The Strategy Unit.

Assessing equality of health outcomes across the Black Country and West Birmingham

Produced for The Black Country and West Birmingham Integrated Care System

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NHS
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Appendices

Summary

The purpose of this analysis is to help the Black Country and West Birmingham ICS identify areas where health inequalities due to socio-economic status and ethnicity are largest.

The analysis examines inequalities in emergency hospital admission rates. These are important indicators for several reasons: An emergency admission will be distressing for the individual and also places substantial demands on the system. Moreover, emergency admission rates are indirect measures of broader, long-term, disparities in health and care.

We looked at outcomes across 21 clinical areas (defined by ICD-10 Chapter) for two segments of the population. The first segment was persons aged 55-74 (broadly equivalent to adults with long-term conditions), whilst the second was individuals aged 75+ (broadly equivalent to adults with comorbidities and frailty).

Inequalities were examined in terms of scale (the numbers affected) and in terms of degree (how uneven admission rates are, independent of the size of the clinical area). Healthcare systems might decide to give different weights to each of these measures, depending on their objectives. Addressing the scale of inequality will benefit the greatest numbers but may also leave clear inequalities in areas where emergency admissions are less common.

Inequalities related socioeconomic status

In all clinical areas, age-and-sex-standardised emergency admission rates increased as deprivation level increased.

Both the scale and degree of inequality for admissions related to diseases of the respiratory system is large. This is true for both the 55-74 and the 75+ population segments. We also note inequalities when looking at diseases of the circulatory system (segment aged 55-74), diseases of the digestive system, and mental and behavioural disorders (both segments).

Continued overleaf...

Summary continued...

Inequalities related to ethnicity

In the majority of clinical areas, ethnic minority populations had significantly higher standardised admission rates than the aggregated White population.

This analysis suggests considerable inequalities, in terms of scale and degree, in admission rates for diseases of circulatory system. Also noteworthy is the high relative inequality for endocrine, nutritional and metabolic diseases.

Symptoms and signs not elsewhere classified

Another feature of the analysis was the high degree of inequality - across both socioeconomic and ethnic groups – in cases where the primary diagnosis was in the, "Symptoms and signs not elsewhere classified" (NEC) chapter. Such a diagnosis signifies that no conclusion was reached about the underlying cause of admission (only symptoms were recorded).

While this is one of the most common primary diagnosis categories within the ICS, it appears that disadvantaged and ethnic minority populations (particularly in the 55-74 population segment) were far more likely to be discharged without a firm diagnosis than the least deprived and aggregated white populations, respectively.

It is unclear why this may be the case. Such a finding might indicate that the depth of care and attention varies across population subgroups (perhaps due to communication gaps, among other factors). Alternatively, this outcome could be a product of clinical coding practice, or differential admission thresholds. It is, however, clear that this is not a data quality issue and that the finding warrants further investigation.

Introduction

"Health inequalities are unfair and avoidable differences in health across the population, and between different groups within society. Health inequalities arise because of the conditions in which we are born, grow, live, work and age. These conditions influence our opportunities for good health, and how we think, feel and act, and this shapes our mental health, physical health and wellbeing."

- NHS England definition of health inequalities

The Black Country and West Birmingham Integrated Care System (ICS) has identified healthcare inequalities as a priority area for attention. **The aim of this report is to highlight clinical areas where more substantial inequalities exist and where rapid progress might be achieved.**

Health inequalities may exist due to many factors including differences in socio-economic status, gender, ability, and ethnicity. In this report we focus on inequality of health outcomes due to differences in:

i) Socioeconomic status; and

ii) Ethnicity

The report should supplement existing knowledge of inequality across the ICS and support a process to establish a list of potential priority programme areas. Such a process could inform the specification of further more directed analysis of inequality, perhaps focussing on specific services or interventions.

Introduction continued...

Population segments

We looked at health inequalities across two segments of the population:

1. Persons aged 55-74
   This group was chosen for its broad equivalence to the group of adults with long term conditions (LTCs), whilst being a more pragmatic alternative.

2. Persons aged 75+
   This group was chosen for its broad equivalence to the group of adults with comorbidities or frailty or those requiring end-of-life care, whilst being a more pragmatic alternative.

Measured health outcomes

For both segments, we assessed inequalities in emergency hospital admission rates across 21 clinical areas. Many emergency admissions may be prevented with appropriate upstream interventions. By examining inequalities in emergency admission rates we are indirectly measuring broader, long-term, inequalities in health and care.

For the LTC segment, we also highlight the impact that each disease category has on the population. We express this in terms of years of life lost due to premature death.

How we measured inequality

We examined inequalities using metrics based on the Index of Disparity (IoD). This original form of the index will – for example - summarise the difference in health status between several groups and a reference level. In our case, the reference level was the population-weighted mean standardised emergency admission rate.

The scale and degree of inequality

From the IoD, we can derive measures of the *scale* of inequality (indicative of the number of people affected by the inequality) and/or the *degree* of inequality (the unevenness of the area, independent of size).

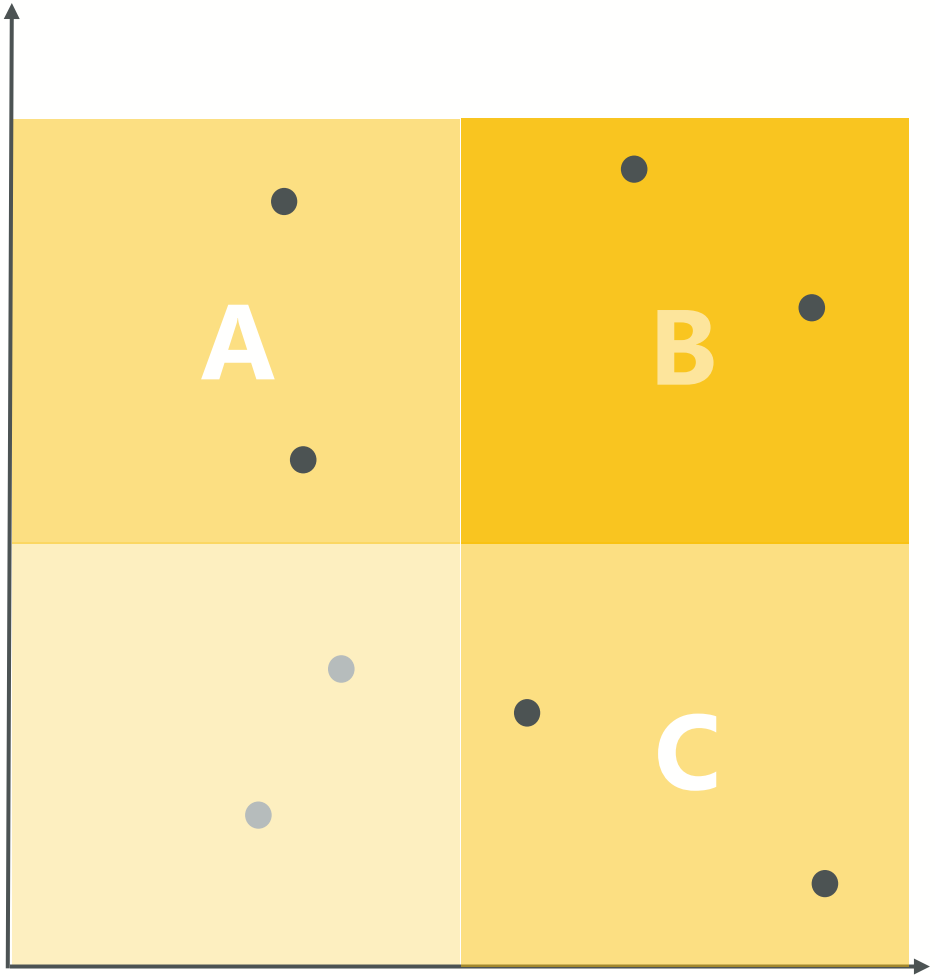
While both of these measures are important, we may wish to prioritise one or the other depending on our particular values or objectives.

The interaction of the scale and degree of inequality, and the resulting influence on a healthcare system's response, is examined in the figure on the following page. This model will form the basis of our analysis.

Visualising the scale and degree of inequality

Return to results pages

Scale of inequality
(numbers affected)



Degree of inequality
(how uneven- independent of size)

Quadrant A

For some clinical areas, the scale of inequality may be great but the degree may be low. A health system might target these areas if their main objective is to reduce the total number of people affected by inequalities. This approach, however, may leave clear inequalities in areas where events (in our case, emergency admissions) are less common.

Quadrant B

Alternatively, both the degree and scale of inequality may be great. These are areas that should certainty be addressed - assuming suitable interventions exist.

Quadrant C

In other areas, the degree of inequality may be great but the scale, low. A system might target these areas if their priority is fairness, no matter how small the clinical area.

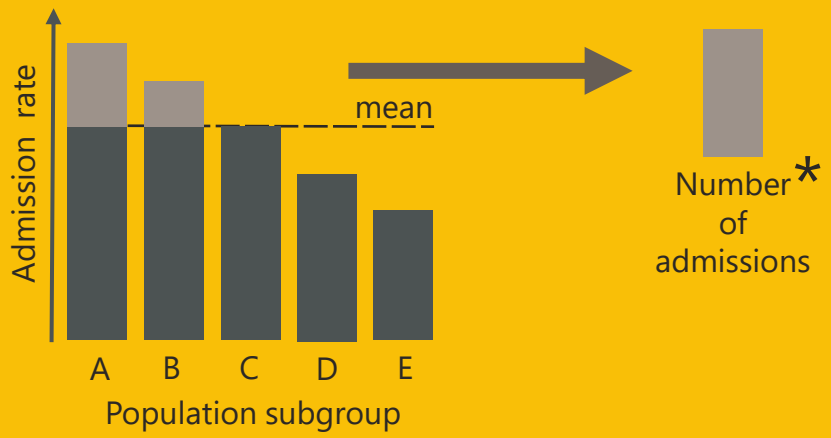
Methods – Measuring inequality

There are several approaches that might be used to measure the scale and degree of inequality [1, 2, 3]. We have chosen metrics based on the **Index of Disparity (IoD),** a measure which summarises the difference in health status between several groups and a reference level.

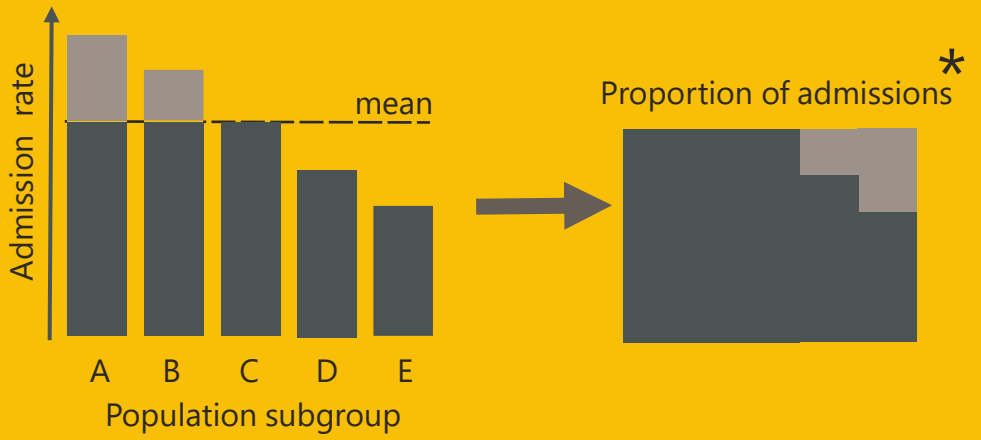
For this exercise, our reference level will be the population-weighted mean (standardised emergency admission rate). While other reference levels could be used, the population mean rate gives an indication of the response needed to achieve equality without assuming that a system will have additional resources to improve overall population health.

An augmentation of the conventional IoD provides our scale and degree metrics, opposite. (See Appendix 3 for mathematical form.)

Scale: An "absolute index of disparity" provides the number of "excess" admissions that result from subgroup rates being above the population mean rate.



Degree: A "relative index of disparity" returns the excess admissions (as above) as a proportion of all admissions.



* Subgroup rate must be multiplied by the corresponding population to determine counts. Illustrations assume subgroup populations are equal.

1. Regidor E, Measures of health inequalities: part 1, Journal of Epidemiology & Community Health 2004;58:858-861.

2. Regidor E Measures of health inequalities: part 2, Journal of Epidemiology & Community Health 2004;58:900-903.

3 Pearcy JN, Keppel KG. A summary measure of health disparity. Public Health Rep. 2002;117(3):273-280. doi:10.1093/phr/117.3.273

Methods – Measuring inequality continued...

Directly standardised rates

To produce the directly standardised rates used in the IoD calculations, the age-and-sex-specific rates of the population subgroups are applied to the age-and-sex structure of a chosen standard population (in our case, the 2013 European Standard Population). This calculation returns the overall rate that would have occurred in the subgroup if it had the standard age-and-sex profile. This approach allows us to control for the effect of differences in the structure of the population subgroups. Such differences are not the focus of the study yet may have a considerable affect on event rates.

In this analysis, emergency admission rates were standardised by sex, and 5-year age band.

Impact: Years of life lost

Years of life lost (per year) due to premature death is calculated as the sum (across all subgroups) of the negative differences between age at death and 75 years.

Data sources

Our study aims to describe, as far as possible, the current situation within the ICS.

Data on emergency hospital admissions of individuals living within the ICS boundary were sourced from the Hospital Episode Statistics (HES) "Admitted Patient Care" tables. We looked at activity occurring in the 2018/19 financial year. Primary diagnosis codes (on which the ICD-10 chapter is based) were taken from the final episode of a spell.

We derived the "Years of life lost due to premature death" statistic by linking HES tables to the ONS Mortality Dataset. The indicator is based on data from the 2016/17 financial year.

An estimate of the socio-economic status of each individual was derived from the 2019 Index of Multiple Deprivation (IMD) associated with that individual's area of residence.

Many computations required population denominators. The ONS Mid-2018 Population Estimates provide populations by age, sex and LSOA, and were sufficient for the calculations relating to socio-economic status.

The challenge of working with ethnicity data

Within our HES activity sample, 10% of records had a value for ethnicity that was either missing or reported as "unknown". While this problem is widely recognised, there is no clear solution. Indeed a paper on this subject by Mathur et al. merely concludes, "it is important to be aware of the biases that may arise from using incomplete data." [4]

Since it is difficult to guess how the "unknown" records may be distributed across ethnic groups, we removed activity with no ethnicity label. This will mean that the numerator for our admission rates by ethnicity will be lower than the true value.

For the computations relating to ethnicity, we required population estimates by age, sex, ethnicity and geographical area. However, since estimates of the current populations are not produced at this level, we relied on counts from the 2011 Census. Thus, population denominators for our admission rates by ethnic group do not account for population growth between 2011 and 2018.* The denominators will therefore also be lower than the true value.

In conclusion, our analysis of inequalities due to ethnicity should be approached with an understanding of these shortcomings.

4. Rohini Mathur, Krishnan Bhaskaran, Nish Chaturvedi, David A. Leon, Tjeerd vanStaa, Emily Grundy, Liam Smeeth, Completeness and usability of ethnicity data in UK-based primary care and hospital databases, Journal of Public Health, Volume 36, Issue 4, December 2014, Pages 684–692, https://doi.org/10.1093/pubmed/fdt116

* And growth in this period will vary by ethnic group

Results 1 – How to read our results

How to read our results

We examine inequalities of outcome first by deprivation quintile - for both population segments (ages 55-75; and age 75+) - before considering inequalities relating to aggregated ethnic group.

For each clinical area (based on ICD10 chapters, shown in Table 1), we plot the degree and the scale of inequality against each other. This provides a clear visualisation of the areas in which the greatest inequalities exist, but also allows for a range of priorities or objectives. An example of this type of chart is shown on the following page.

It is important to recognise that the metrics we plot provide only a magnitude and do not indicate which subgroups are affected. It is therefore necessary to look at the profiles of the standardised rates on which the indices are built. We have provided links to these profiles next to the graphics.

At the end of this section, we present table summaries of the information.

Table 1 : List of clinical areas (ICD-10 Chapters) and abbreviations used in the following graphics

Chapter	Chapter Name	Abbrevation
1	Infectious and parastic diseases	1. Inf
2	Neoplasms	2. Canc
3	Blood and immune system	3. Bld
4	Endocrine, and metabolic diseases	4. Endo
5	Mental and behavioural disorders	5. Ment
6	Nervous system	6. Nerv
7	Eye and adnexa	7. Eye
8	Ear and mastoid process	8. Ear
9	Circulatory system	9. Circ
10	Respiratory system	10. Resp
11	Digestive system	11. Dig
12	Skin and subcutaneous tissue	12. Skin
13	Musculoskeletal system	13. MSK
14	Genitourinary system	14. GU
15	Pregnancy, childbirth, the puerperium	15. Preg
16	Conditions orig. in perinatal period	16. Peri
17	Congenital diseases	17. Cong
18	Signs and symptoms NEC	18. NEC
19	Consequences of external causes	19. Inj
20	External causes of morbidity	20. Ext
21	Factors influencing health status	21. Fact

Example chart

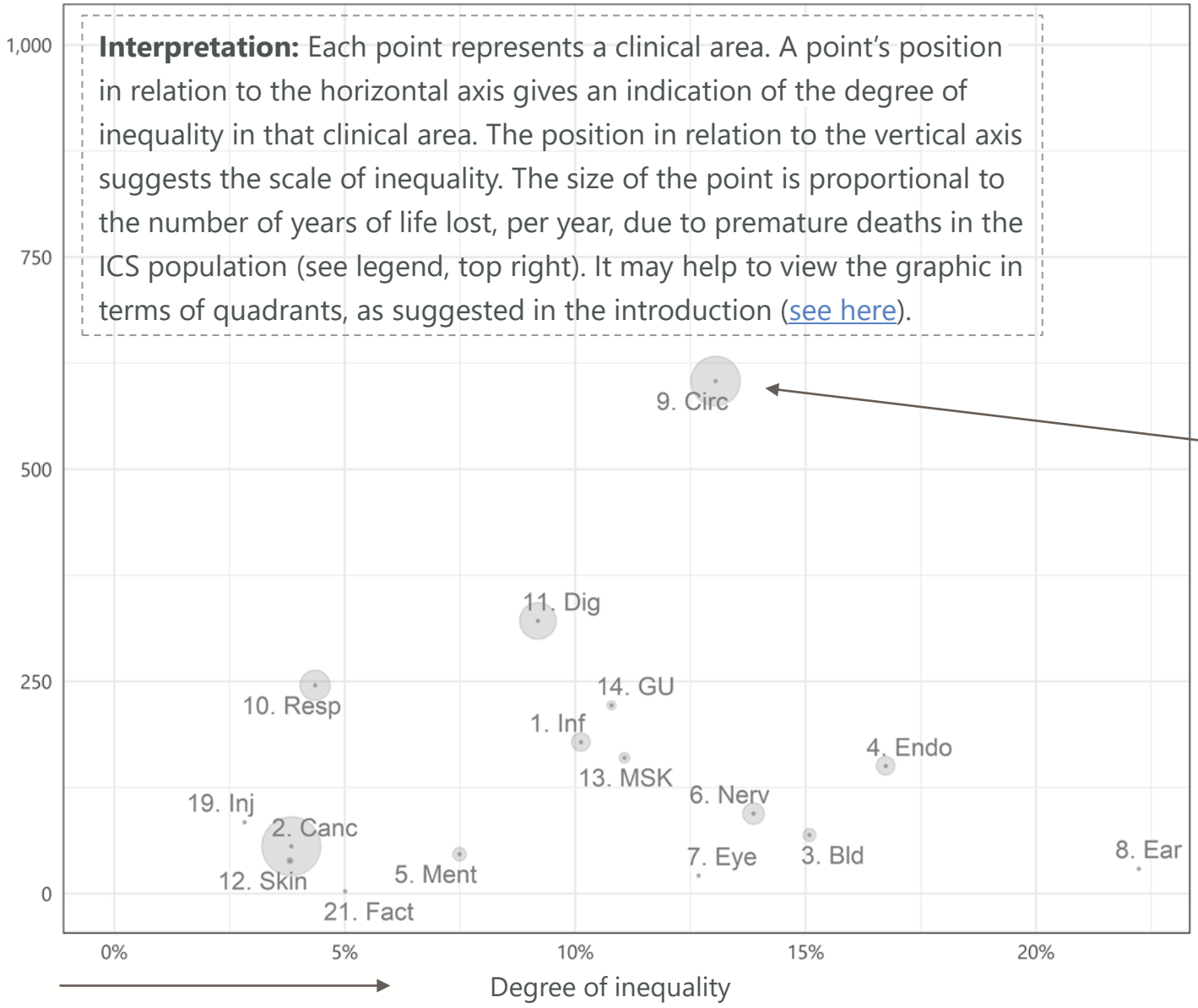
Interpreting the degree and scale plots

Dimension → Ethnicity

Population segment → 55 -74

Vertical axis: Scale of inequality

(The number of "excess" admissions that result from subgroup rates being above the population mean rate)



Degree of inequality

("Excess" admissions as a proportion of all admissions in a clinical area)

Interpretation: Each point represents a clinical area. A point's position in relation to the horizontal axis gives an indication of the degree of inequality in that clinical area. The position in relation to the vertical axis suggests the scale of inequality. The size of the point is proportional to the number of years of life lost, per year, due to premature deaths in the ICS population (see legend, top right). It may help to view the graphic in terms of quadrants, as suggested in the introduction (see here).

Point size: Years of life lost, per year

5,000 10,000 15,000

Written summary of graphic appears here

Includes link to profiles of standardised rates for this group.

Example data point: The ICD-10 chapter/ clinical area, "9. Diseases of the circulatory system" has a relatively high scale and degree of inequality: To achieve the population mean rate, over 600 admissions would need to be removed from the subgroups with above average rates. This number is equivalent to 13% of all admissions in the clinical area.

From the size of the point, we also see that diseases of the circulatory system have a sizeable impact – almost 13,000 years of life are lost, per year, due to premature deaths. See Appendix 4 for reference.

Results 2 – Charts and tables

Populations by segment and socioeconomic status

Whilst the population segment aged 55-74 is almost three times the size of the segment aged 75+, the proportions in each quintile are similar across segments.

A large proportion of the population in both segments are counted in the most deprived quintiles.

Table 2: The Black Country and West Birmingham population aged 55-74, by IMD quintile

Deprivation Quintile	Population (55-74)	%*
1	120,000	43%
2	57,000	21%
3	39,000	14%
4	34,000	12%
5	25,000	9%

Table 3: The Black Country and West Birmingham population aged 75+, by IMD quintile

Deprivation Quintile	Population (75+)	%*
1	44,000	40%
2	23,000	21%
3	17,000	15%
4	15,000	13%
5	12,000	11%

** Due to rounding, percentage total may add to 101%.*

Measures of inequality relating to socioeconomic status

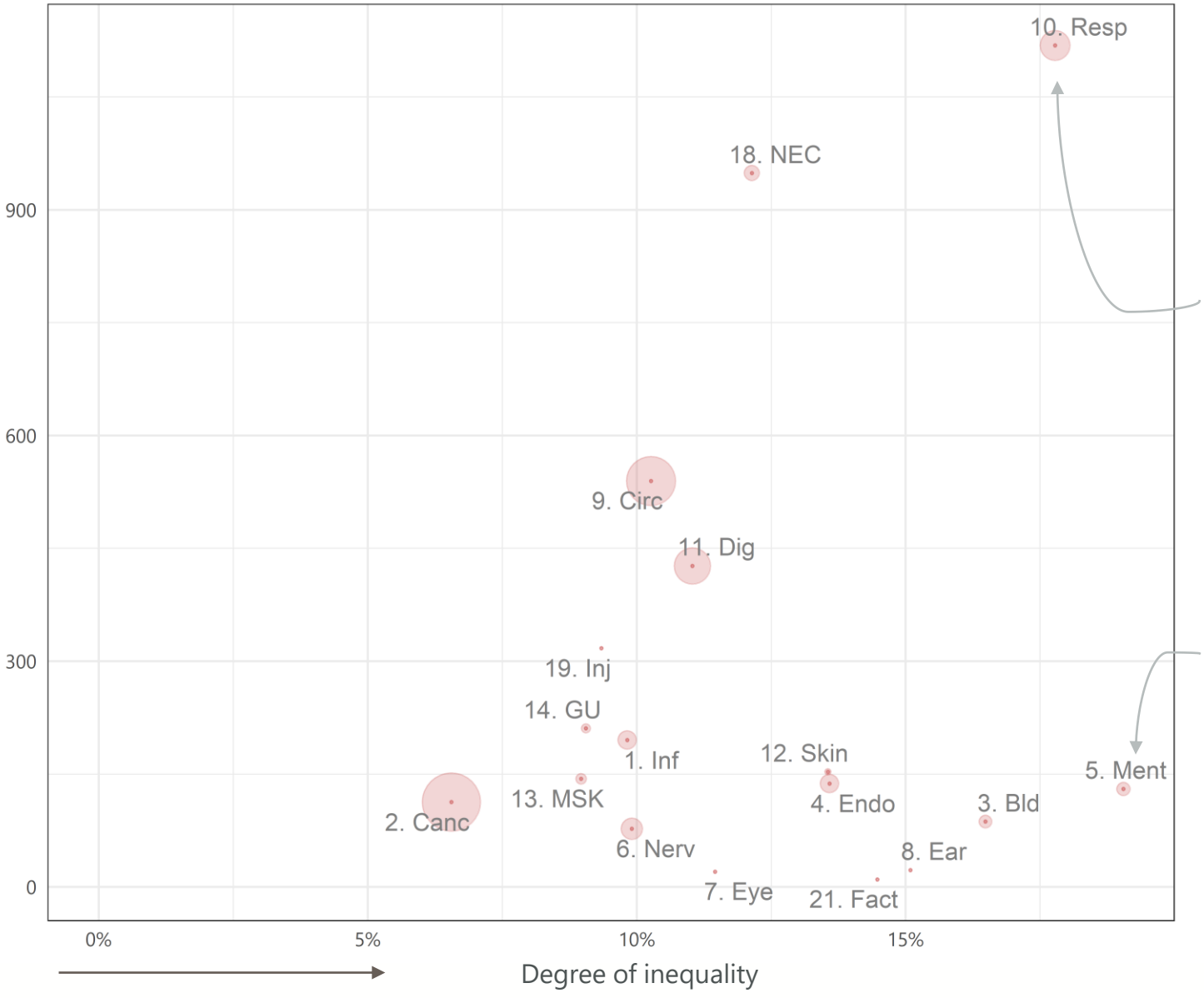
Emergency admissions by clinical area (ICD-10 Chapter)

Deprivation

55 -74

Vertical axis: Scale of inequality

(The number of "excess" admissions that result from subgroup rates being above the population mean rate)



("Excess" admissions as a proportion of all admissions in a clinical area)

Point size: Years of life lost, per year

5,000 10,000 15,000

Here we look at socioeconomic inequalities for the long-term conditions (LTC) segment.

Socio-economic inequality is clearly highest for admissions related to diseases of the respiratory system. To achieve the population mean rate, 1,100 admissions would need to be removed from the subgroups with above average rates. This number is equivalent to 18% of all admissions in the clinical area. This graphic also suggests inequalities in admission rates related to diseases of the circulatory and digestive systems, and in those due to mental and behavioural disorders.

A theme across these graphics is the high relative inequality for the "Symptoms and signs not elsewhere classified" (NEC) chapter. This suggests that disadvantaged and ethnic minority populations are considerably more likely to have a "not elsewhere classified" primary diagnosis.

Link: Profiles of standardised rates for this group (Ctrl +Click)

Measures of inequality relating to socioeconomic status

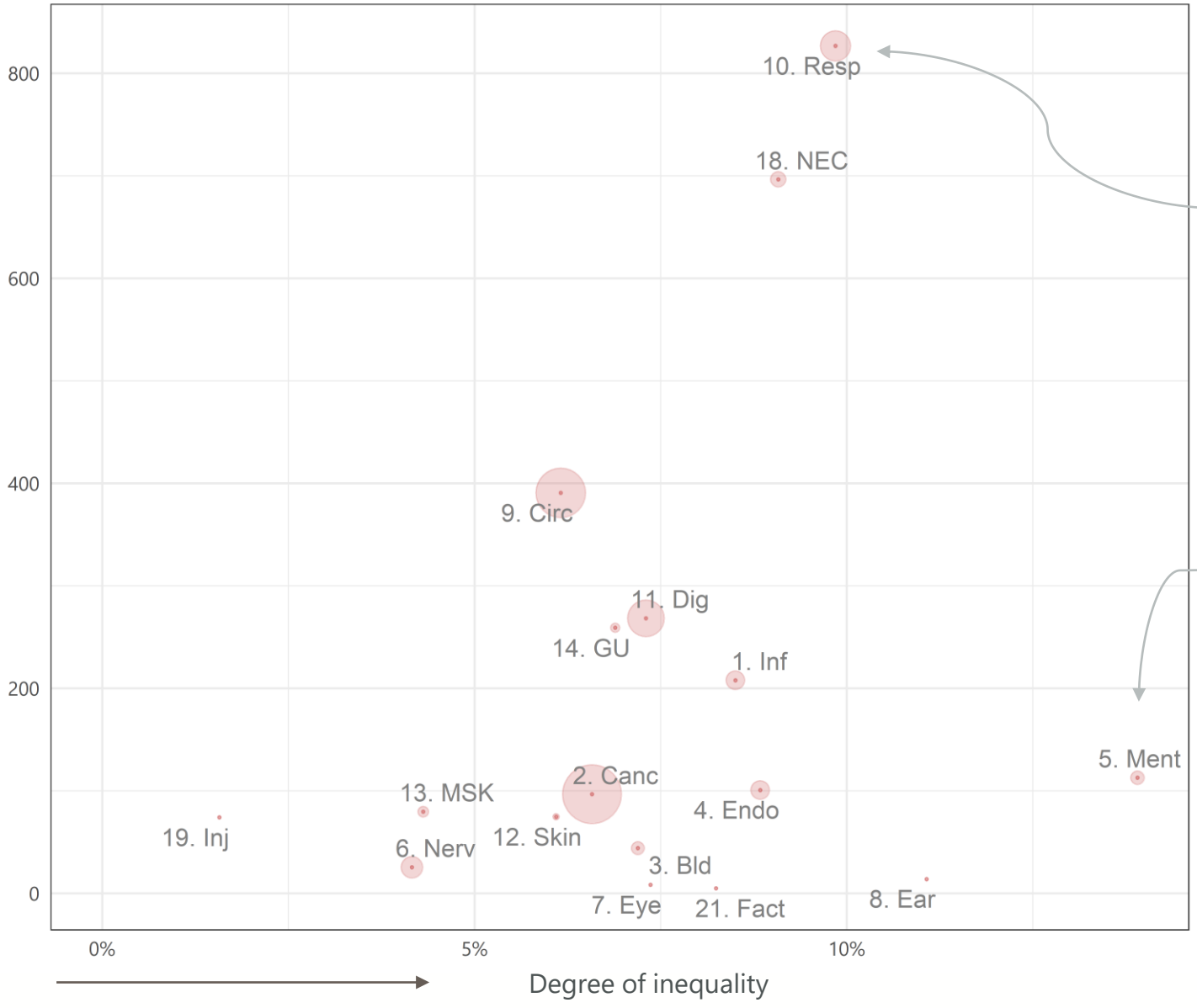
Emergency admissions by clinical area (ICD-10 Chapter)

Deprivation

75+

Vertical axis: Scale of inequality

(The number of admissions that exceed the level we would observe if all quintiles had the mean admission rate)



("Excess" admissions as a proportion of all admissions in a clinical area)

Point size; Years of life lost, per year

5,000 10,000 15,000

In the oldest segment of the population, it again appears to be admissions rates for respiratory diseases where the greatest inequalities exist: To achieve the population mean rate, around 800 admissions would need to be removed from the subgroups with above average rates. This number is equivalent to 10% of all admissions in the clinical area.

We also see noteworthy inequalities for diseases of the circulatory system and, once more, a high degree of inequality for mental and behavioural disorders.

Link: Profiles of standardised rates for this group (Ctrl +Click)

Populations by segment and aggregated ethnic group

Based on 2011 UK Census counts, ethnic minority populations make up about 15% of the segment aged 55-74 and 11% of the segment aged 75+. The aggregated Asian group is the biggest minority population in both segments, followed by the aggregated Black population. There are low numbers in the aggregated Mixed and Other population groups, especially for the segment aged 75+.

Table 4: Black Country and West Birmingham population aged 55-74 by aggregated ethnic group

Ethnic Group	Population (55-74)	%*
Asian	25,000	10.1%
Black	8,200	3.3%
Mixed	1,200	0.5%
Other	2,000	0.8%
White	210,000	85.3%

Table 5: Black Country and West Birmingham population aged 75+ by aggregated ethnic group

Ethnic Group	Population (75+)	%*
Asian	6,100	6.1%
Black	4,200	4.2%
Mixed	420	0.4%
Other	540	0.5%
White	88,000	88.8%

** Due to rounding, percentage total may add to 101%.*

Measures of inequality relating to ethnicity

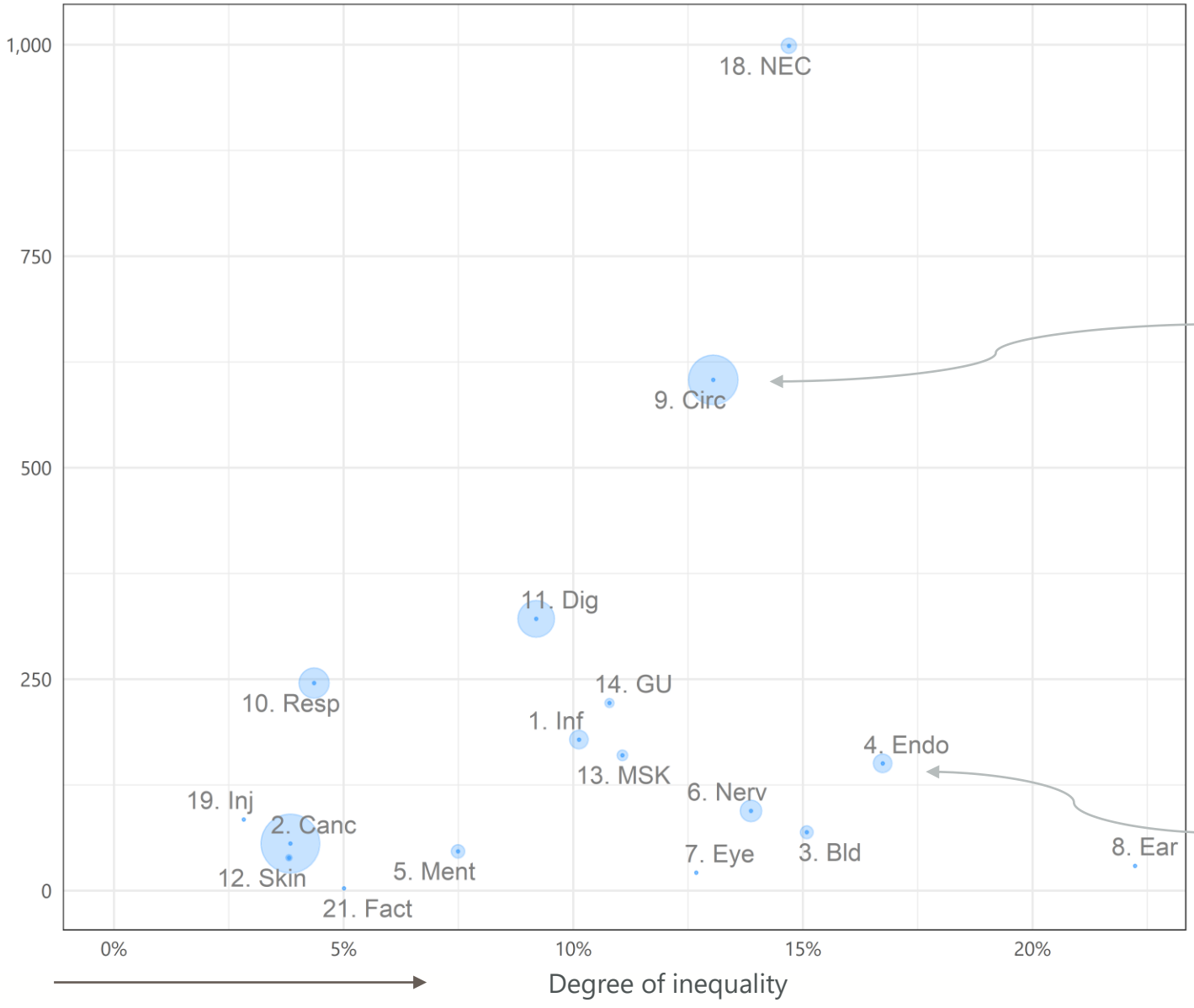
Emergency admissions by clinical area (ICD-10 Chapter)

Ethnicity

55 -74

Vertical axis: Scale of inequality

(The number of "excess" admissions that result from subgroup rates being above the population mean rate)



("Excess" admissions as a proportion of all admissions in a clinical area)

Years of life lost, per year

5,000 10,000 15,000

Here, we look at inequality of outcome, by ethnic group, for the LTC population segment.

The graphic suggests considerable inequalities in admission rates for diseases of the circulatory system: To achieve the population mean rate, around 600 admissions would need to be removed from the subgroups with above average rates. This number is equivalent to 13% of all admissions in the clinical area. We also see that diseases of the circulatory system have a considerable impact: Almost 13,000 years of life are lost each year due to such illnesses. Only cancer has a greater toll when measured in this way.

Also noteworthy is the high degree of inequality for endocrine, nutritional and metabolic diseases.

Link: Profiles of standardised rates for this group (Ctrl +Click)

Measures of inequality relating to ethnicity

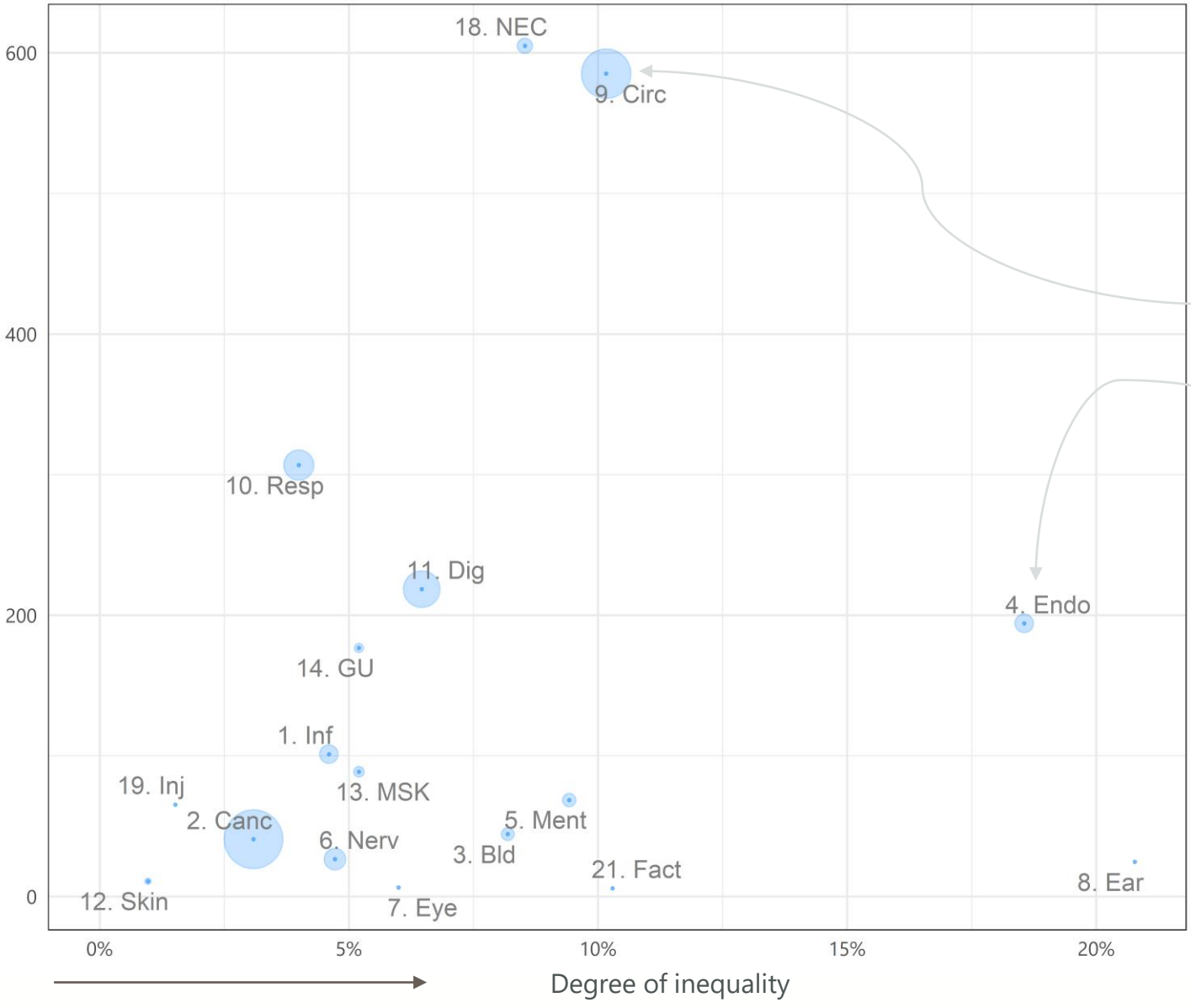
Emergency admissions by clinical area (ICD-10 Chapter)

Ethnicity

75+

Vertical axis: Scale of inequality

(The number of "excess" admissions that result from subgroup rates being above the population mean rate)



Degree of inequality

("Excess" admissions as a proportion of all admissions in a clinical area)

Impact: Years of life lost per year

5,000 10,000 15,000

Finally, we look at inequalities relating to ethnicity for the oldest segment of the population.

Our metrics again suggest considerable inequality for diseases of circulatory system.

Also notable is the high degree - and relatively high scale - of inequality for endocrine, nutritional and metabolic diseases.

Link: Profiles of standardised rates for this group (Ctrl +Click)

Table 6: Summary of measures of inequality

Population segment aged 55-74

55 -74

ICD Chapter	ICD Chapter name	Emergency Admissions	Socioeconomic status		Ethnicity	
			Degree	Scale	Degree	Scale
1	Infectious and parastic diseases	1,986	10%	195	10%	179
2	Neoplasms	1,724	7%	113	4%	56
3	Blood and immune system	528	16%	87	15%	69
4	Endocrine, and metabolic diseases	1,011	14%	137	17%	151
5	Mental and behavioural disorders	684	19%	130	7%	47
6	Nervous system	781	10%	77	14%	94
7	Eye and adnexa	178	11%	20	13%	21
8	Ear and mastoid process	149	15%	22	22%	30
9	Circulatory system	5,258	10%	540	13%	604
10	Respiratory system	6,291	18%	1,118	4%	246
11	Digestive system	3,867	11%	427	9%	322
12	Skin and subcutaneous tissue	1,130	14%	153	4%	39
13	Musculoskeletal system	1,606	9%	144	11%	160
14	Genitourinary system	2,328	9%	211	11%	222
19	Consequences of external causes	3,396 *	9%	317	3%	84
21	Factors influencing health status	70	14%	10	5%	3

We have removed admissions related to congenital diseases due to the low number of events.
In such cases, uncertainty due to random (or "natural") variation will be high.

18	Signs and symptoms NEC	7,815	12%	949	15%	999

Table 7: Summary of measures of inequality

Population segment aged 75+

75+

ICD Chapter	ICD Chapter name	Emergency Admissions	Socioeconomic status		Ethnicity	
			Degree	Scale	Degree	Scale
1	Infectious and parastic diseases	2,446	9%	208	5%	101
2	Neoplasms	1,472	7%	97	3%	41
3	Blood and immune system	612	7%	44	8%	44
4	Endocrine, and metabolic diseases	1,141	9%	101	19%	194
5	Mental and behavioural disorders	812	14%	113	9%	69
6	Nervous system	611	4%	25	5%	27
7	Eye and adnexa	115	7%	8	6%	7
8	Ear and mastoid process	126	11%	14	21%	25
9	Circulatory system	6,345	6%	391	10%	585
10	Respiratory system	8,395	10%	827	4%	307
11	Digestive system	3,676	7%	268	6%	219
12	Skin and subcutaneous tissue	1,223	6%	75	1%	11
13	Musculoskeletal system	1,851	4%	80	5%	89
14	Genitourinary system	3,761	7%	259	5%	177
19	Consequences of external causes	4,729*	2%	74	2%	65
21	Factors influencing health status	61	8%	5	10%	6

We have removed admissions related to congenital diseases due to the low number of events.
In such cases, uncertainty due to random (or "natural") variation will be high.

18	Signs and symptoms NEC	7,672	9%	696	9%	605

Discussion

The purpose of this analysis is to help the Black Country and West Birmingham ICS identify areas where inequalities due to socio-economic status and ethnicity are largest.

We examined inequalities across clinical areas in terms of scale and in terms of degree. As noted, healthcare systems might decide to give different weights to each of these measures, depending on their objectives. Addressing the scale of inequality will benefit the greatest numbers, but may also leave clear inequalities in areas where emergency admissions are less common.

Inequalities related socioeconomic status

Examining the profiles of the age-and-sex-standardised admission rates, we see that, almost universally, admission rates increase as deprivation increases.

Socio-economic inequality is high in scale and degree for admissions related to diseases of the respiratory system. This is true for both the 55-74 and the 75+ population segments. It is possible that differential smoking rates across quintiles are a factor in the disparity: A recent study [5] suggested rates of smoking are four times higher in the most deprived areas than in the least deprived areas – and this is a similar story to the one we see when looking at the standardised admission rates in this clinical area.

We also note inequalities when looking at diseases of the circulatory system (segment aged 55-74), diseases of the digestive system, and mental and behavioural disorders (both segments).

Inequalities related to ethnicity

In the majority of clinical areas, ethnic minority populations have significantly higher standardised admission rates than the aggregated White population.

This analysis suggests considerable inequalities in admission rates for diseases of circulatory system. Also noteworthy is the high relative inequality for endocrine, nutritional and metabolic diseases. The disparity in these areas may be in part related to the relatively high risks of heart disease and type 2 diabetes in people with a South Asian background [6].

Continued overleaf...

5. Likelihood of smoking four times higher in England's most deprived areas than least deprived, ONS, 2018.

6. South Asian background and heart health, accessed 19/05/2021, https://www.bhf.org.uk/informationsupport/heart-matters-magazine/medical/south-asian-background

Discussion continued...

Symptoms and signs not elsewhere classified

Another feature of the analysis was the high degree of inequality - across both socioeconomic and ethnic groups - where the primary diagnosis was, "Symptoms and signs not elsewhere classified" (NEC). Such a diagnosis signifies that no conclusion was reached about the underlying cause of admission (only symptoms were recorded).

While this is one of the most common primary diagnosis categories, it appears that disadvantaged and ethnic minority populations (particularly in the 55-74 population segment) were far more likely to have a NEC primary diagnosis than the least deprived and aggregated white populations, respectively.

It is unclear why this may be the case. Such a finding might indicate that the depth of care and attention varies across population subgroups (perhaps due to communication gaps, among other factors). Alternatively, this outcome could be a product of clinical coding practice, or differential admission thresholds. It is, however, clear that this is not a data quality issue and that the finding warrants further investigation.

Why use the mean admission rate as a reference level?

Both improvements in overall health and greater equality have been longstanding NHS priorities [7, 8, 9].

Improving overall population health tends to require additional investment. However, in principle, a system can realise equality and maintain population health *without* additional investment. This is might be achieved if all groups were to experience the population mean admission rate.

Whilst a potential consequence of seeking lower admission rates in disadvantaged groups is a rise in rates in the more privileged groups, the major policy objective of equality is addressed without compromising overall population health.

Thus the scale and degree measures of inequality that we use here may also be thought of, respectively, as the number and percentage of admissions that would need to be redistributed between subgroups in order to achieve equal admission rates across the population.

Continued overleaf...

7. Wanless et al., Securing Good Health for the Whole Population, 2004.
8. NHS England, Five Year Forward View, 2014.
9. NHS England, NHS Long Term Plan, 2019.

Discussion continued...

Limitations

The availability of ethnicity data was the major constraint of this study and our analysis of inequalities by ethnic group should be treated with some care. Computations required population denominators by ethnicity, but since official estimates of the current populations are not produced at the necessary geographical level, we relied on counts from the 2011 Census. Thus, due to population growth, denominators for our standardised admission rates by ethnic group are likely to be lower than the true value.

Equally, the numerator for our admission rates by ethnicity will also be substantially lower than the true value: In our HES activity sample, 10% of records had a value for ethnicity that was either missing or reported as “unknown”. Our decision was to remove these, as it is difficult to guess how the “unknown” records may be distributed across ethnic groups.

Appendix 1 – Standardised rate profiles.

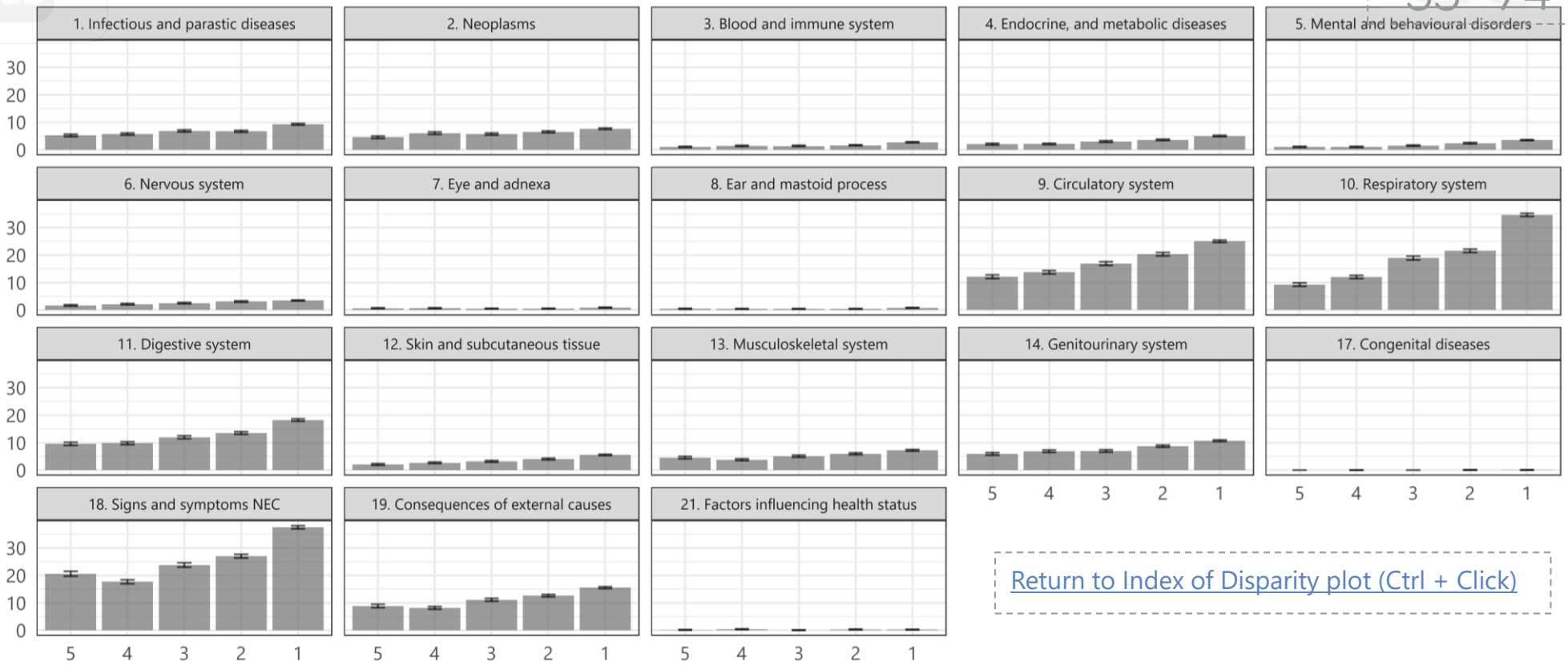
Directly standardised emergency admission rates -
by Index of Multiple Deprivation (quintile) and clinical area

Deprivation

55 -74

Vertical axis: Directly standardised rate per 1,000 population

Horizontal axis: IMD quintile (1 = most deprived)



Return to Index of Disparity plot (Ctrl + Click)

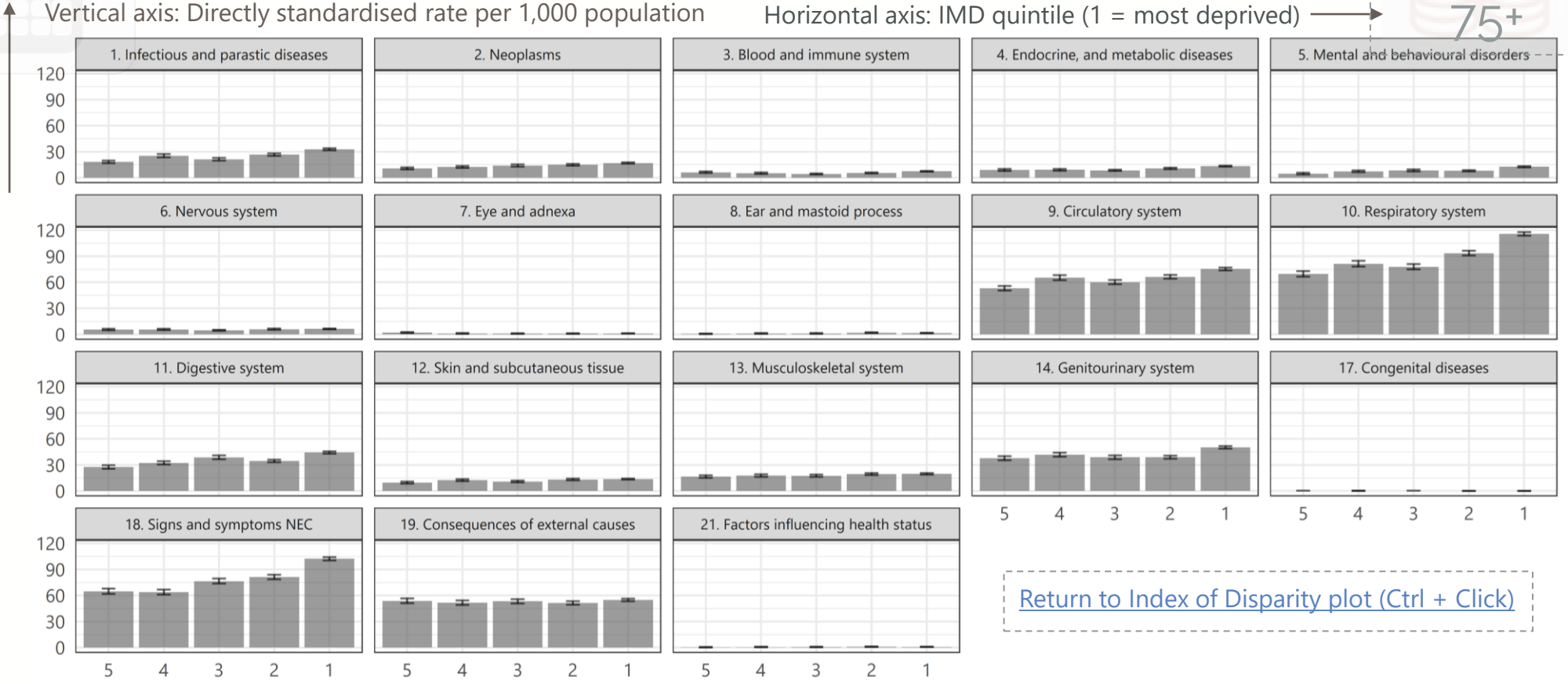
These age-and-sex-standardised rates for emergency admissions, by clinical area and IMD quintile, are the profiles we use to calculate the population mean rates. Since the indices of disparity suggest only a magnitude, and do not indicate where the inequality exists, it is important to look at these profiles. For example, if we examine activity related to ICD Chapter 9, "The Circulatory System", we see that IMD Quintile 1 (the most deprived group in the population) has the highest rate of admission (having controlled for the age and sex structure of this group).

Almost universally, we see that admission rates increase as deprivation increases.

Directly standardised emergency admission rates -
by Index of Multiple Deprivation (quintile) and clinical area

Deprivation

75+



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Almost universally, we see that admission rates increase as deprivation increases.

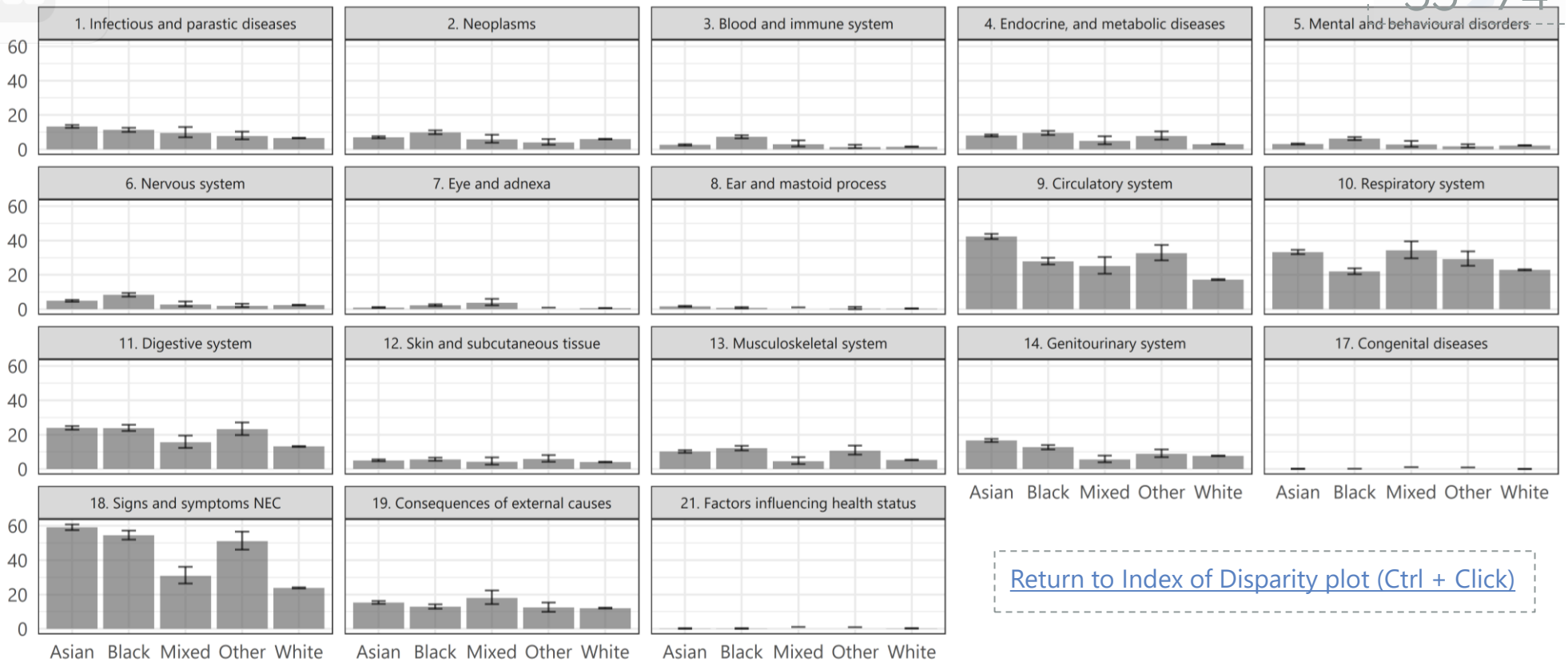
Directly standardised emergency admission rates -
by aggregated ethnic group and clinical area

Ethnicity

55 -74

Vertical axis: Directly standardised rate per 1,000 population

Horizontal axis: Ethnic group →



Return to Index of Disparity plot (Ctrl + Click)

As with inequality by socio-economic status, it is important to look at the profile of the standardised emergency admissions rates by aggregated ethnic group. For example, if we examine activity related to ICD Chapter 9, "The Circulatory System", we see that the aggregated Asian population has the highest rate of admission (having controlled for the age and sex structure of this group).

In fact, for most clinical areas, aggregated Black, Asian, and "Other (ethnic group)" populations have higher rates of admission than the White population*.

* "Other" is a relatively small group and this fact, together with the problems associated with coding ethnicity, may affect the results we see for this population.

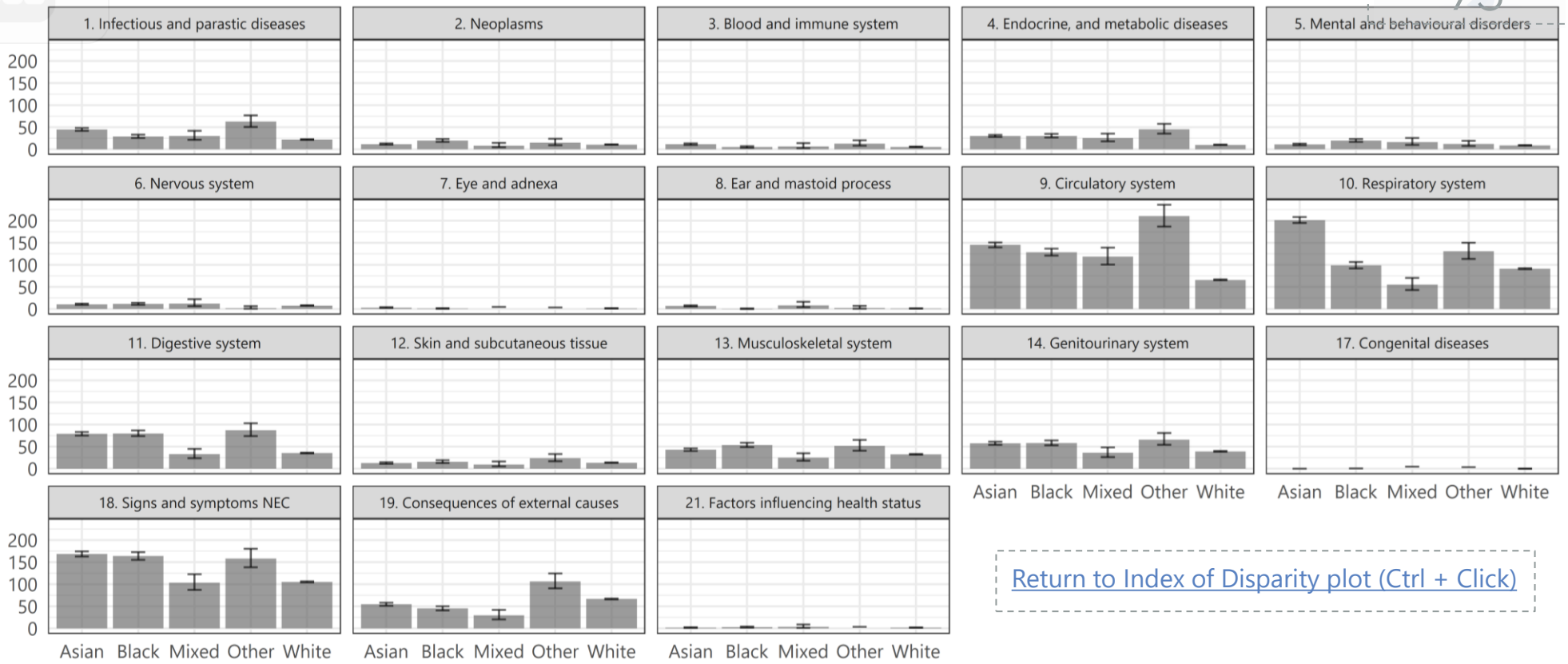
Directly standardised emergency admission rates -
by aggregated ethnic group and clinical area

Ethnicity

75+

Vertical axis: Directly standardised rate per 1,000 population

Horizontal axis: Ethnic group →



Return to Index of Disparity plot (Ctrl + Click)

As with inequality by socio-economic status, it is important to look at the profile of the standardised emergency admissions rates by aggregated ethnic group. For example, if we examine activity related to ICD Chapter 9, "The Circulatory System", we see that the "Other" aggregated population group has the highest rate of admission (having controlled for the age and sex structure of this group).

In fact, for most clinical areas, aggregated Black, Asian, and "Other (ethnic group)" populations have higher rates of admission than the White population*.

* "Other" is a relatively small group and this fact, together with the problems associated with coding ethnicity, may affect the results we see for this population.

Appendix 2 – Place-based analysis

The Black Country and West Birmingham ICS has been divided into 5 places. These are:

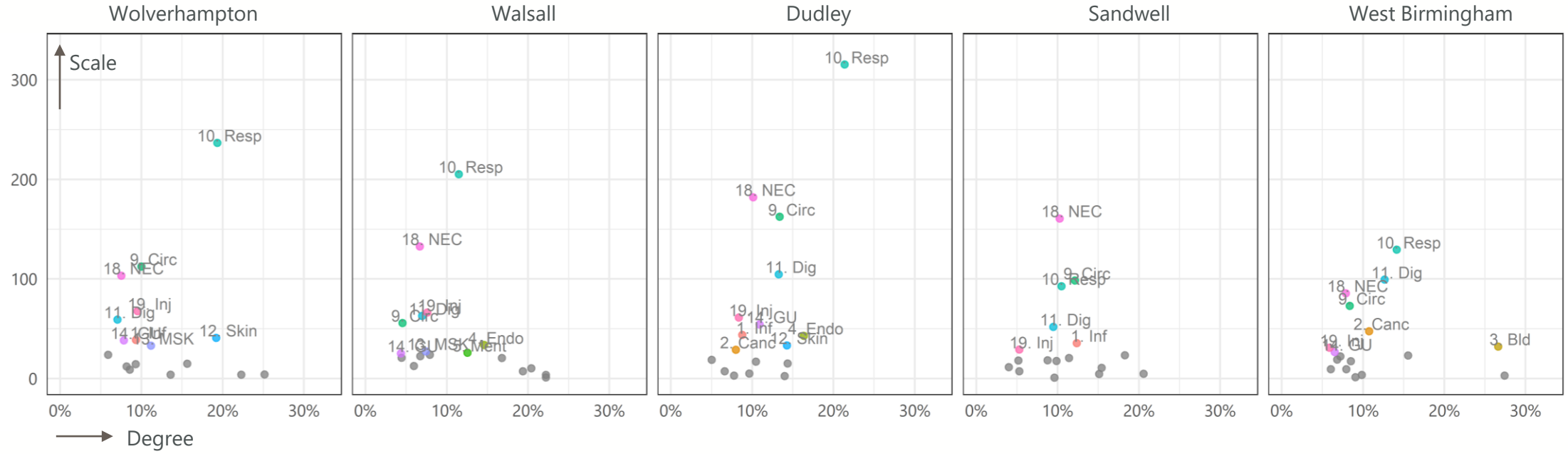
- Wolverhampton
- Walsall
- Dudley
- Sandwell
- West Birmingham

We have produced population profiles and “degree and scale plots” for each of these, by dimension (socioeconomic status / ethnic group) and segment.

Note: The statistics in the following graphics are often based on small counts. In these cases, the uncertainty of our estimates will be proportionally large. Labels are present only for cases where the scale of inequity is at least 25 admissions.

Inequality relating to socioeconomic status, by place (Ages 55-74)

Deprivation Quintile	Wolverhampton Population (55-74)	Wolverhampton %*	Walsall Population (55-74)	Walsall %*	Dudley Population (55-74)	Dudley %*	Sandwell Population (55-74)	Sandwell %*	West Birmingham Population (55-74)	West Birmingham %*
1	22,000	44%	26,000	44%	16,000	22%	34,000	57%	20,000	62%
2	11,000	21%	9,000	16%	16,000	22%	12,000	21%	9,300	29%
3	6,900	14%	7,100	12%	11,000	15%	11,000	19%	2,900	9%
4	9,500	19%	7,600	13%	14,000	20%	2,100	3%	230	1%
5	1,700	3%	8,300	14%	15,000	21%				

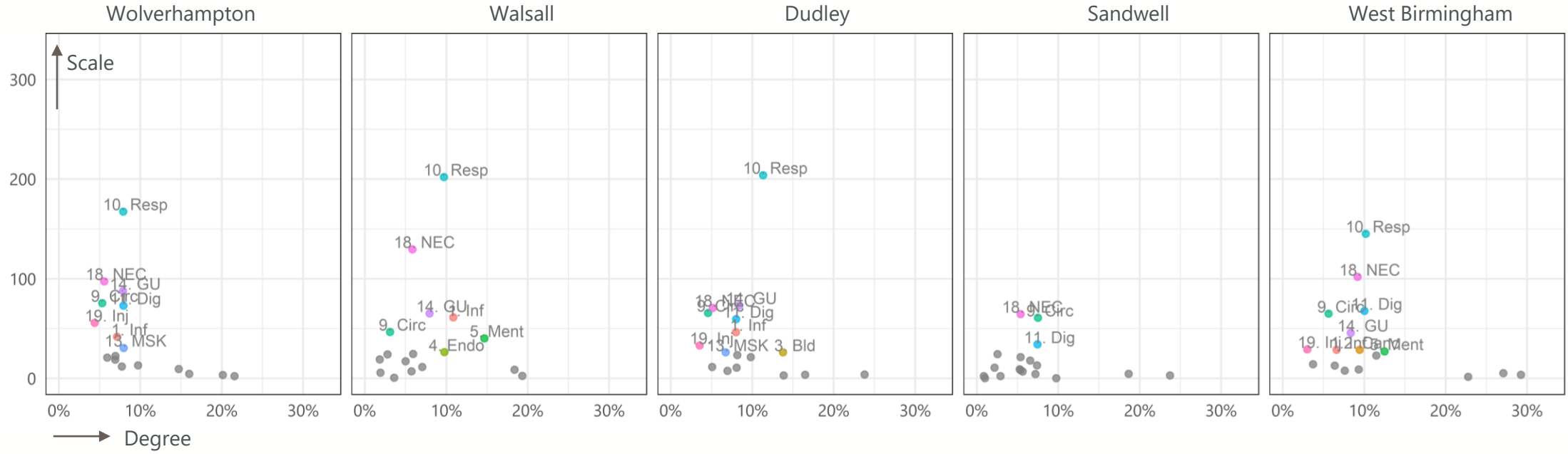


The first point to note is that deprivation profiles vary by place. In cases where the least deprived quintiles are not represented, the degree of inequality *within* the place should be lower since there is less variation in the socioeconomic status of the population. Despite this, we see high degrees of inequality across all places, including those with less balanced profiles (Wolverhampton, Sandwell, and West Birmingham).

In terms of clinical areas, inequality for diseases of the respiratory system is high in both scale and degree across most of the places. We also see a high degree of inequality for blood and immune system disorders in West Birmingham.

Inequality relating to socioeconomic status, by place (Ages 75+)

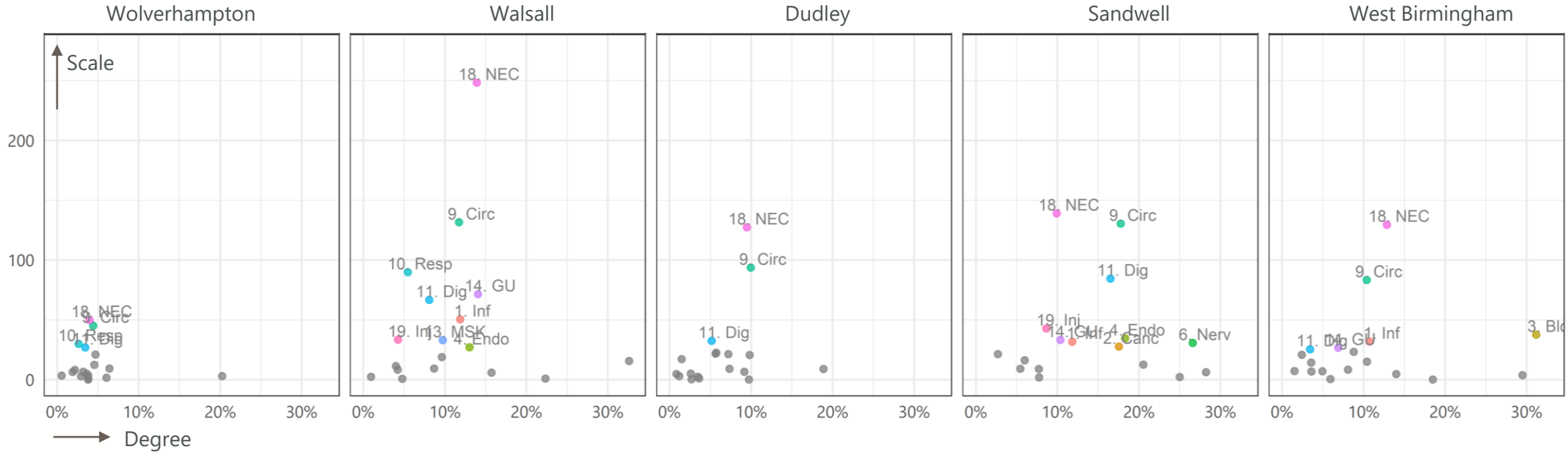
Deprivation Quintile	Wolverhampton Population (75+)	Wolverhampton %*	Walsall Population (75+)	Walsall %*	Dudley Population (75+)	Dudley %*	Sandwell Population (75+)	Sandwell %*	West Birmingham Population (75+)	West Birmingham %*
1	8,200	39%	9,300	39%	6,000	19%	13,000	57%	6,900	61%
2	4,600	21%	3,800	16%	6,700	22%	4,700	20%	3,500	31%
3	3,400	16%	3,000	13%	4,500	15%	4,800	20%	910	8%
4	4,300	20%	3,600	15%	6,300	21%	600	3%	45	0%
5	790	4%	4,200	17%	7,200	23%				



Looking at the 75+ segment, we again see a high degree and scale of inequality for diseases of the respiratory system. The relatively high degree of inequality in West Birmingham is perhaps surprising, given the low variation in the socioeconomic status of the population. It is possible that there is a considerable difference between admission rates in the most deprived group (quintile 1) and rates in quintiles 2 and 3.

Inequality relating to ethnicity, by place (Ages 55-74)

Ethnic Group	Wolverhampton Population (55-74)	Wolverhampton %*	Walsall Population (55-74)	Walsall %*	Dudley Population (55-74)	Dudley %*	Sandwell Population (55-74)	Sandwell %*	West Birmingham Population (55-74)	West Birmingham %*
Asian	6,000	13%	4,300	8%	1,800	3%	6,100	11%	7,200	29%
Black	1,800	4%	540	1%	480	1%	1,700	3%	3,700	15%
Mixed	330	1%	190	0%	170	0%	240	0%	290	1%
Other	590	1%	310	1%	130	0%	540	1%	400	2%
White	38,000	82%	49,000	90%	67,000	96%	47,000	84%	13,000	53%



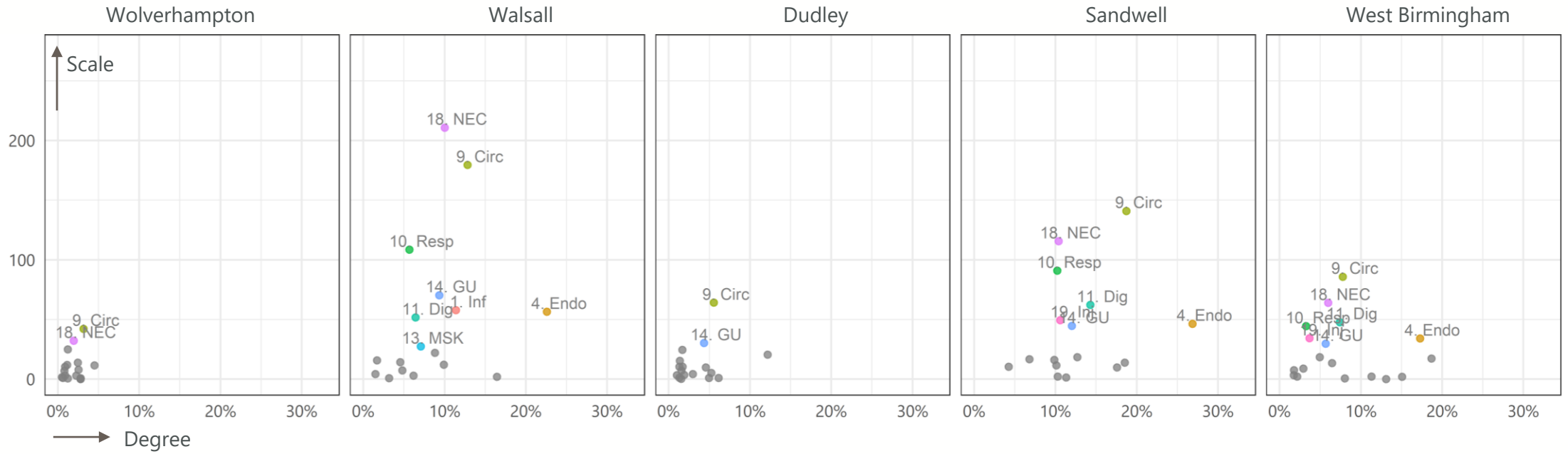
Population profiles by ethnicity vary considerably: In West Birmingham, ethnic minority groups make up approximately 50% of the 55-74 population segment, whilst in Dudley the figure is less than 5%.

The most striking feature of these charts is the generally high degree of inequality in Sandwell and Walsall. Here we see inequalities in admission rates for diseases of circulatory system and, "Symptoms and signs not elsewhere classified."

Also noteworthy is the high degree of inequality for blood and immune system disorders in West Birmingham. We saw the same when looking at inequalities due to socioeconomic status for the same population segment. Note: Population counts are from the 2011 UK Census.

Inequality relating to ethnicity, by place (Ages 75+)

Ethnic Group	Wolverhampton Population (75+)	Wolverhampton %*	Walsall Population (75+)	Walsall %*	Dudley Population (75+)	Dudley %*	Sandwell Population (75+)	Sandwell %*	West Birmingham Population (75+)	West Birmingham %*
Asian	1,400	7%	970	5%	420	2%	1,400	6%	1,900	20%
Black	1,000	5%	200	1%	200	1%	790	4%	2,000	21%
Mixed	99	0%	57	0%	63	0%	80	0%	120	1%
Other	140	1%	73	0%	64	0%	170	1%	95	1%
White	17,000	87%	20,000	94%	26,000	97%	20,000	89%	5,300	56%



For the population segment aged 75+, we see similar profiles and trends as we did for the 55-74 segment: Walsall and Sandwell display high degrees of inequality in areas including for diagnoses related to the circulatory system and "Signs and Symptoms not elsewhere classified".

However, these places - together with West Birmingham - also exhibit high degrees of inequality for endocrine, nutritional and metabolic diseases.

Note: Population counts are from the 2011 UK Census.

Appendix 3 – Measuring inequality

In mathematical terms, the (population weighted) Index of Disparity, $I_{w,}$, is given by:

$$I_w = \frac{\sum_j p_j \left| r_j - \mu \right|}{\mu}$$

where:

p_j = number of persons in population subgroup *j;*

r_j = directly standardised rate of admission for the population in subgroup *j;* and

μ = *the* population weighted standardised rate = $\frac{\sum_j p_j r_j}{\left(\sum_j p_j\right)}$

A relative index of disparity can then be calculated with:

$$I_{rel} = I_w \cdot \frac{1}{\sum_j p_j} \cdot \frac{1}{2}$$

And an absolute index of disparity is given by:

$$I_{abs} = I_{rel} \cdot d$$

Where d is the number of admissions in the population.

Appendix 4 – Years lost due to premature death

Return to results pages

Chapter	Chapter Name	Number of Deaths	Total Years Lost *
1	Infectious and parastic diseases	67	1,255
2	Neoplasms	1,625	19,093
3	Blood and immune system	17	531
4	Endocrine, and metabolic diseases	77	1,268
5	Mental and behavioural disorders	68	596
6	Nervous system	128	1,840
9	Circulatory system	988	12,977
10	Respiratory system	413	4,167
11	Digestive system	355	6,546
12	Skin and subcutaneous tissue	18	219
13	Musculoskeletal system	25	369
14	Genitourinary system	30	284
15	Pregnancy, childbirth, the puerperium	3	115
16	Conditions orig. in perinatal period	1	74
17	Congenital diseases	37	1,506
18	Signs and symptoms NEC	24	812
20	External causes of morbidity	288	8,233

* Due to premature death, across the ICS population