to deprivation translate into stark geographical differences between local authorities, with the premature (under-75) mortality rate in 2019-21 from CVD in the second most deprived LA (Glasgow City) more than double the rate in the second least deprived LA.

Notably, in Scotland, the absence of deprivation data on several areas related to cardiovascular disease prevents us commenting on some aspects of the cardiac pathway. This is the case for secondary care, where the absence of deprivation data makes it impossible to robustly ascertain whether patient deprivation is associated with the number and length of elective and emergency care episodes. The notable exception to this is the data available on admissions for first time heart attacks under the age of 75, which highlights clearly how deprivation is associated with cardiac admissions, and more national-level deprivation data for cardiology services in secondary care would be of great benefit to understanding the association between deprivation and cardiology care.

Another notable gap in the data is that there has been no data published on cardiac rehabilitation, which prevents us from assessing whether referrals to—and uptake of—cardiac rehab are influenced by deprivation. A key commitment of the Scottish Government's 2021 Heart Disease Action Plan[20] was the establishment of the

[20] Scottish Government, Heart Disease Action Plan. 2021. Available from: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/03/heart-disease-action-plan/documents/heart-disease-action-plan-2021/heart-disease-action-plan-2021/govscot%3Adocument/heart-disease-action-plan-2021.pdf.

Scottish Cardiac Audit Programme (SCAP).[21] As the Programme progresses, it is important that steps are taken to address data gaps that relate to deprivation in cardiovascular disease care. Beyond cardiac rehab, there is also a lack of data at a deprivation level on how confident people feel managing their cardiovascular condition, and thus condition management is a broader area where deprivation data is sparse.

Likewise, unlike in England, in Scotland (and indeed the other devolved nations) there is no data quantifying the extent to which differences in life expectancy between people in the most and least deprived areas can be attributed to different diseases. In England, data from the Office for Health Improvement and Disparities that from 2020 to 2021 indicates that the 22.9% of the life expectancy gap for men, and 19.3% of the gap for women, can be attributed to cardiovascular disease.[22] This makes cardiovascular disease the single-largest contributed for men, and the second-largest contributor for women. The absence of comparable data for Scotland, despite the larger burden of CVD in Scotland, could inhibit the case for wider action to tackle the drivers of the life expectancy gap in Scotland – to which CVD is undoubtedly a key contributor.

6 Limitations

There are several limitations to this analysis. First, whilst in many areas of our analysis we were able to look at deprivation (via SIMD or IEI) using national deciles or quintiles, in some areas (specifically in the analysis of GPs per population, and prescriptions) we had to gauge deprivation at a health board or local authority level. There can be large disparities in the wider determinants of health within these geographies. Whilst utilising deprivation ranks for these geographies, and the percentage of these areas' populations in the 20% and 40% most deprived areas of Scotland, undoubtedly enabled us to look at deprivation across more of the cardiac pathway, it is likely that disparities within smaller geographies were inadvertently muted.

Likewise, in most of this analysis the data were not granular enough to stratify by patient demographics, which we recognise as another limitation. The effects of deprivation may be compounded by other social factors. Intersectionality[23] is a word used to describe how race, class, sex, and other individual characteristics overlap or combine with one another, which can affect outcomes.

Similarly, the data used in this analysis did not have the detail for us to explore people with multiple conditions, which we know is an important contributing factor to people's overall health and is linked to deprivation.[24] Where we can, it is important to look at whole individuals across the cardiac patient pathway instead of parsing out individual patient characteristics.

We know that multiple structural, contextual, and individual factors determine social disadvantage and that in in turn this has an impact on health. Thus, we need health services to collect and be transparent with demographics data in order to evaluate the effects of intersectionality.

7 Conclusion

In summary, there is a clear association between deprivation and heart and circulatory diseases in Scotland. This is the case across the cardiac pathway, from prevention to outcomes, and the higher rates of premature mortality from CVD in more deprived areas are a clear contributor to the stark differences in both life and healthy life expectancy between the most and least deprived areas in Scotland. The persistent and—in some cases—growing gap in the prevalence of CVD and its risk factors according to deprivation, despite significant advances in the treatment of CVD over recent decades, is also testament to just how much of the CVD burden is driven by socioeconomic conditions – and not just individual differences in lifestyle, and what happens within a narrower conception of 'healthcare'.

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[21] Public Health Scotland, 2023. Scottish Cardiac Audit Programme (SCAP). https://publichealthscotland.scot/services/scottish-national-audit-programme-snap/scottish-cardiac-audit-programme-scap/publications/.

[22] Office for Health Improvement and Disparities, 2023. https://analytics.phe.gov.uk/apps/segment-tool/.

[23] An analytical framework coined by Kimberlé Williams Crenshaw.

[24] The Health Foundation (2018) Understanding the health care needs of people with multiple health conditions.

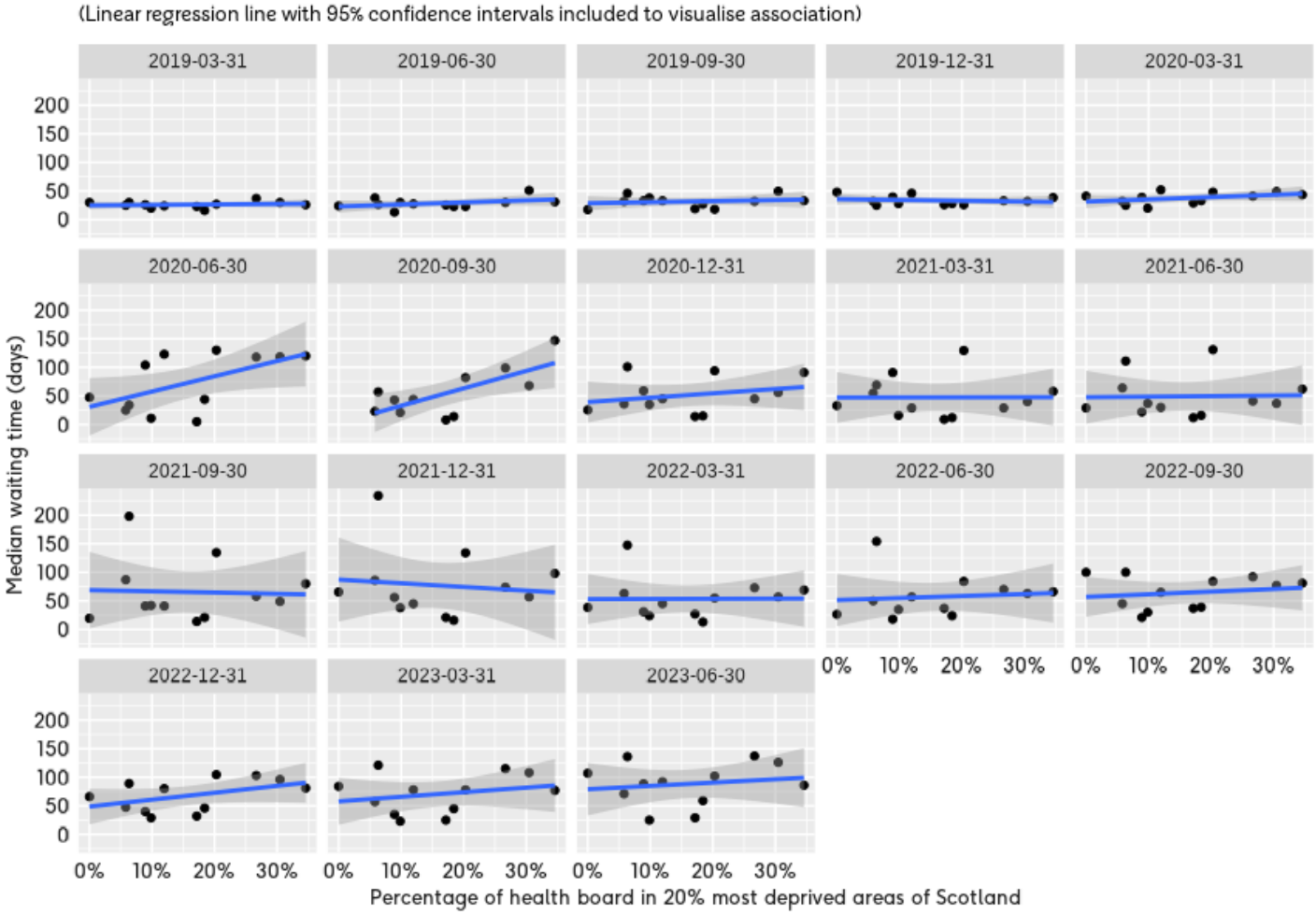
That being said, this analysis does have relevance for people involved in both the delivery of healthcare, and those involved in the policy that govern the conditions under which healthcare is provided in Scotland. Whilst there are significant gaps in the data that make it difficult to establish the degree to which deprivation-based inequalities are apparent in the treatment part of the cardiac pathway, it is clear that—otherwise—there is a strong association between deprivation and CVD, from prevention through to outcomes (including mortality). Thus, there exist opportunities across the cardiac pathway for interventions that could potentially improve outcomes for patients (particularly in the most deprived areas) and reduce health inequalities.

More broadly, it is also clear that individuals and unique populations should be at the centre of our health services. Due to the inherent limitations of data, it is important to look beyond the datasets and connect health services with trusted local figures who can engage with people in specific communities and ensure services are tailored to the needs of the communities they serve. People in more deprived areas must be given information and tools to manage their cardiac conditions and risk factors that suit their specific needs, which may differ from the needs of those in less deprived areas. It is also important to ensure that more deprived populations have equitable access and quality of treatment commensurate with need, to help improve cardiovascular outcomes and reduce health inequalities.

8 Appendix

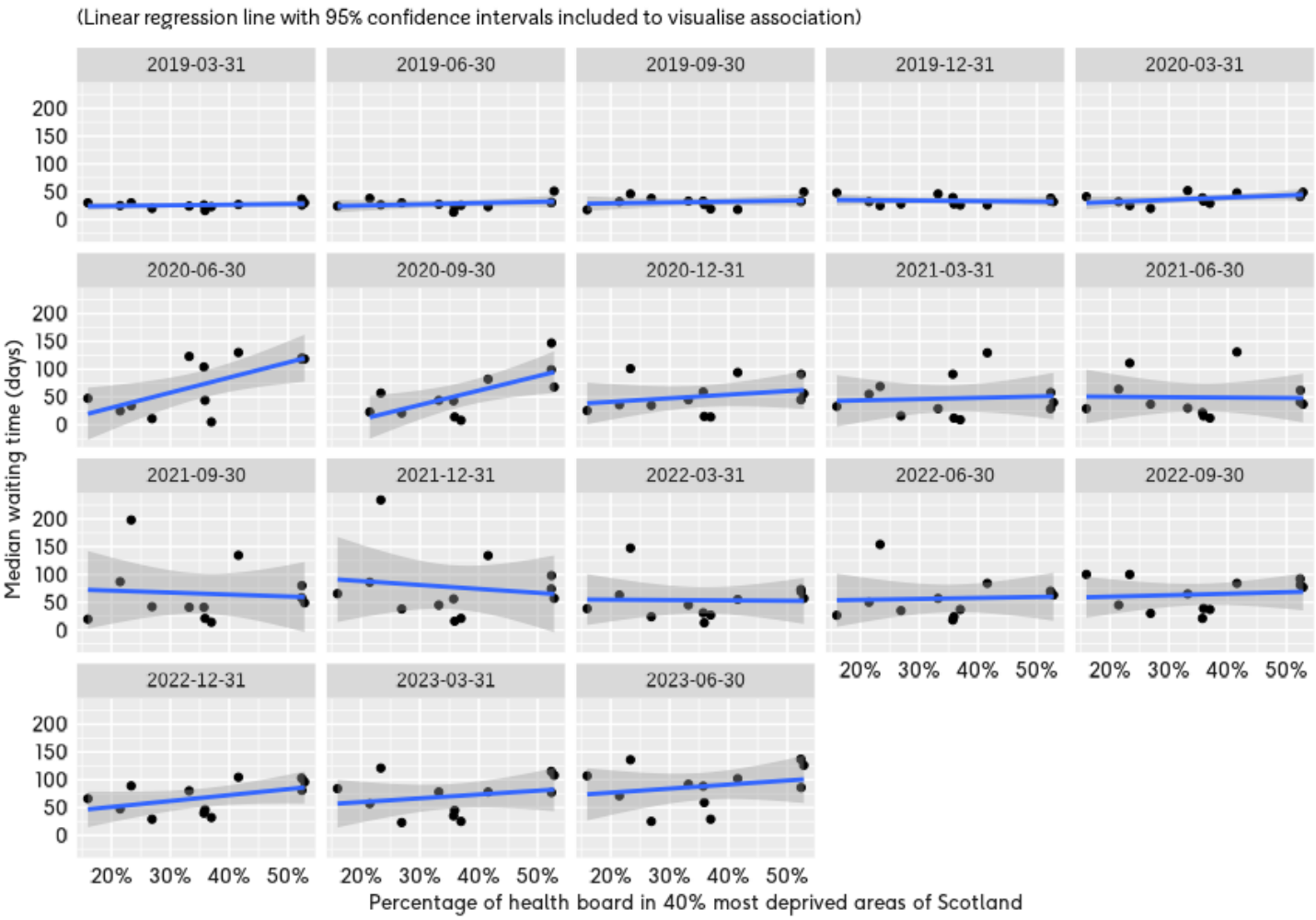
8.1 Median waiting times for outpatient cardiology appointments

Figure 15 - Plot of health board median waiting times for cardiology outpatient appointments against percentage of health board populations in 20% most deprived areas in Scotland



Date source: Public Health Scotland
Note: NHS Western Isles excluded due to no reported cardiology outpatient appointment data

Figure 16 - Plot of health board median waiting times for cardiology outpatient appointments against percentage of health board populations in 40% most deprived areas in Scotland



Date source: Public Health Scotland
Note: NHS Western Isles excluded due to no reported cardiology outpatient appointment data

8.2 Acute hospital activity – Outpatients, Inpatients (Elective & Emergency), and Day Cases

Public Health Scotland make national-level data available on acute hospital activity by patients' SIMD quintile, albeit not at a speciality level. Please see Public Health Scotland's Data Dictionary for full definitions of each type of acute hospital activity.

Outpatient appointments

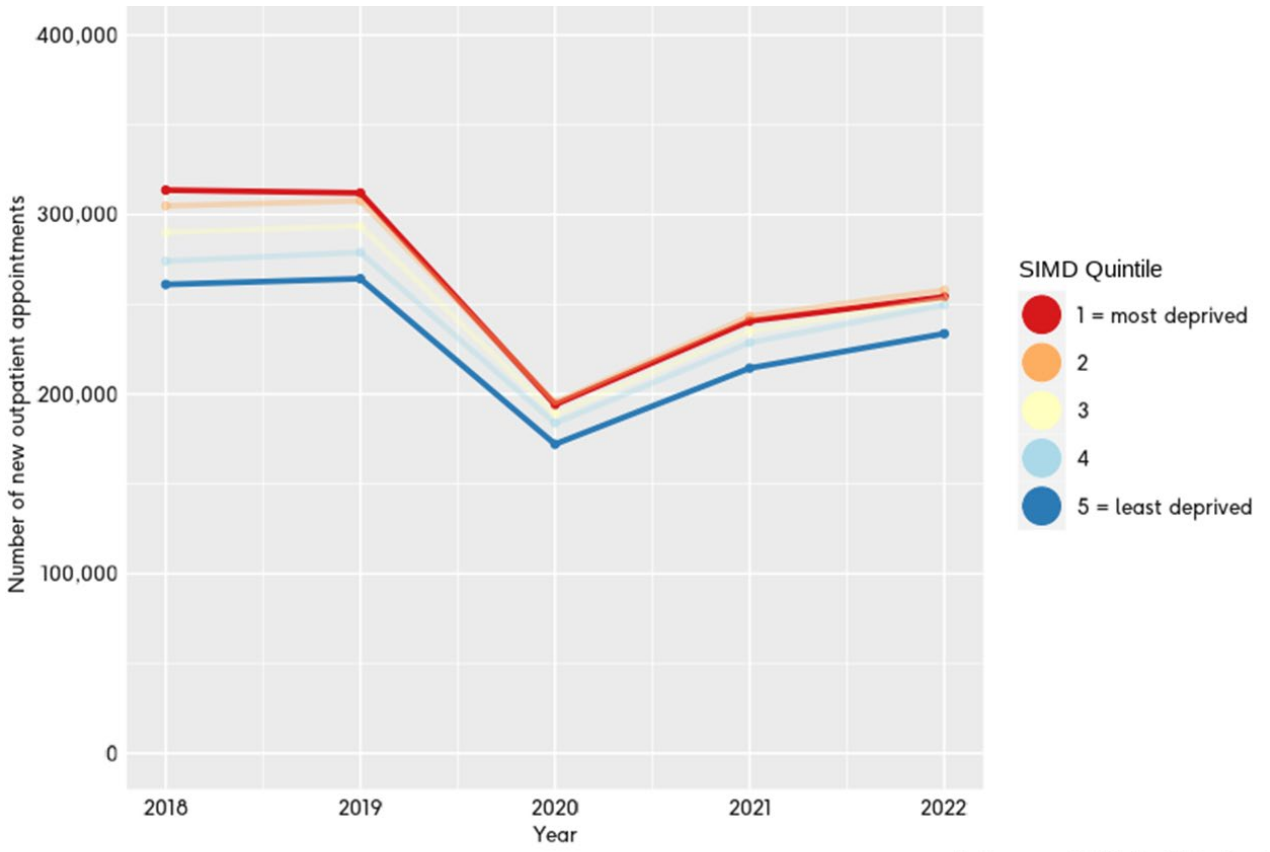
Analysis of outpatient data makes clear that there is an association between area deprivation and both the number of new outpatient appointments, and the number of 'Did not attend' (DNA) outpatient appointments in Scotland.

Figure 17 displays the number of new outpatient appointments by year and SIMD quintile from 2018 to 2022. It shows that, before the pandemic, there was a clear association between the number of new outpatient appointments and patients' area deprivation, with more new outpatient appointments for people in the most deprived areas likely representative of their poorer population health profiles (including but not limited to cardiovascular disease). This association has remained since the onset of the pandemic, albeit with some difference. While there are still more new appointments in more deprived areas, the second most deprived quintile now has the largest number of new appointments, and the gap between the number of new appointments in the least and most deprived quintiles has shrunk by more than half from 2018 to 2022. This represents a larger decline in the number of appointments in the most deprived quintile compared to the least deprived quintile. Given the poorer health profile of people living in the most deprived areas, the shrinking of this gap could suggest cause for concern – if it does indicate people in more deprived areas are receiving relatively fewer outpatient appointments compared to the pre-pandemic era.

There is also an association between area deprivation and the percentage of outpatient appointments that people 'Did not attend' (DNA). Figure 18 shows that the percentage of appointments that are DNAs is significantly higher in more deprived areas. This may suggest that engagement with the health service is lower in more deprived areas.

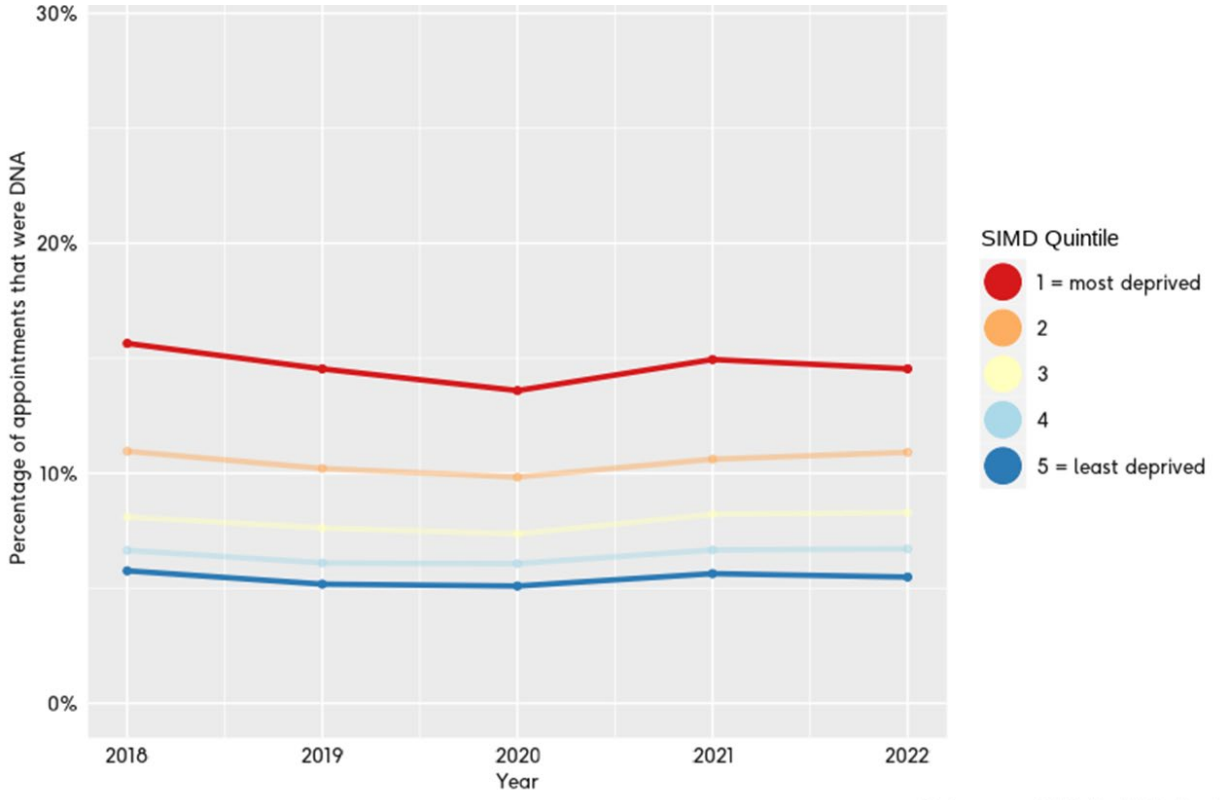
Whilst not specific to cardiology, together, these two figures do indicate that more deprived areas have a seemingly higher unmet need for outpatient services (likely because of their poorer population health) since the onset of the pandemic, but also have a higher rate of not attending outpatient appointments.

Figure 17 - Number of new outpatient appointments (all specialties) in Scotland by year and patients' SIMD quintile



Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Figure 18 - Percentage of new outpatient appointments (all specialties) in Scotland which were 'Did Not Attend' (DNA) appointments, by patients' SIMD quintile, and year



Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Inpatient episodes – Elective

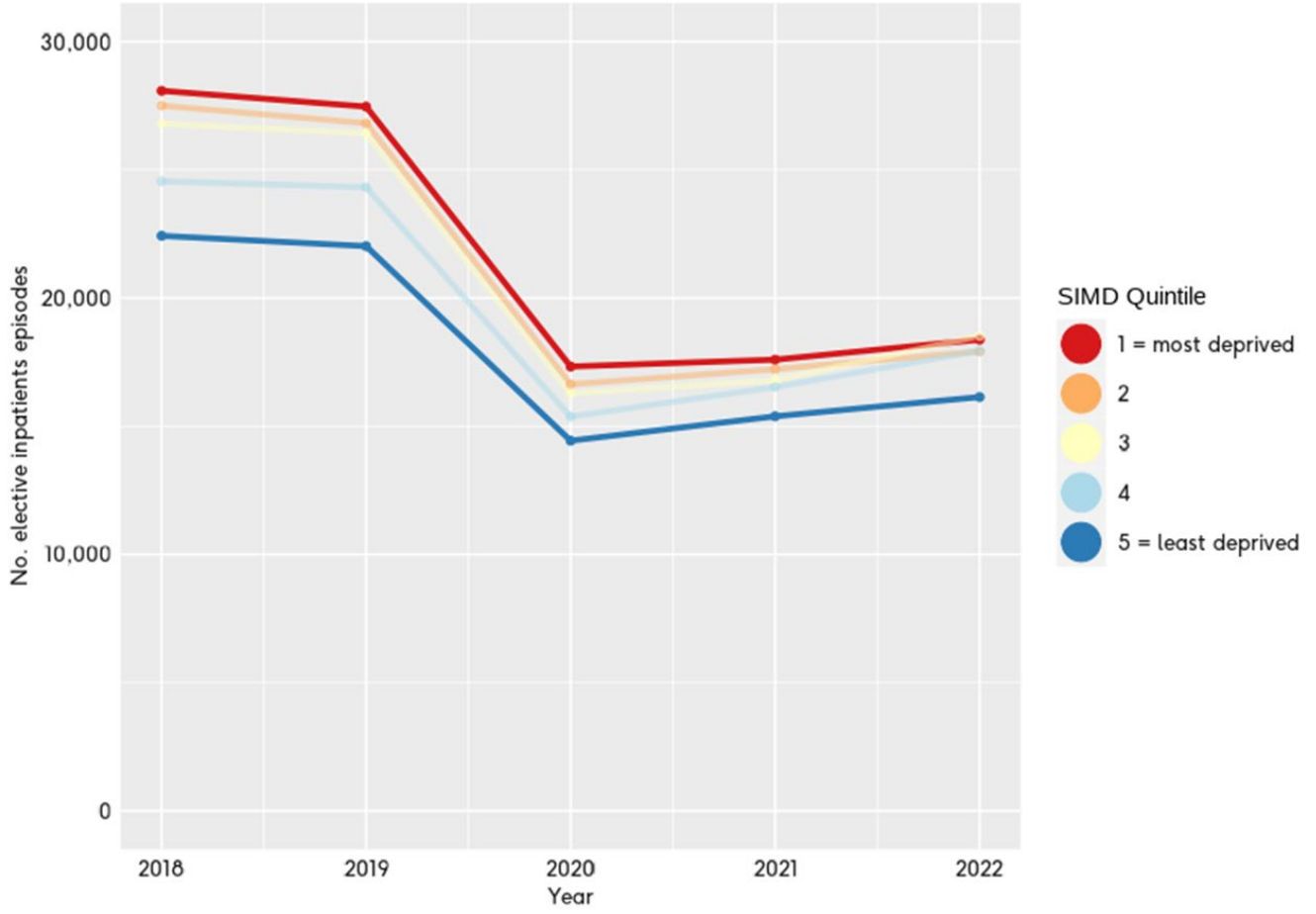
Public Health Scotland also make data available on inpatient episodes, for both elective and emergency admissions by SIMD quintile. Again, this is for all specialties, and not specific to cardiology.

Figure 19 shows the number of elective inpatient episodes by SIMD quintile and year. It shows a clear association between area deprivation and the number of elective inpatient episodes, in that there have consistently been more elective inpatient episodes for patients from the most deprived areas of Scotland. However, as with outpatient appointments, this association was stronger before the onset of the Covid-19 pandemic. In 2019, there were 27,463 elective inpatient episodes for patients from the most deprived quintile compared to 22,022 in the least deprived quintile. This represents a difference of 5,440, equivalent to there being 25% more elective inpatient episodes in the most deprived quintile compared the least deprived quintile. In 2022, the difference between the number of elective inpatient episodes in the most deprived quintile (n=18,374) and the least deprived quintile (n=16,138) was 2,236. This is equivalent to there being 14% more elective inpatient episodes in the most deprived quintile compared to the least.

It is outside the scope of this analysis, which is focussed on CVD, to establish whether this reduction in the difference between the most and least deprived areas, in terms of the number of elective inpatient episodes, is definitely a cause for concern or not. However, if the larger difference before the pandemic represented a volume of elective inpatient episodes *more* reflective of the greater health needs of more deprived areas (including, but not limited to, their aforementioned higher prevalence of CVD and its risk factors), then the shrinking of this gap could have negative consequences for health inequalities in Scotland.

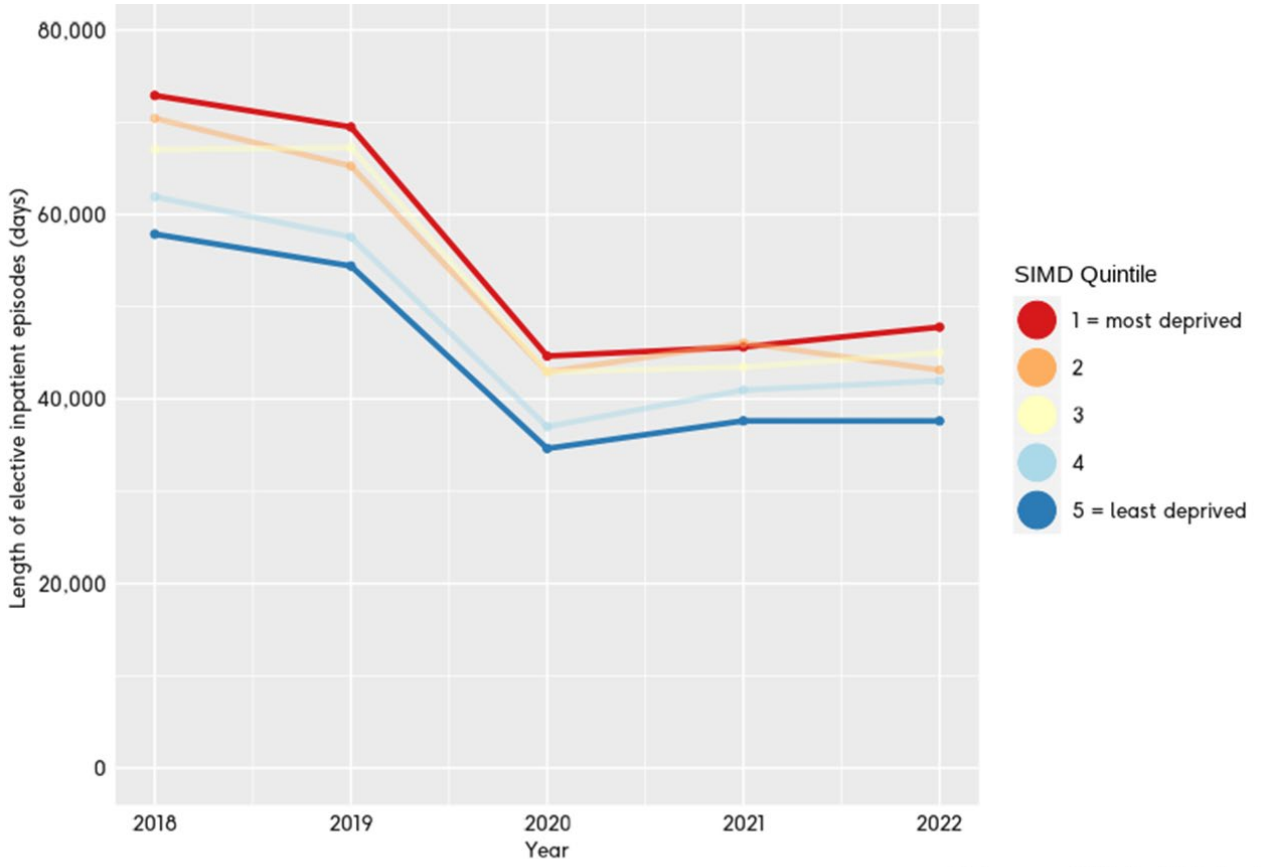
The association between deprivation and inpatient episodes is mirrored in Figure 20, which shows the total length of stay in hospital resulting from elective inpatient episodes by SIMD quintile and year. This analysis shows that the total length of stay in hospital resulting from elective inpatient admissions is highest in more deprived areas. However—at least before the pandemic—this appears to be attributable to the greater *number* of admissions in more deprived areas, rather than people from deprived areas being admitted for longer for elective care. This is clear from an analysis of the data visualised in Figure 21, which displays the average (mean) length of stay in days for elective admissions, by SIMD quintile and year. This shows that prior to the pandemic there was no clear association between average inpatient stay and area deprivation across the *entire* period 2018-2022 (however, in the last three years the average length of stay has been *slightly* longer for patients from more deprived areas).

Figure 19 - Number of elective inpatient episodes in Scotland by patients' SIMD quintile, and year



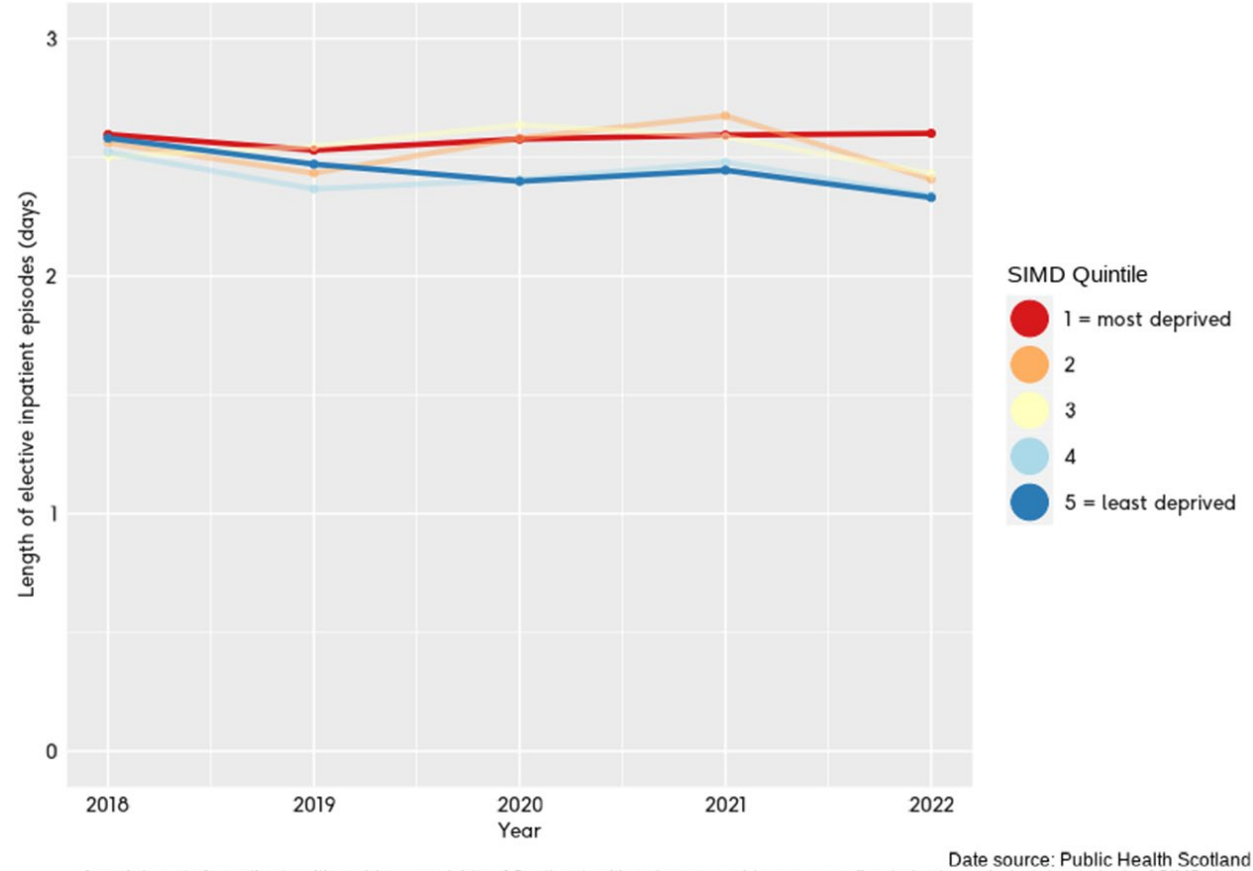
Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Figure 20 - Total length of stay (days) of elective inpatient episodes in Scotland by patients' SIMD quintile, and year



Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Figure 21 - Average length of stay (days) of elective inpatient episodes in Scotland by patients' SIMD quintile, and year



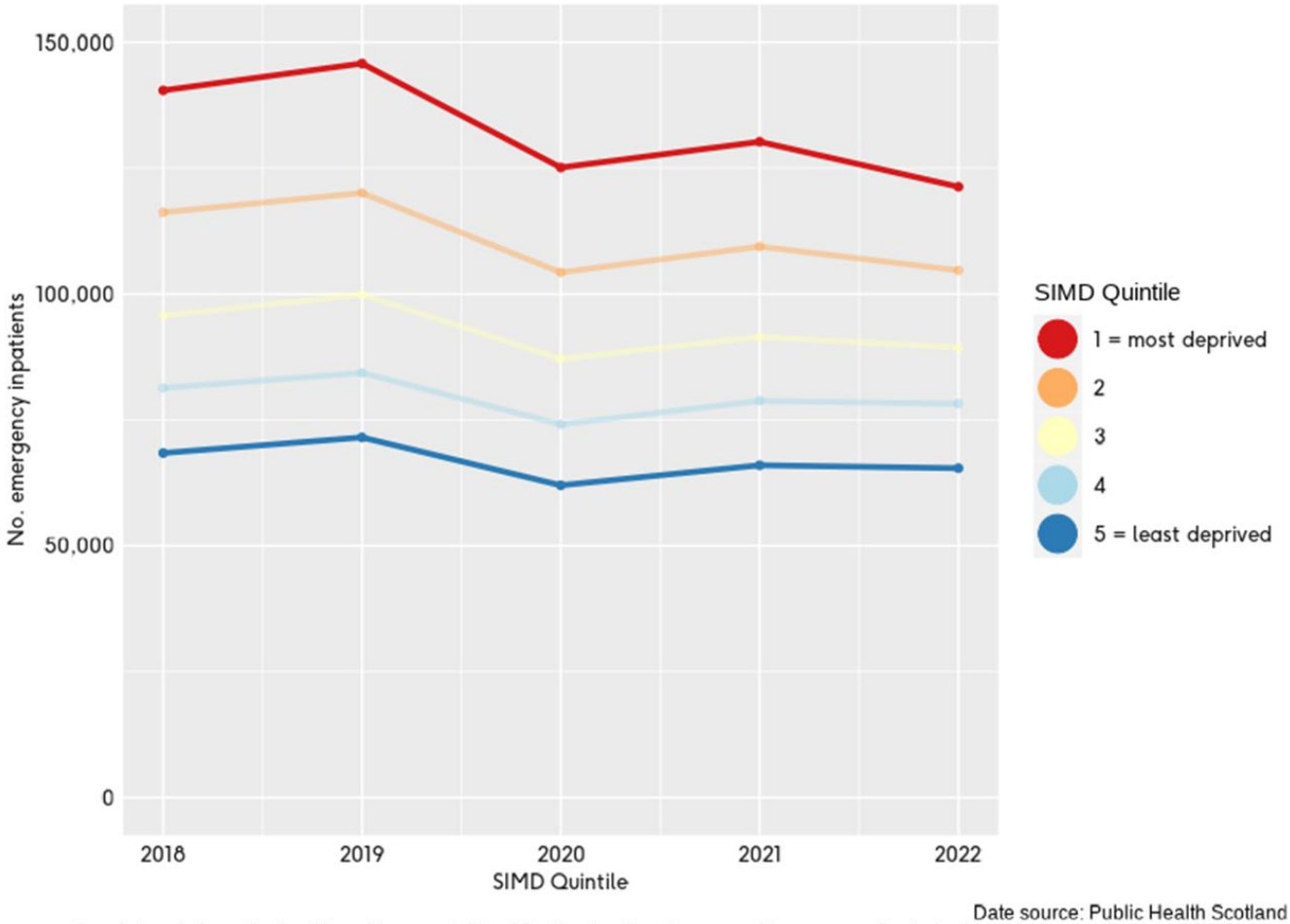
Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Inpatient episodes – Emergency

Figure 22 shows that there is a clear association between area deprivation and the number of emergency inpatient episodes in Scotland. Indeed, there have consistently been more emergency inpatient episodes from people from the most deprived areas in 2018-2022. In 2022, for example, there were 55,891 more emergency inpatient episodes from people in the most deprived quintile (n=121,296) than the least deprived quintile (n=65,405), which is equivalent to there being 85% more emergency inpatient episodes from the most deprived quintile compared to the least deprived quintile. This is notably larger than the difference for the same year reported for *elective* inpatient episodes, which was 14% in 2022. However, like with elective inpatient episodes, the gap between the most and least deprived areas has also shrunk since the onset of the pandemic – in 2019, there were 104% more emergency inpatient admissions from the most deprived quintile than from the least deprived quintile, compared to 85% more in 2022.

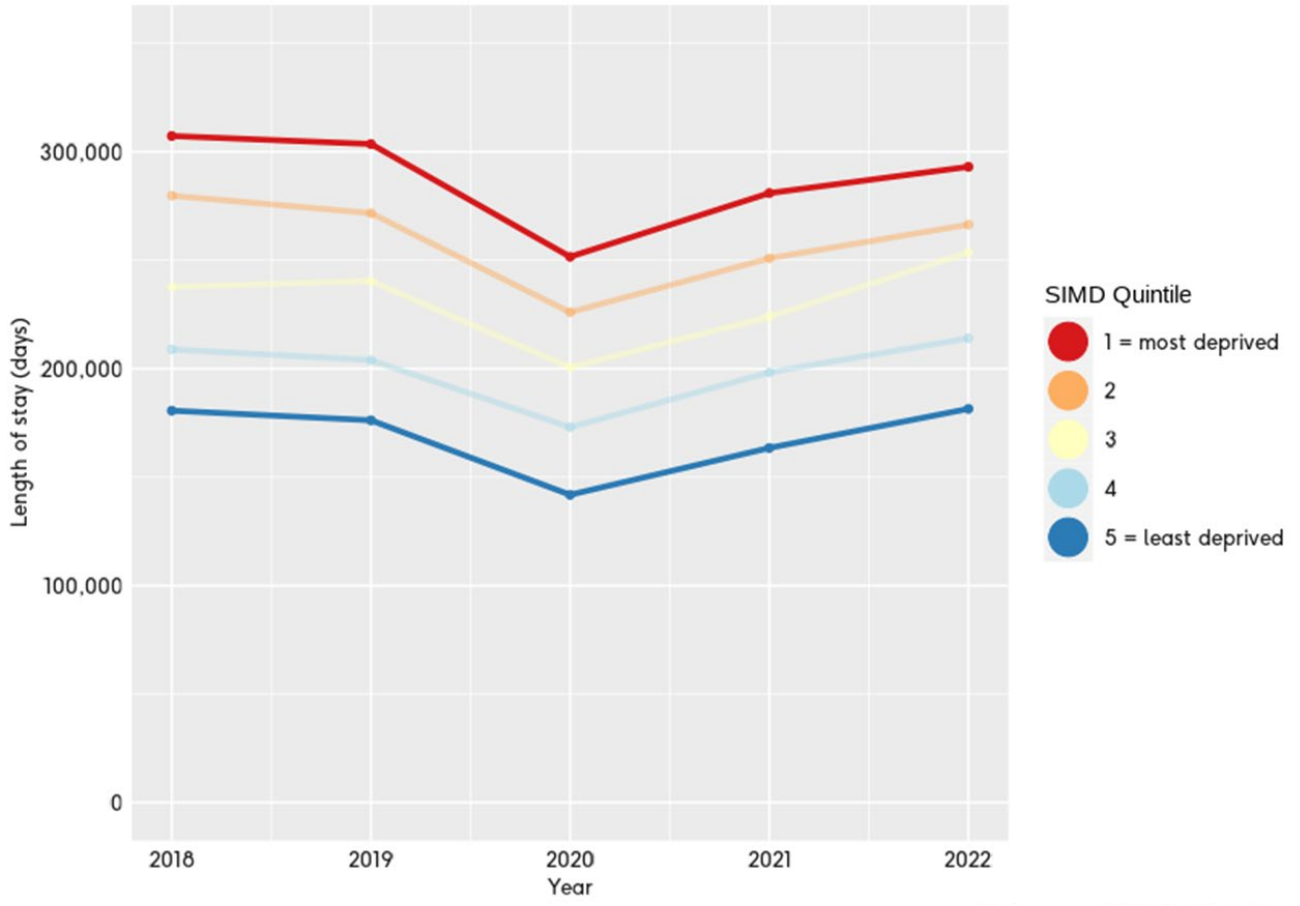
This association between deprivation and emergency inpatient episodes is also mirrored in the data on the total number of days inpatients stayed in hospital for emergency inpatient admissions, with significantly more days spent admitted to hospital for emergency inpatient admissions from more deprived areas (Figure 23). However, the *average* duration of stay for emergency admissions from more deprived areas has consistently been lower for people from more deprived areas (Figure 24). A number of hypotheses may help to explain this. It is possible, for instance, that if people from more deprived areas are being underserved in terms of primary care and elective procedures, then they may be more likely to present as emergency admissions, including for conditions that may warrant shorter inpatient stays and that would have been better addressed earlier through primary or elective care. If this is the case, then it would stand to bear that—being better served by primary and elective care—patients from less deprived areas would conversely be presenting to emergency care settings with more serious conditions requiring longer inpatient stays.

Figure 22 - Number of emergency inpatient episodes in Scotland by SIMD quintile and year



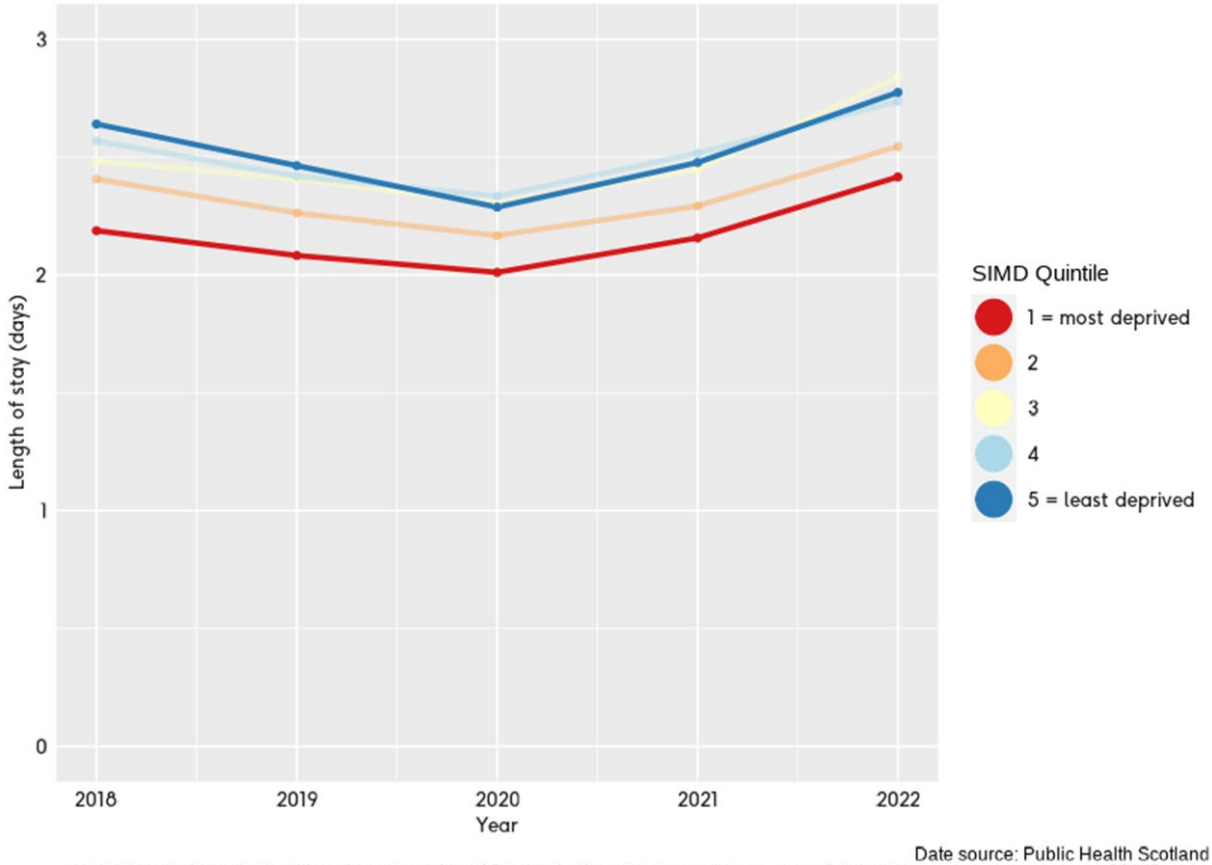
Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Figure 23 - Total length of stay (days) for emergency inpatients in Scotland by SIMD quintile and year



Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Figure 24 - Average length of stays (days) for emergency inpatients in Scotland by SIMD quintile and year

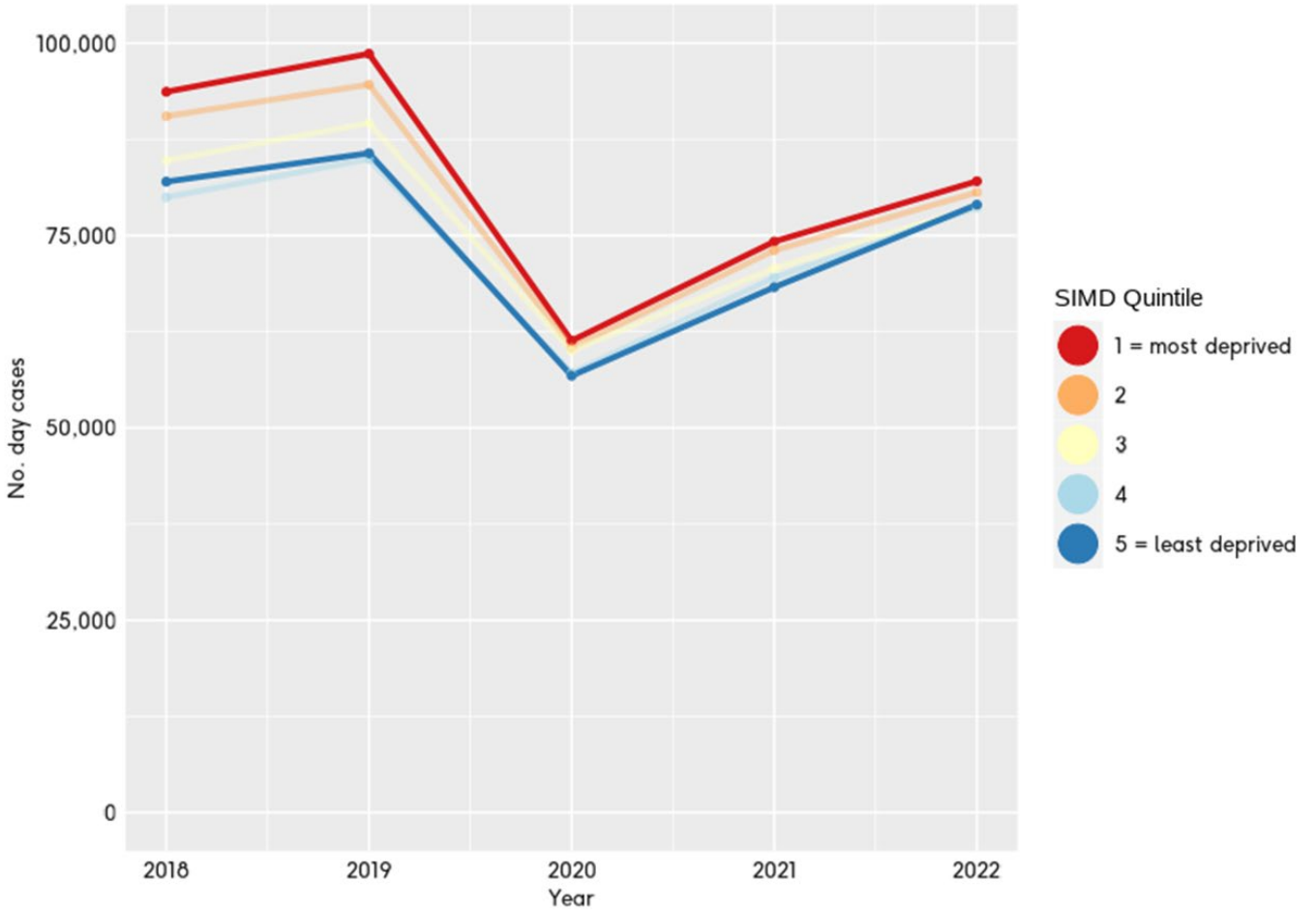


Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

Day cases

There is also an association between SIMD quintile and the number of day cases in Scotland, across the most recent five years of data. In each year, there have been more day cases in the most deprived areas than in the least deprived areas. Though, it is worth highlighting that in three of the last five years of data (2018, 2019, 2022) the second least deprived quintile had the lowest number of day cases.

Figure 25 - Number of day cases in Scotland by SIMD quintile and year



Date source: Public Health Scotland
Appointments for patients with residency outside of Scotland, with unknown residency, or no fixed abode excluded due to lack of SIMD data.

8.3 Primary care

The following two figures (Figures 26 and 27) show the number of patients per GP in Scottish health boards, by the percentage of health board patients in the 20% (Figure 26) and 40% (Figure 27) most deprived areas in Scotland. Both graphs are stratified by year, which highlights how the association has been apparent across the period 2014 to 2022.

Figure 26 - Number of patients per GP (headcount) in Scottish Health Boards, by percentage of patients in 20% most deprived areas (SIMD), and year

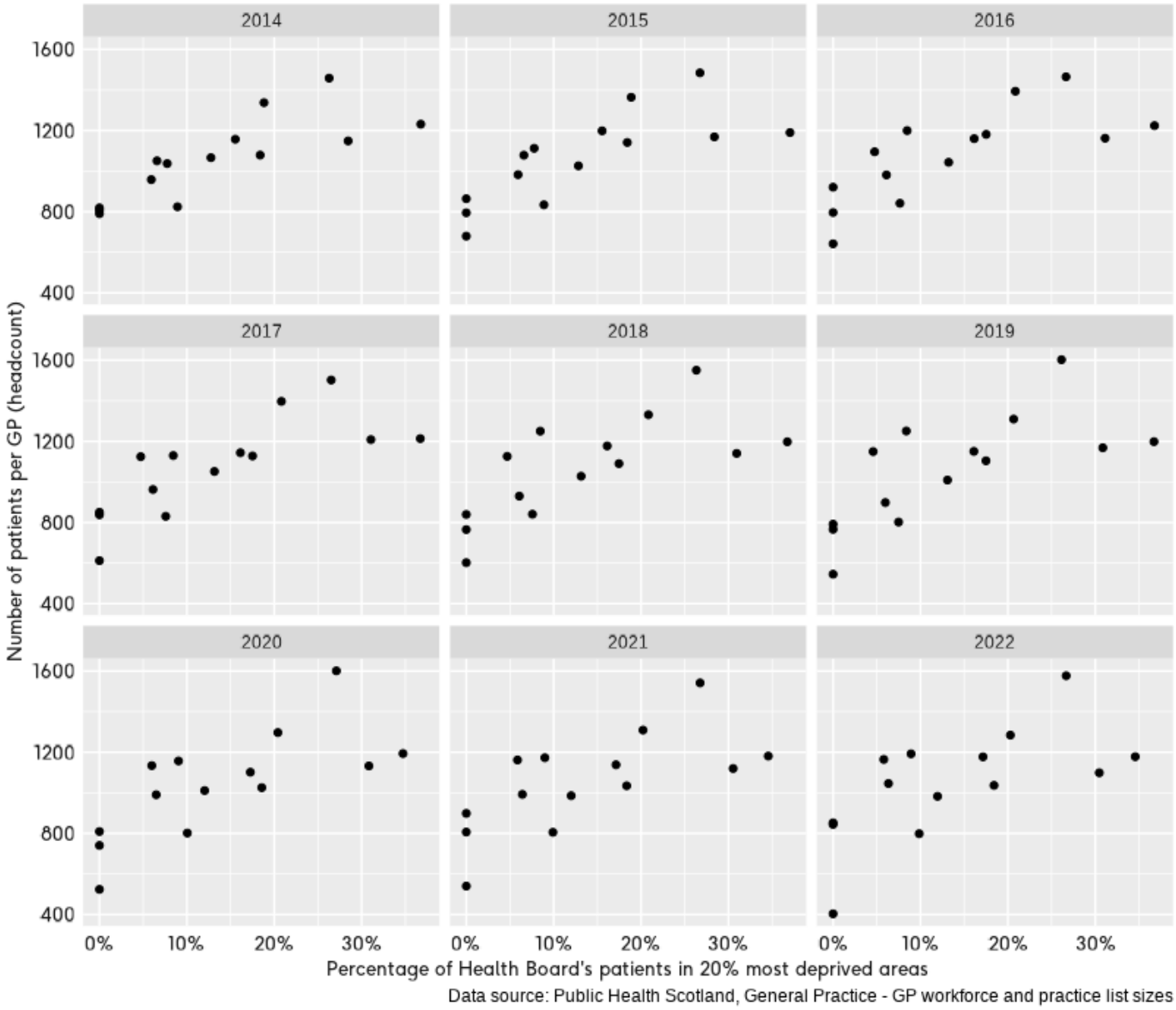
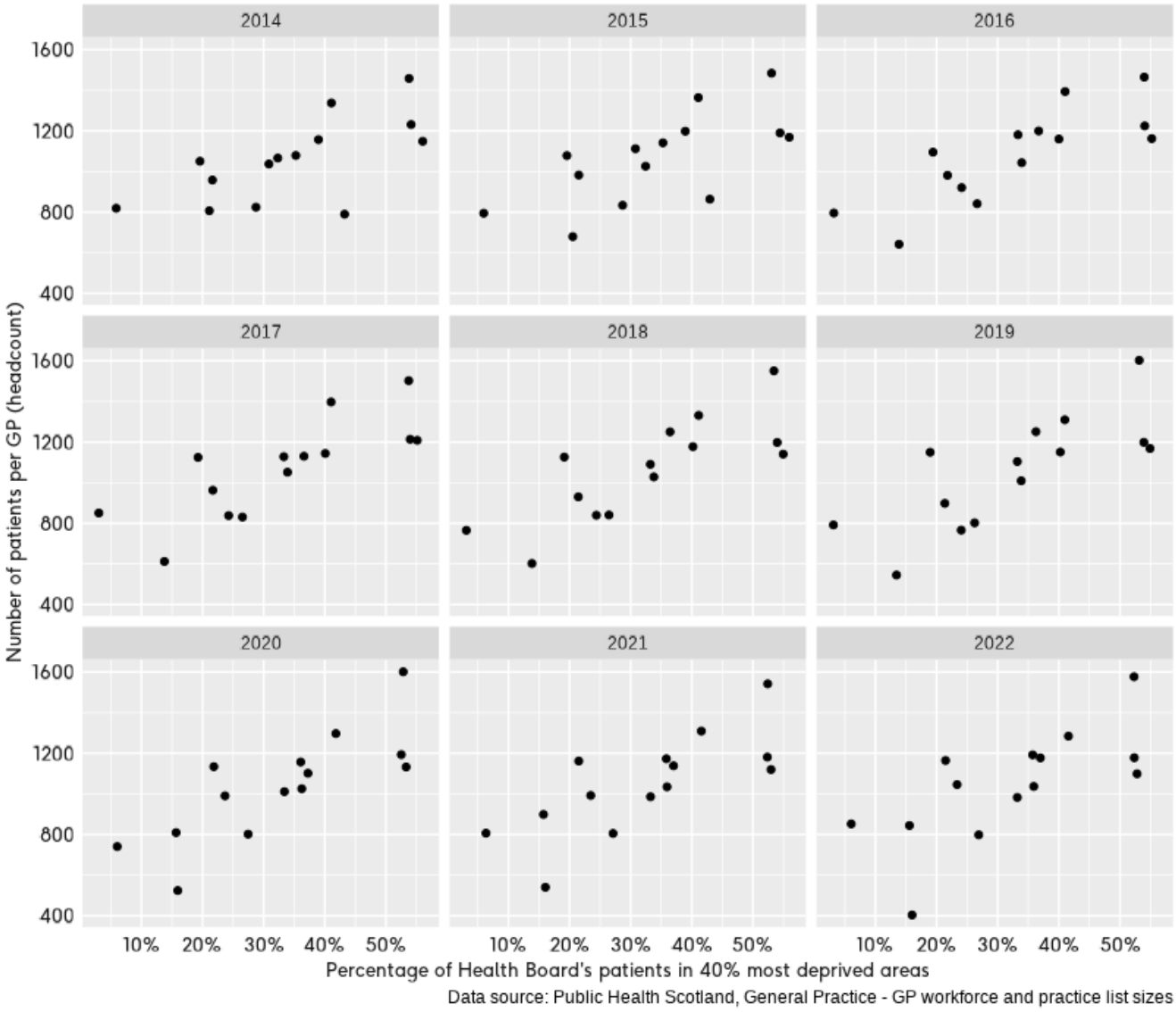


Figure 27 - Number of patients per GP (headcount) in Scottish Health Boards, by percentage of patients in 40% most deprived areas (SIMD), and year

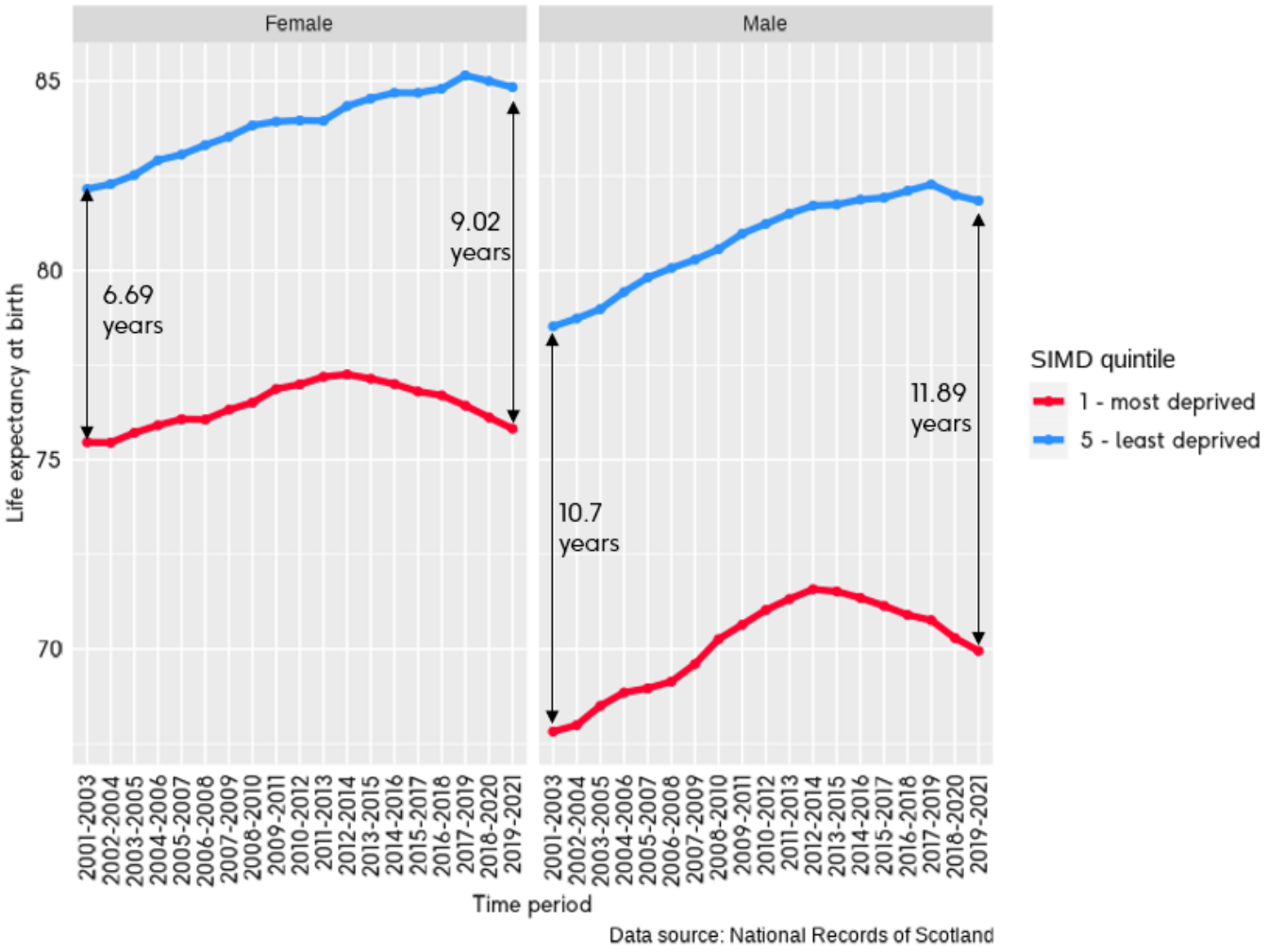


8.4 Life expectancy and healthy life expectancy

Life expectancy

Analysis of NRS data going back to 2001-2003 makes clear several further trends relating to life expectancy and deprivation. The first of these trends is that whilst life expectancy at birth had grown consistently until 2018-20 for women and men in the least deprived quintile, for people in the most deprived quintile, life expectancy began falling for women and men in the most deprived quintile in 2013-15 – and has fallen every year since (Figure 28). Alongside this, the gap in life expectancy between people living in the least and most deprived quintiles has increased over the entirety of the period covered by the data (2001-2003 to 2019-2021). Indeed, the difference in life expectancy between women in the least and most deprived areas has grown from 6.69 years in 2001-03 to 9.02 years in 2019-21, and from 10.7 years to 11.89 years for men across the same period. Though, it should be highlighted that the gap in life expectancy for women was fairly consistent from 2001-03 to 2012-14, after which it has increased with each reporting period. Likewise, for men, the gap in life expectancy was fairly consistent from 2001-03 until 2015-17 (and indeed fell as low 10.18 in 2011-13), before increasing with each subsequent reporting period.

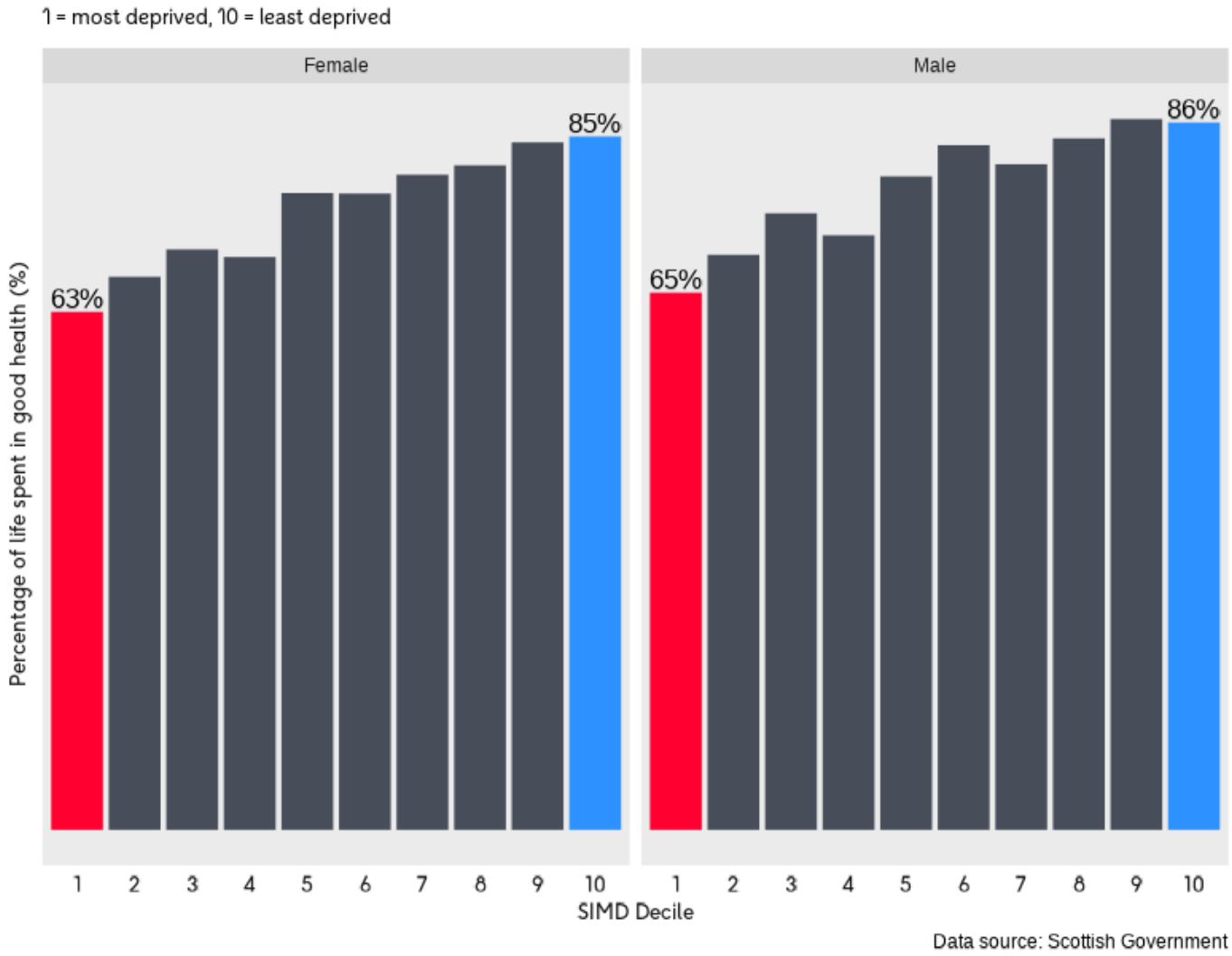
Figure 28 - Life expectancy at birth in Scotland by Scottish Index of Multiple Deprivation (SIMD) quintile



Healthy life expectancy

Figure 29 displays the percentage of life estimated to be spent in good health by SIMD. Both figures display a clear association between deprivation and healthy life expectancy. Likewise, in 2019-21, women living in the most deprived decile could expect to spend 63.1% of their life in good health, compared to 84.5% in the least deprived decile (a gap of 21.4%). Men in the most deprived decile could expect to spend 65.5% of their life in good health, compared to 86.2% in the least deprived decile (a gap of 20.7%).

Figure 29 - Percentage of life estimated to be spent in good health in Scotland, 2019-21, by Scottish Index of Multiple Deprivation decile



Scottish Government have only made healthy life expectancy data by SIMD *decile* available since the 2018/20 reporting period. However, a longer view is available for healthy life expectancy by SIMD *quintile* from NRS (Figure 30), which gives a view of trends apparent across the last four reporting periods, which present three-year averages for healthy life expectancy (2017-17 to 2019-21). The most notable trend is that whilst healthy life expectancy has increased for both women and men in the least deprived quintile, for women and men in the two most deprived quintiles, healthy life expectancy has decline significantly. Indeed, for women in the most deprived quintile, HLE has decreased from 52.3 in 2015-17 to 49.6 in 2019-21 (a decrease of 2.7 years), and for men it is has decreased from 50.3 in 2015-17 to 47.7 in 2019-21 (a decrease of 2.6 years).

Figure 30 - Healthy life expectancy at birth in Scotland by Scottish Index of Multiple Deprivation quintile