Differences in prevalence of health conditions being identified in Primary Care across areas of Greater Manchester, Blackpool and Preston: hot and cold spot analysis

28 June 2024

The Manchester Biomedical Research Centre
Authored by: Jedidah Mould and Joanne Elliott
Project Team: Anna Coleman, Abin Thomas, Tracey Farragher, Blessing Nyakutsikwa, Donna Shrestha and Arpana Verma

Inclusive Research Oversight Board

Introduction

Greater Manchester (GM), Blackpool and Preston have high levels of deprivation and health inequality and have been disproportionately affected by the Covid-19 pandemic. Health inequalities denote the differences in people's health or the differences in the care they receive and opportunities available to people (William et al., 2022). GM, Blackpool and Preston areas are among 20% of the most deprived districts in England (Public Health England (PHE), 2020). The Covid-19 pandemic further widened this inequality. Many people living in GM, Blackpool and Preston are challenged with high levels of poor health, low academic qualifications, poor housing conditions, and low paid jobs among others (PHE, 2020; Wiśniowski et al., 2023). These challenges are particularly evident among minoritised groups (Wiśniowski et al., 2023). Life expectancies in GM, Blackpool and Preston are lower than the UK average (79.0 years for males and 82.9 years for females) and over 42%, 26% and 36% of children under 16 years respectively live in poverty compared with the UK child poverty rate of 29% (PHE, 2020; Office of National Statistics (ONS), 2021; Preston City Council 2022; Greater Manchester Poverty Action 2023). Health inequalities can be reduced as they are not inevitable (Marmot et al., 2010).

How is deprivation measured?

A deprived area is an area with limited access to basic resources and services, such as suitable housing, education and work opportunities (Smith et al., 2015). In the UK, deprivation is often measured using the Index of Multiple Deprivation (IMD), which considers a variety of factors linked to poverty, such as access to housing and services, health, crime, income, employment, education, and living environment (Smith et al., 2015).

What is the Quality and Outcomes Framework?

The Quality and Outcomes Framework (QOF) was designed 'to improve the quality of care patients receive at their practices based on multiple indicators across a range of key areas in clinical care and public health' (NHS Digital 2022). QOF is a voluntary annual reward and incentive programme for GP practices in England, Wales and Northern Ireland. It provides financial awards to general practices for providing good quality care. In 2023, the NHS Greater Manchester Integrated Care Board earned a total of 635 QOF points. This figure aligns with the maximum number of points available in the QOF for that year (NHS Digital, 2023).

What is the aim of this study?

One of the goals of the National Institute for Health and Care Research (NIHR) Manchester Biomedical Research Centre (BRC) is to reduce the gap in health inequalities across Greater Manchester, Blackpool and Preston. In this study we have investigated whether 19 health conditions, as well as patients with a learning disability or in palliative care, have a higher than England prevalence (hot spot) or lower than England prevalence (cold spot) in the most deprived quarter (25%) of all areas in GM, Blackpool and Preston. This technique is called hot and cold spot analysis. We also investigated whether the number of patients receiving palliative care was above or

below the England prevalence. Prevalence was determined by the number of patients recorded by GP practices and reported to QOF in 2022-23. In addition, we looked at the geographical spread of hot and cold spots and compared this with maps of deprivation. This investigation has enabled us to highlight conditions that are underdiagnosed or underreported in primary care.

Methods

- We collected data from 451 GP surgeries in 12 North West Local Authorities including Manchester, Bury, Bolton, Salford, Wigan, Trafford, Stockport, Tameside, Rochdale, Oldham, Blackpool and Preston. These areas vary in levels of deprivation with Blackpool being the most deprived area and Trafford the least deprived (Appendix 1). These data were published by QOF 2022-2023 (NHS Digital, 2023).
- We calculated the prevalence of patients diagnosed with 19 specific health conditions, as well as the number of patients diagnosed with a learning disability or receiving palliative care (see Table 1 for full list).
- We used Microsoft Excel to analyse the data from the practices in the 25% most deprived areas, based on their IMD score (IMD 2019). We used a technique known as 'hot and cold spot analyses' to identify whether each practice had a higher than England prevalence (hot spot) or lower than England prevalence (cold spot) for the 19 health conditions and patients with a learning disability or needing palliative care. We then calculated the percentage of hot spots and cold spots for each condition.
- We developed 'heat maps' of Greater Manchester, Blackpool and Preston to look at the geographical spread of the prevalence of two health conditions we chose as exemplars: cancer and mental health. The maps are divided up into small regions known as Lower Layer Super Output Areas (LSOA), that allow for detailed and useful statistical analysis. These regions are designed to have a relatively uniform population size, typically around 1,000 to 3,000 people. This consistency makes it easier to compare data across different areas. Using the QOF data, we worked out the prevalence of the cancer and mental health in each LSOA. Hot spots were shaded red and cold spots were shaded blue. We then compared these hot and cold spot maps to maps of regional deprivation (based on the IMD score).
- In addition, we developed heat maps that gave a picture of *how much* the prevalence differed from the England prevalence. For this, we chose to look at cancer, osteoporosis, rheumatoid arthritis and mental health. The difference in prevalence was represented by 6 colour shades: light blue, mid blue and dark blue showing the cold spots, with the darkest shaded areas having the highest difference in prevalence from the England prevalence. Conversely, light red, mid red and dark red shades were used for the hot spots.

Table 1: List of conditions investigated

Group	Condition
Cardiovascular	Atrial fibrillation Coronary heart disease Heart failure Hypertension Peripheral arterial disease Stroke and transient ischaemic attack (TIA)
Respiratory	Asthma Chronic obstructive pulmonary disease (COPD)
Lifestyle	Obesity
High dependency and other long-term conditions	Cancer Chronic kidney disease Diabetes Mellitus Non-diabetic (ND) hyperglycaemia Palliative care
Mental health and neurology	Dementia Depression Epilepsy Learning disability Mental health
Musculoskeletal	Osteoporosis Rheumatoid arthritis

Results

Cold spots

We identified 10 conditions that had lower than England prevalence in the most deprived areas of GM, Blackpool and Preston: atrial fibrillation, cancer, dementia, osteoporosis, hypertension, rheumatoid arthritis, heart failure, coronary heart disease, chronic kidney disease, and stroke and transient ischaemic attack (TIA). Patients receiving palliative care were also below England prevalence (Fig. 1, Table 2). For a comparison with all areas in GM, Blackpool and Preston, see Appendix 2.

Table 2: Conditions with lower than England prevalence in the most deprived areas of GM, Blackpool and Preston

Cold spots	
Condition	**Prevalence (% of GP practices below England Prevalence)**
Atrial Fibrillation	95%
Cancer	95%
Dementia	85%
Osteoporosis	81%
Hypertension	79%
Rheumatoid Arthritis	76%
Heart failure	75%
Coronary Heart Disease	70%
Chronic Kidney Disease	70%
Stroke and Transient Ischaemic Attack (TIA)	69%
Palliative Care	69%

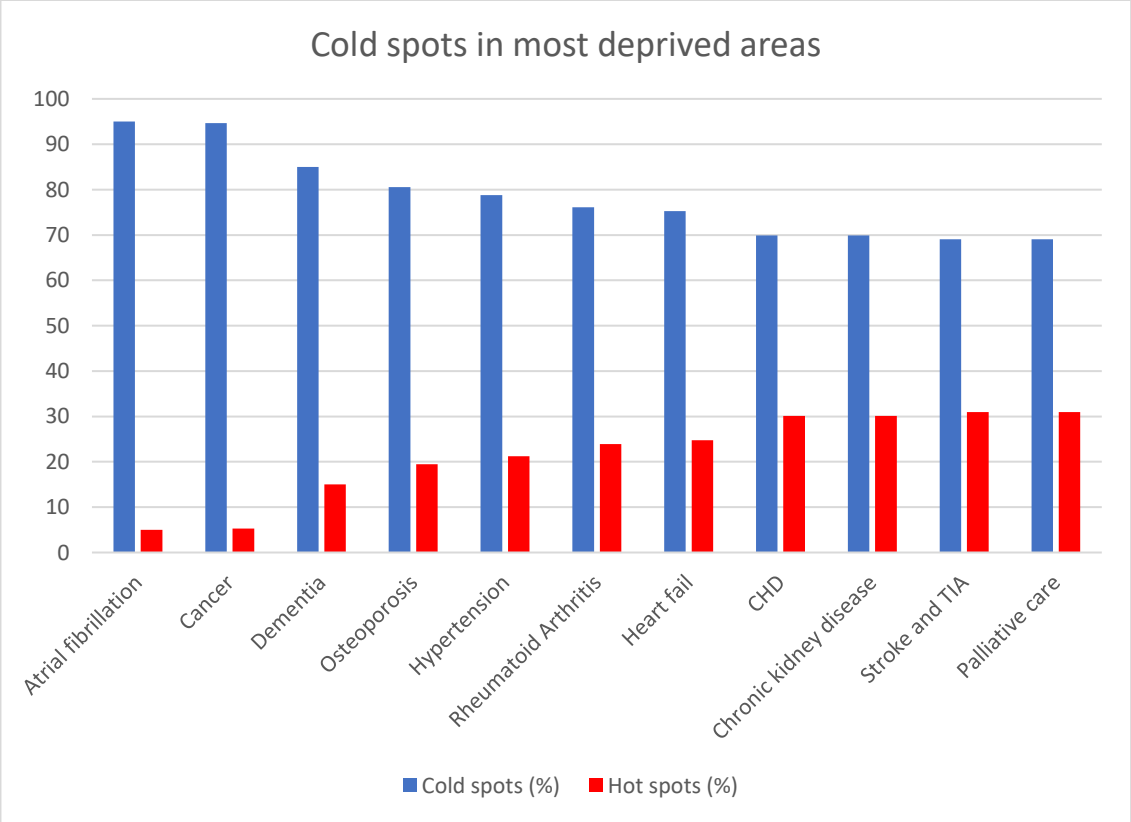

Figure 1: Percentage of GP practices in the 25% most deprived areas of GM, Blackpool and Preston with below England prevalence (cold spots) of 10 health conditions and palliative care cases

Hot spots

We identified 9 conditions that had higher prevalence than the England prevalence in the most deprived areas of GM, Blackpool and Preston: mental health, diabetes mellitus, obesity, COPD, peripheral arterial disease, non-diabetic (ND) hyperglycaemia, depression, epilepsy and asthma. Patients diagnosed with a learning disability were also above England prevalence (Fig. 2, Table 3). For a comparison with all areas in GM, Blackpool and Preston see Appendix 2.

Table 3: Conditions with higher than England prevalence in the most deprived areas of GM, Blackpool and Preston

Hot spots	
Condition	**Prevalence (% of GP practices above England Prevalence)**
Mental Health	82%
Diabetes Mellitus	79%
Obesity	72%
COPD	60%
Learning disability	70%
Peripheral arterial disease	68%
Non-diabetic hyperglycaemia	65%
Depression	65%
Epilepsy	65%
Asthma	55%

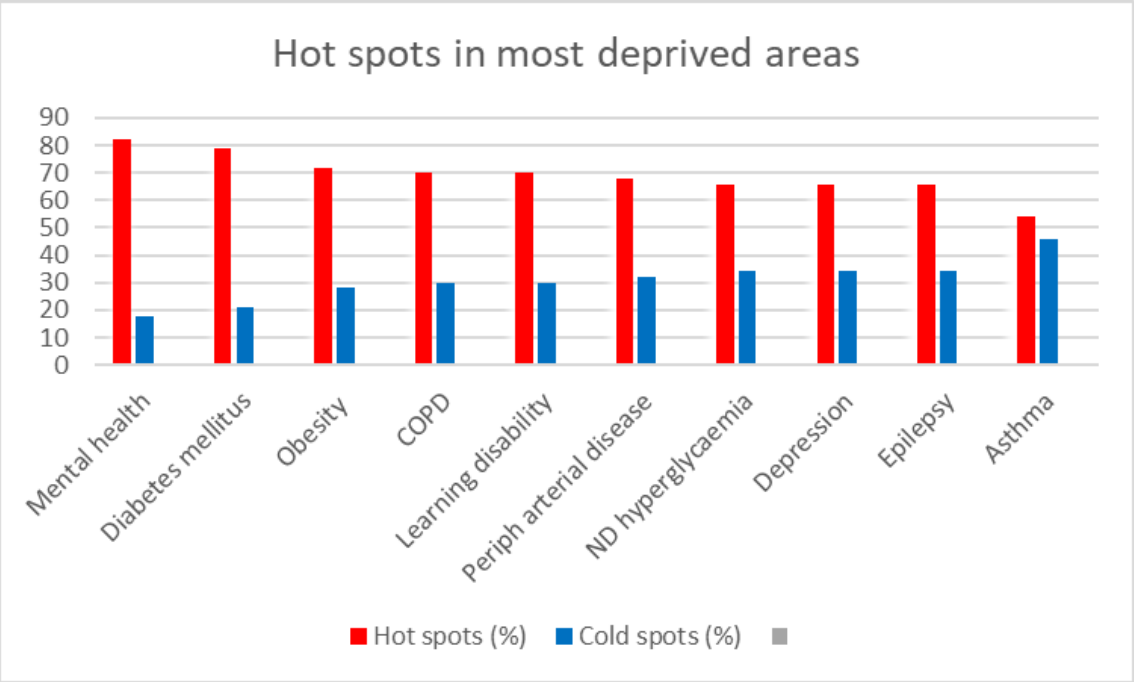

Figure 2: Percentage of GP practices in the 25% most deprived areas of GM, Blackpool and Preston with above England prevalence of 9 health conditions and learning disability cases

Hot and cold spot maps

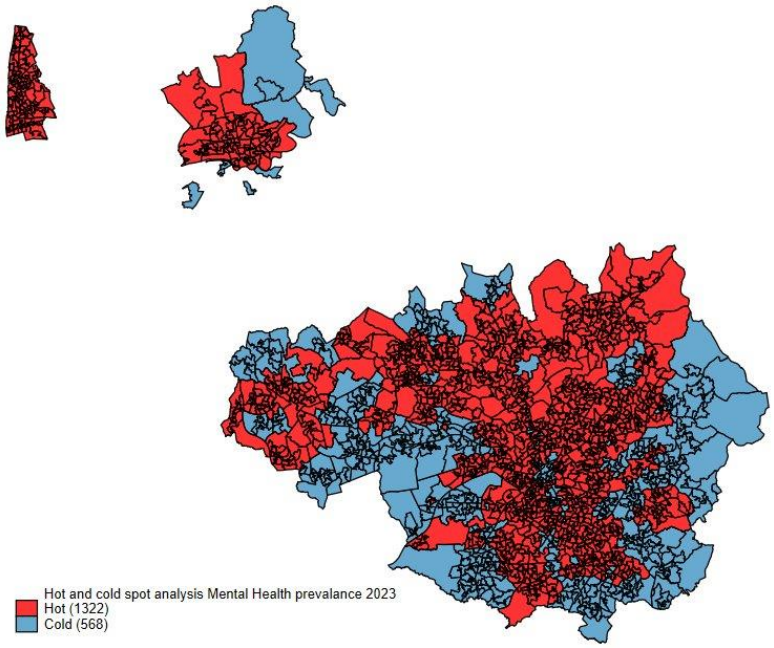

Figure 3: Hot and cold spot maps of **mental health** prevalence (from left to right: Blackpool, Preston and Greater Manchester)

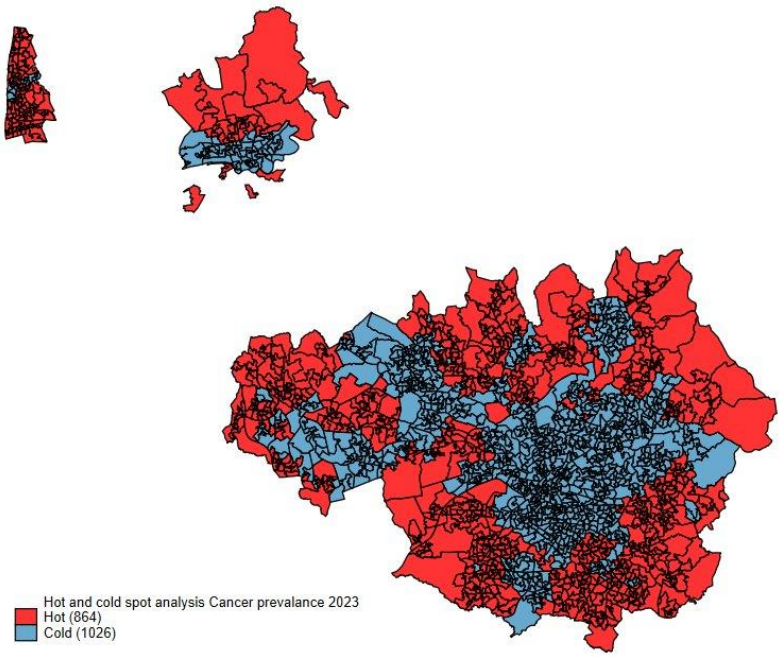

Figure 4: Hot and cold spot maps of **cancer** prevalence (from left to right: Blackpool, Preston and Greater Manchester)

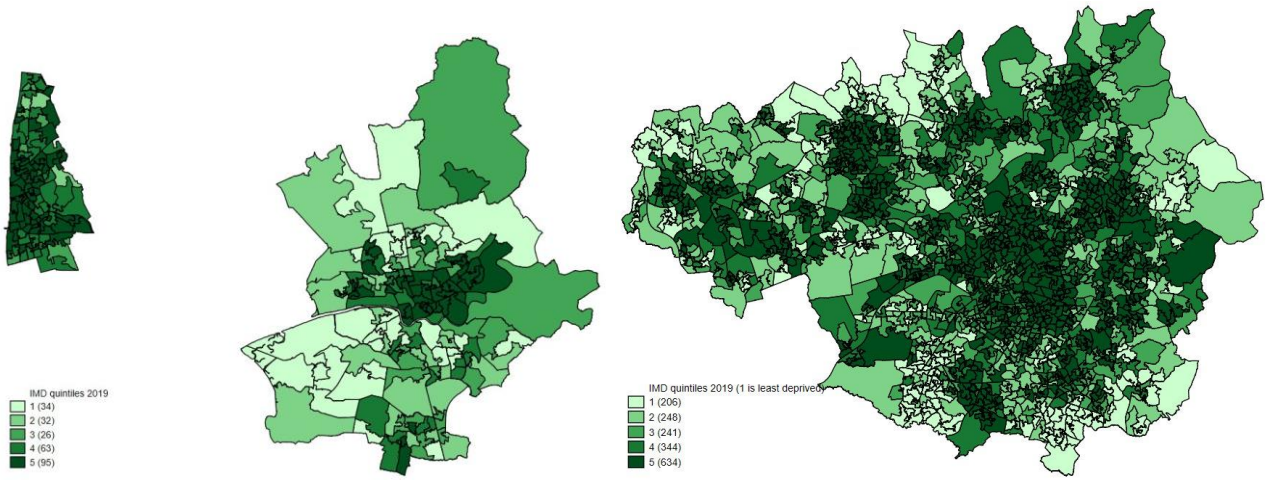

Figure 5: Maps of **deprivation** based on 2019 IMD score (divided in to 5 levels of deprivation, darkest green = highest level). (From left to right: Blackpool, Preston and Greater Manchester)

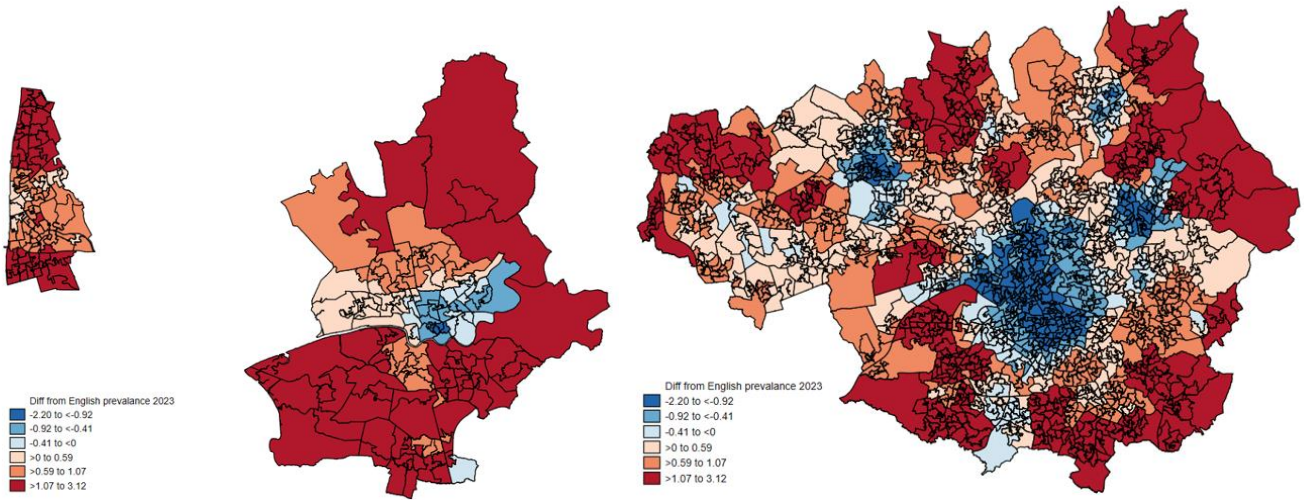

Figure 6: Maps showing how much the prevalence differs from the England prevalence for **cancer** (from left to right: Blackpool, Preston, and Greater Manchester). England prevalence = 2.93%.

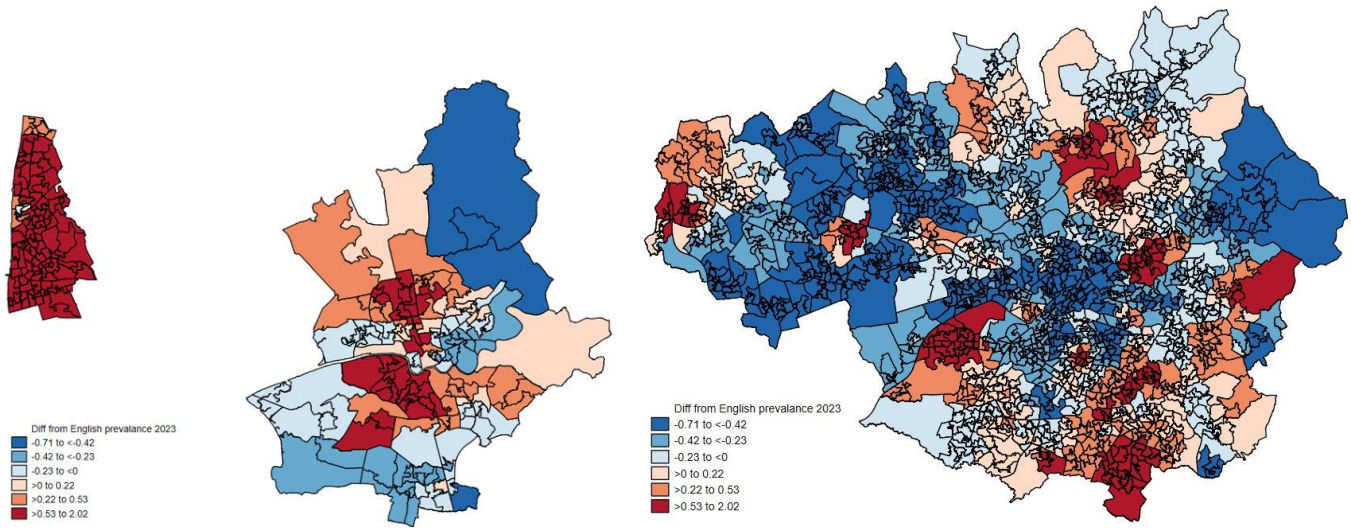

Figure 7: Maps showing how much the prevalence differs from the England prevalence for **osteoporosis** (from left to right: Blackpool, Preston, and Greater Manchester). England prevalence = 0.83%.

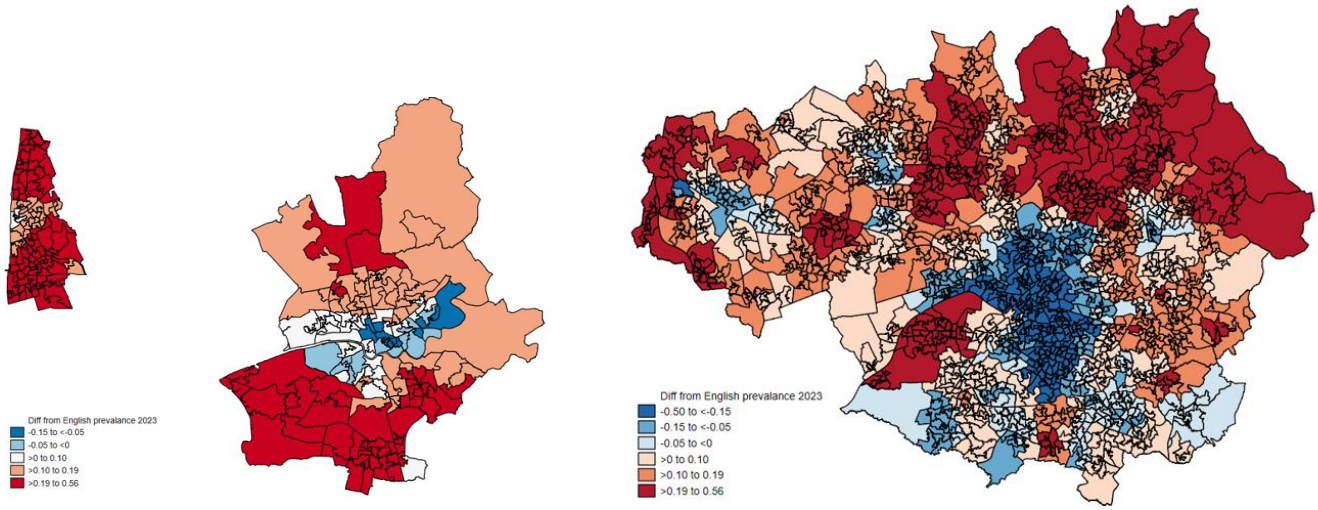

Figure 8: Maps showing how much the prevalence differs from the England prevalence for **rheumatoid arthritis** (from left to right: Blackpool, Preston, and Greater Manchester). England prevalence = 0.67%.

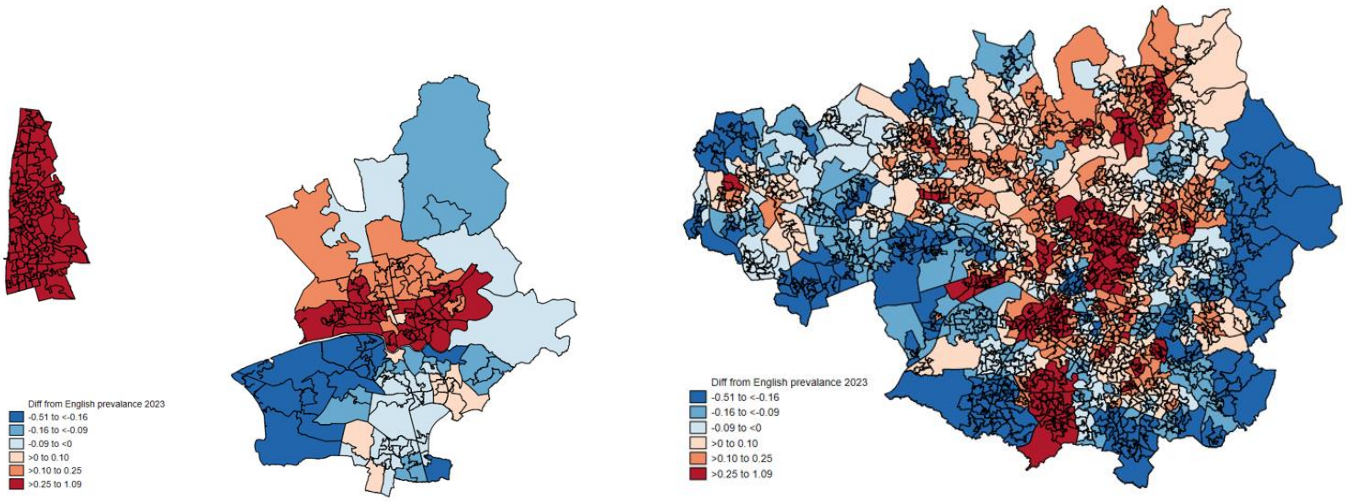

Figure 9: Maps showing how much the prevalence differs from the England prevalence for **mental health** (from left to right: Blackpool, Preston, and Greater Manchester). England prevalence = 1.07%.

Discussion

Studies have shown that deprivation is linked to poor health outcomes and high levels of health inequalities (Williams et al., 2022). As such, people living in deprived areas are more likely to be ill (Bambra et al., 2020; Barlow et al., 2021; Williams et al., 2022; Wiśniowski et al., 2023).

We investigated whether deprivation is reflected in the number of people being diagnosed with specific health conditions by their GPs in GM, Blackpool and Preston. We expected the most deprived areas to have higher prevalence of the selected conditions than the England prevalence. However, the findings from our analysis showed that the prevalence of 10 health conditions and palliative care cases reported by GP practices in the 25% most deprived areas were below the England prevalence. When ordered by lowest prevalence, atrial fibrillation and cancer were at the top of the list with 95% of practices recording below-England prevalence (Table 2). The findings suggest that people with these conditions have not been picked up in primary care. On the other hand, mental health conditions are markedly higher with 82% of GP practices in deprived areas having a higher prevalence than the England prevalence (Table 3).

Why are certain conditions being missed and other conditions being picked up at primary care?

At this stage it is too early to make any conclusions or draw any inferences about the causes, although there is evidence to demonstrate that people living in deprived areas, especially ethnic minority groups, have less access to GPs and primary care for a variety of reasons and this is likely to have been exacerbated by the Covid-19 pandemic (Barlow et al., 2021; Campbell et al., 2015; Wiśniowski et al., 2023).

The results of this preliminary investigation suggest some medical conditions are being missed in primary care. This may be due to missed diagnosis or people not being able to access primary care in a timely way. This rapid research has provided actionable feedback to the research team.

Importance of Hot and Cold Spot Analysis

Hot spots: the heat maps above illustrate the distribution of mental health hot spots, serving as our exemplar hot spot condition. Individuals in these hot spot areas are already on medical registers and thus place a demand on healthcare services. These maps are useful for identifying where to engage with these individuals for coproduction in research. However, there is likely to still be underdiagnosis, and as such, there may be further hot spots and the differences from the English average could be more pronounced than currently identified.

Cold spots: cold spot analysis is important for identifying unmet need. The cold spots for cancer, rheumatoid arthritis, and osteoporosis highlight areas where people with these conditions may not be registered in primary care datasets. This may pose a challenge for their transition into secondary and tertiary care and for their

inclusion in research. Addressing this gap is essential for making research at the BRC inclusive, understanding patients' needs, and ultimately improving patient outcomes.

Next steps

A further investigation is required to ascertain why people in certain communities are not making it onto the GPs' registers. In the next stage, we will investigate other indicators such as ethnicity, gender, economic status, and age.

The BRC Inclusive Research Team is collaborating with the Cancer Prevention and Early Detection theme in the Cancer Cluster of the BRC to conduct targeted investigations into why cancer exhibits the highest prevalence as a cold spot. They will examine both rare and common cancers, utilizing data from cancer disease and treatment registers to perform needs assessments.

The IMD scores used in this report are from 2019, pending the release of updated IMD scores, we will explore the trends in deprivation over time.

In addition, the biostatistics team is using census and QOF data to improve our estimates of the indicators. This will provide more accurate estimates of the prevalence of the hot and cold conditions, considering issues like underreporting, misdiagnosis, deprivation, age, and sex, and to provide projections for the future.

Ultimately, we plan to conduct qualitative studies (interviews) to explore the underlying factors behind these findings.

Conclusion

It is too early to make any definite conclusions as our biostatistics team is still validating the data and conducting more analyses. There are different underlying factors we need to understand and account for that might explain differences in the prevalences of the hot and cold conditions.

The findings demonstrate the existence of potentially missed diagnosis among patients living and registered to practices in deprived areas. This is characterised by a high rate of conditions falling below the national prevalence (cold spots). Hot and cold spot analysis is a valuable tool to look at unmet need and will ultimately aid in making the invisible, visible.

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Appendices

Appendix 1: List of local authorities in GM, Blackpool and Preston ranked by deprivation

Local Authority (LA)	Deprivation score (IMD Rank of Average Score) out of 317 LAs, 1 = most deprived
Blackpool	1
Manchester	6
Rochdale	15
Salford	18
Oldham	19
Tameside	28
Bolton	34
Preston	45
Wigan	76
Bury	95
Stockport	130
Trafford	191

Appendix 2: A comparison of the percentage of hot and cold spots in the most deprived areas with all areas in GM, Preston and Blackpool

	Condition	In 25% most deprived areas (GM, Preston and Blackpool)		In all areas (GM, Preston and Blackpool)	
		% of cold spots	% of hot spots	% of cold spots	% of hot spots
Respiratory group	Asthma	46	54	33	67
	COPD	30	70	31	69
Lifestyle group	Obesity	28	72	33	67
High dependency and other long term conditions group	Cancer	95	5	64	36
	Chronic kidney disease	70	30	56	44
	Diabetes mellitus	21	89	33	67
	ND hyperglycaemia	35	65	37	63
	Palliative care	69	31	67	35
Mental health and neurology group	Dementia	85	15	62	38
	Depression	35	65	29	71
	Epilepsy	35	65	35	65
	Learning disability	30	60	43	57
	Mental health	18	82	39	61
Musculoskeletal group	Osteoporosis	81	19	76	24
	Rheumatoid Arthritis	76	24	59	41
Cardiovascular group	Atrial fibrillation	95	5	63	37
	Coronary heart disease	70	30	46	54
	Heart failure	75	25	57	43
	Hypertension	79	21	52	48
	Peripheral arterial disease	32	68	33	67
	Stroke and transient ischaemic attack	69	31	48	52