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A Health Partnership for Northern England

COVID-19 and the Northern Powerhouse

Tackling inequalities for UK health and productivity

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This report is a spotlight on the disproportionate effect of COVID-19 and the underlying inequality that helps to fuel this disparity of impact. The writing has been on the wall for many years now but it will be for years to come that we are all responsible for.
In September 2019, the Office for National Statistics (ONS) revealed that life expectancy in the UK had stopped improving for the first time since records began.

Professor Cheng-Hock Toh, MD, FRCP, FRCPath
Academic vice-president, Royal College of Physicians London

Between 2011 and 2017, improvement was slower in the UK than in the majority of OECD countries. Four months later, Health Equity in England: The Marmot Review 10 Years On was published by the Institute of Health Equity. The RCP, along with 20 other leading health organisations, wrote to the Prime Minister to urge the government to accept Sir Michael Marmot's recommendations.

Sadly, as this report shows, those with the fewest resources have indeed borne the brunt of the negative impacts of the pandemic on health and the economy.

As Sir Michael tweeted on 12 June in response to ONS data on the rate of deaths involving COVID-19: "Inequalities in mortality from #COVID19 - the social gradient - are similar to inequalities in mortality from all causes, suggesting that the general causes of health inequalities as laid out in #Marmot2020 apply to COVID19 plus some extra in more deprived areas".

This is not what we should, or do, expect to find in the UK in 2020. Around 20 countries are more populous than ours, yet we have the fifth highest GDP in the world. Why, then, does OECD data show we are only 17th in terms of life expectancy?

The causes, as the ONS said about the slowdown it identified in September last year, "are likely to be complex." Which reminds me of the foreword to the 1980 report of the working group on inequalities in health, better known as the 'Black Report' as the chair of the group was the then president of the Royal College of Physicians (RCP), Sir Douglas Black.

In his foreword, the secretary of state explained why: "It will be seen that the Group has reached the view that the causes of health inequalities are so deep rooted that only a major and wide-ranging programme of public expenditure is capable of altering the pattern. I must make it clear that additional expenditure on the scale which could result from the report's recommendations – the amount involved could be upwards of £2 billion a year – is quite unrealistic in present or any foreseeable economic circumstances, quite apart from any judgement that may be formed of the effectiveness of such expenditure in dealing with the problems identified. I cannot, therefore, endorse the Group's recommendations."

While £2 billion was around a sixth of the health budget at the time, the figures in the report are before you outline the cost of choosing not to ignore the problem. A similar choice faces us today: invest in the health of the nation now, or fail to realise our economic and social potential in the future, instead spending money on caring for people who are ill but do not need to be.

This is why the RCP this year convened the Inequalities in Health Alliance (IHA), which has a growing membership of over 100 organisations with an interest in health and care. We are together asking the Prime Minister to develop a cross-government strategy to reduce health inequalities as a matter of urgency - and invite you all to join this call with us.

Because while the pandemic has not created new inequalities, it has exacerbated existing ones. As we said in the letter to the Prime Minister on behalf of the IHA, "COVID-19 has exposed how health inequalities can have an impact not just over a lifetime, but a matter of weeks."

As such a rich country, we should have all done more to protect all our citizens from the shockwaves of a crisis. But we should not wallow in that shame or blame but act. The impact of the pandemic will be felt for years to come, but we still have time to make sure it is felt equally.

EXECUTIVE SUMMARY

60 Second Summary

The COVID-19 pandemic has hit the country unevenly with a disproportionate effect on the North of England.

There is a well-known productivity gap between the Northern Powerhouse and the rest of England of £4 per person per hour. There is also a substantial health gap between the Northern Powerhouse and the rest of England, with average life expectancy 2 years lower in the North. In our 2018 'Health for Wealth' report, the NHSA found that: improving health in the Northern Powerhouse would reduce the regional gap in productivity by 30% or £1.20 per-person per-hour, generating an additional £13.2 billion in UK GDP.

However, the COVID-19 pandemic has vastly changed the regional context.

The Northern Health Science Alliance commissioned this report working with the Northern ARCs (NIHR Applied Research Collaborations: ARC North East and North Cumbria, ARC Greater Manchester, ARC North West Coast, ARC Yorkshire and Humber) to understand the impact of the COVID-19 pandemic on health and productivity in the Northern Powerhouse and to explore the opportunities for 'levelling up' regional health and productivity, across the life course. Our report shows the unequal health and economic impacts of COVID-19 on the Northern Powerhouse. As it develops its post-COVID-19 'levelling up' industrial strategy, central government should pay particular attention to the importance of supporting the physical and mental health and development of the Northern Powerhouse as a route to increased prosperity.

Key findings

- Mortality rates during the first wave (March to July 2020) were higher in the Northern Powerhouse than the rest of England
  - An extra 12.4 more people per 100,000 died in the Northern Powerhouse than the rest of England due to COVID-19
  - An extra 57.7 more people per 100,000 died in the Northern Powerhouse than the rest of England due to all-causes
- These extra 57.7 deaths per 100,000 could cost the UK Economy an additional £6.86bn in lost productivity (measured by GVA)
- Economic outcomes, particularly unemployment rates, were hardest hit in the Northern Powerhouse
- Mental and financial wellbeing was hardest hit in the Northern Powerhouse, as was loneliness
- Reductions in mental wellbeing in the Northern Powerhouse could cost the UK economy up to £5 billion in reduced productivity (measured by GVA)
- Austerity disproportionately affected the Northern Powerhouse, particularly its areas of high deprivation. We estimate that reductions in the core spending power of local authorities in the Northern Powerhouse by £1 per-head cost £3.17 per-head in lost productivity (measured by GVA), equivalent to around a £2bn loss in GDP per-year
- Pre-pandemic child health, a key predictor of life-long health and economic productivity, was poor and deteriorating. Since the pandemic adverse trends in poverty, education, employment and mental health for children and young people have been exacerbated.
- The productivity gap between the Northern Powerhouse and the rest of the country is likely to worsen for subsequent generations without a COVID-19 recovery strategy that prioritises families with children.

An extra 12.4 PER 100,000 died in the Northern Powerhouse than the rest of England due to COVID-19

An extra 57.7 PER 100,000 died in the Northern Powerhouse than the rest of England due to all-causes

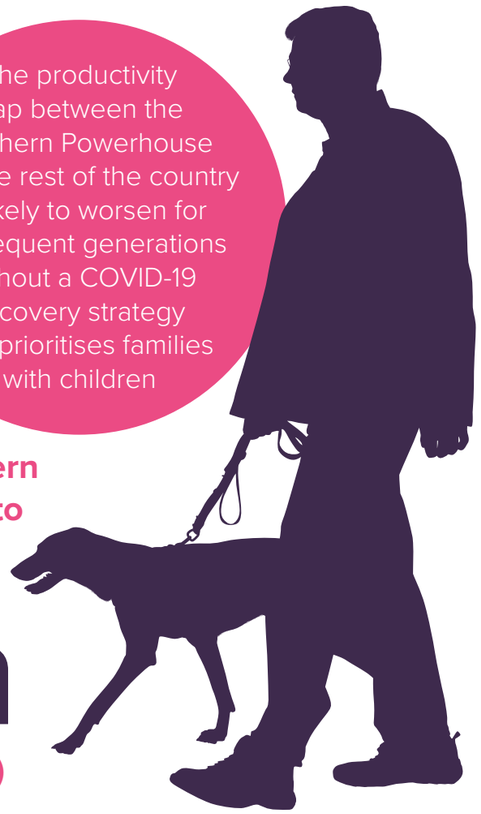
Mental and financial wellbeing was hardest hit in the Northern Powerhouse, as was loneliness

We estimate that reducing the core spending power of local authorities by **£1 per-head** will cost **£3.17 per-head** in lost productivity (measured by GVA). equivalent to a

£2bn loss in GDP per-year

Pre-pandemic child health, a key predictor of life-long health and economic productivity, was poor and deteriorating. Since the pandemic adverse trends in poverty, education, employment and mental health for children and young people have been exacerbated.

The productivity gap between the Northern Powerhouse and the rest of the country is likely to worsen for subsequent generations without a COVID-19 recovery strategy that prioritises families with children



Reductions in mental wellbeing in the Northern Powerhouse could cost the UK economy up to £5 billion in reduced productivity (measured by GVA)

Summary of Detailed Findings

Chapter 2: EFFECTS OF COVID-19 ON HEALTH AND PRODUCTIVITY IN THE NORTHERN POWERHOUSE

- On average, the rates of mortality attributable to COVID-19 in the first wave (March to July 2020) were higher in the Northern Powerhouse than in the rest of the country
  - 12.4 more people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England including London (95% CI: 2.2 to 22.6)
  - 21.4 more people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England excluding London (95% CI: 12.7 to 30.2)
- On average, the rates of mortality attributable to all-causes were also much higher in the Northern Powerhouse than in the rest of the country
  - 57.7 more people per 100,000 died of all causes in the Northern Powerhouse compared to the rest of England including London (95% CI: 41.3 to 74.2)
  - 63.2 more people per 100,000 died of all causes in the Northern Powerhouse compared to the rest of England excluding London (95% CI: 46.8 to 79.5)
- We estimate that this excess Northern Powerhouse mortality could cost the UK Economy an additional £6.86bn in lost GDP
- The increased mortality rates in the Northern Powerhouse remains significant even after accounting for deprivation, ethnicity, and the age-structure of the population
- Pre-COVID unemployment rates were higher in the Northern Powerhouse, and they rose the fastest there too in the first few months on the first wave

These extra

57.7 deaths per 100,000 could cost the UK economy an additional

£6.86bn

in lost productivity (measured by GVA)

Chapter 3: EFFECTS OF COVID-19 ON MENTAL AND FINANCIAL WELLBEING IN THE NORTHERN POWERHOUSE

- People living in the Northern Powerhouse experienced a larger reduction in their mental wellbeing (particularly the North East and Yorkshire and the Humber) than the rest of the country
- We estimate that the reductions in mental wellbeing in the Northern Powerhouse could cost the UK economy up to £5 billion in reduced productivity (measured by GVA)
- People in the Northern Powerhouse were more likely to have reduced their number of hours worked
- People in the Northern Powerhouse were more likely to have made new Universal Credit Claims
- People in the Northern Powerhouse were more likely to have experienced loneliness than the rest of England, particularly in the North East

Chapter 4: THE COVID-19 ECONOMIC CRISES AND HEALTH IN THE NORTHERN POWERHOUSE

- A major reason the Northern Powerhouse could have disproportionately been affected by Covid-19 is because it was hit the hardest by austerity
- This is directly linked to declining life expectancy; places that have experienced the greatest reduction in local authority and welfare funding (particularly concentrated in the Northern Powerhouse and the 'Red Wall' seats) have experienced greater declines in life expectancy over the last decade
- Reducing core spending power of local authorities by £1 per-head cost £3.17 per-head in lost productivity (measured by GVA), equivalent to a loss of £2bn per-year in GDP
- Pre-Covid-19 mental health problems were 74% higher in the Northern Powerhouse than the rest of England and this is expected to get worse
- Mental health affects productivity. Hence the productivity and GVA of the Northern Powerhouse will fall further behind the rest of the country unless action is taken

Chapter 5: COVID-GENERATION: CHILDREN AND THE FUTURE OF THE NORTHERN POWERHOUSE

- Childhood health is a key predictor of later health and economic productivity
- There are substantial, persistent regional inequalities in child health: children living in the North have worse health outcomes than children living in the rest of England
- Child poverty rates in the Northern Powerhouse are amongst the highest in the country with child poverty as high as 41% in parts of the North East
- The closing of Sure Start centres disproportionately hit the North, reversing improvements in school readiness they brought about
- The pandemic has negatively impacted on education, employment and mental health for children and young people. In future, the productivity gap between the Northern Powerhouse and the rest of the country is likely to worsen without further action
- The productivity gap between the Northern Powerhouse and the rest of the country is likely to worsen for subsequent generations without a COVID-19 recovery strategy that prioritises families with children

Short-term

1

Place additional resource into the Test and Trace system in the Northern Powerhouse and deliver through local primary care, public health, NHS labs and local authority services to ensure full population coverage

2

Target clinically vulnerable and deprived communities in the Northern Powerhouse in the first phase of the roll out of the COVID-19 vaccine

3

Increase NHS and local authority resources and service provision for mental health in the Northern Powerhouse. Invest in research into mental health interventions in the North

4

Reduce child poverty – increase child benefit, increase the child element of Universal Credit by £20 per week, extend provision of free childcare, remove the benefit cap and the two-child limit; and extend provision of free school meals. Invest in children's services by increasing government grants to local authorities in the Northern Powerhouse

5

Maintain and increase the additional £1,000 extra funding of Universal Credit

Medium term

6

Provide additional resource to local authorities and the NHS in the Northern Powerhouse by increasing the existing NHS health inequalities weighting within the NHS funding formula in its reset and restore plans

7

Deliver a £1 billion fund ring-fenced to tackle health inequalities at a regional level and increase local authority public health funding to address the higher levels of deprivation and public health need in the North

8

Create northern 'Health for Life' centres offering a life-long programme of health and wellbeing advice and support services from pre-natal to healthy ageing programmes. Targeted to the most deprived areas in the North, they will take a preventative approach to health directly into the communities which need it most

9

Deliver health and mental health promotion interventions together with industry and employers, targeted at employee mental and physical health

10

Level up investment in health R&D in the North of England to create high value jobs and support local health and drive the economy

11

Recommit to ending child poverty

12

Develop a national strategy for action on the social determinants of health with the aim of reducing inequalities in health, with a key focus on children

CHAPTER 1
INTRODUCTION

There is a well-known productivity gap between the Northern Powerhouse (Figure 1.1) and the Rest of England of £4 per person per hour.[1]

There is also a large gap in health between the Northern Powerhouse and the rest of England, with life expectancy 2 years lower in the North. In our 2018 'Health for Wealth' report[2], the NHSA found that: improving health in the Northern Powerhouse would reduce the regional gap in productivity by 30% or £1.20 per-person per-hour, generating an additional £13.2 billion in UK GDP.

However, the 2020 COVID-19 pandemic has vastly changed the regional context. So, the NHSA commissioned this report from four of its university members (Newcastle, Manchester, Liverpool, and York) to understand the impact of the COVID-19 pandemic on health and productivity in the Northern Powerhouse and to explore the opportunities for 'levelling up' regional health and productivity.

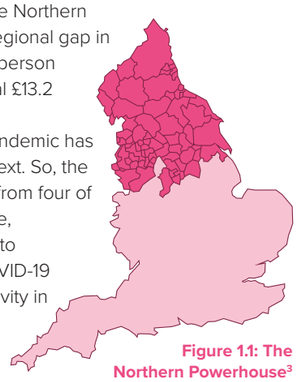


Figure 1.1: The Northern Powerhouse[3]

This introductory chapter provides background on productivity, health and COVID-19 in the Northern Powerhouse.

1.1 Productivity in the Northern Powerhouse

The UK's productivity crisis is well-documented and entrenched. While labour productivity grew at its fastest rate for a decade in the second half of last year, Britain's annual productivity rate remains well below its pre-crisis peak. Nowhere is this decline more pronounced than in the North – where job growth since 2004 has been less than 1% compared to over 12% in London, the South East and the South West.[4] The North has not been benefiting from economic growth:

- The North of England generated over £327 billion Gross Value Added (GVA)[5] to the UK economy in 2015 – around 20% of total UK GVA[6] .
- However, the Northern Powerhouse accounts for 25% of the UK population (16 million people - of which 63% are of working age)[7] so GVA per worker is well below that of the rest of the UK
- The average GVA output per worker in the Northern Powerhouse is £44,850 - 13% less than the national average.[8]
- GVA per hour worked was £28 in the Northern Powerhouse compared to £32 nationally.[9]
- There are some places in the North that do better, such as Cheshire, but generally, productivity is lower in the North.[10]
- Average annual earnings in the Northern Powerhouse are more than 10% lower than the rest of England (Figure 1.2).[11]
- Economic activity rates are also lower with higher rates of unemployment, economic inactivity and worklessness.
- For example, in 2018, economic inactivity rates were 25.8% in the North East compared to 18.8% in the South East.[12]

Figure 1.2: Average regional annual pay, median, £ gross 2019 [18]

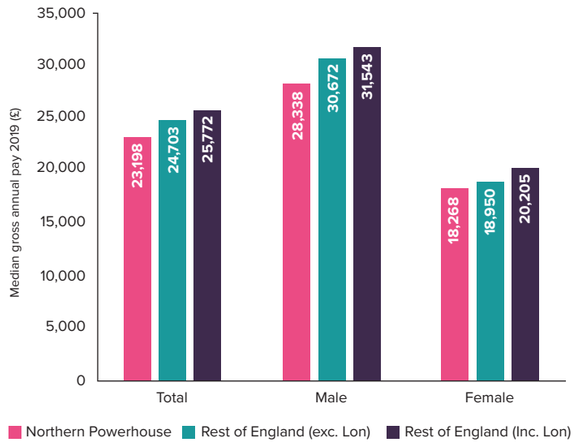


Figure 1.3: Job density by region, 2019 [19,20]

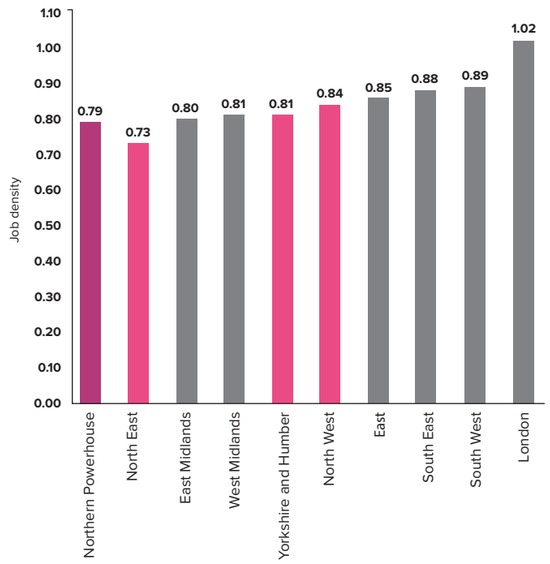


Table 1.1: Key Health Outcomes by English Region in 2018/19 (latest available data) [26]

	Population (millions)	Life expectancy at birth (years)		CVD deaths (<75 years /100,000)	Cancer deaths (<75 years /100,000)	Diabetes % (> 17 years)	% Obese or overweight (> =18 years)
		Men	Women				
Northern Powerhouse	**15.5**	**78.3**	**82.0**	**83.8**	**146.5**	**7.3**	**65.1**
North East	2.7	77.9	81.7	82.8	152.6	7.4	64.9
North West	7.3	78.3	81.8	86.6	145.6	7.2	64.9
Yorkshire & Humber	5.5	78.7	82.4	82.0	141.2	7.2	65.4
REST OF ENGLAND	**40.5**	**80.0**	**83.5**	**67.8**	**127.9**	**6.9**	**61.8**
East Midlands	4.8	79.4	82.9	73.5	133.4	7.3	64.2
West Midlands	5.9	78.9	82.7	78.4	138.4	7.8	65.4
East of England	6.2	80.3	83.7	63.4	126.0	6.9	63.3
South West	5.6	80.2	83.8	61.9	125.6	6.6	61.3
London	8.9	80.7	84.5	70.5	120.1	6.6	55.9
South East	9.1	80.7	84.1	59.0	123.6	6.2	60.9
ENGLAND	56	79.6	83.2	71.7	132.3	6.9	62.3

- Relatedly, poverty rates are also over 5 percentage points higher in the Northern Powerhouse than the rest of England. For example, child poverty rates are 29% in the North East, 31% in the North West and 30% in Yorkshire and Humber, compared to 21% in the South East.[13]
- The North East (21%) and North West (19%) also have some of the highest levels of fuel poverty in England, whilst the South East (11%) has the lowest.[14]
- The economy of the Northern Powerhouse has around 23% of the UK's jobs, but the job density rate[15] for the Northern Powerhouse is 0.79 compared to 1.02 in London (as shown in Figure 1.3).[16,17]

Productivity in the North is consistently below the UK average. Figure 1.4 (panel a) plots the trend in GVA per-head from 2010 to 2018 (latest available data). To aid direct comparison, all GVA figures are converted to 2018 prices. The average GVA per-head in the Northern Powerhouse is consistently below the rest of England. Further, it has grown less in the Northern Powerhouse (Figure 1.4; panel (b)).

The dashed lines in panel (a) are predicted forecasts of what will happen to GVA going forward to 2025 and it is clear this gap between the Northern Powerhouse and the rest of England will continue to grow. It further can be seen that the GVA per-head of the Northern Powerhouse is not expected to be at the same level as it was in rest of the country excluding London in 2010 until around 2025. From these predictions, it could take decades for the Northern Powerhouse to be at the same level as the rest of England including London was at in 2010.

These predictions are based on pre-COVID-19 data, and there is a real worry the gap will grow larger due to the pandemic and the Northern Powerhouse will fall further behind.

We explore the impact of COVID-19 on inequalities in regional productivity in the rest of the report.

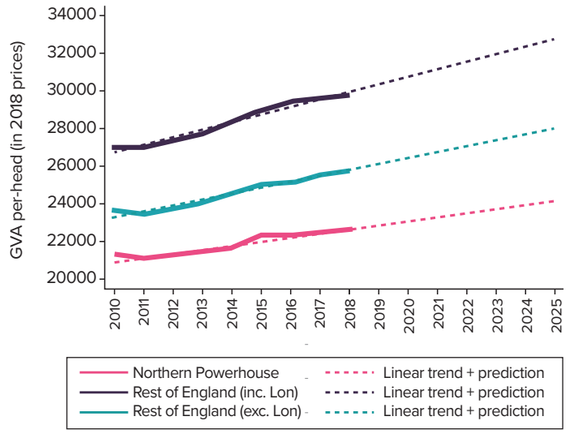
1.2 Health in the Northern Powerhouse

There are deep-rooted and persistent regional inequalities in health across England, with people in the North consistently found to be less healthy than those in the South - across all social groups and amongst both men and women (Table 1.1).[22]

There is a two year life expectancy gap between the Northern Powerhouse and the rest of England (Table 1.1), and premature death rates are 20% higher for those living in the North across all age groups.[23] Over the last 50 years, this is equivalent to over 1.5

Figure 1.4: Gross Value Added (GVA), in 2018 prices[21]

Panel (a): trends over time (solid lines) and linear prediction (dashed lines)



Panel (b): Percentage growth in GVA (in 2018 prices) from 2010 to 2018

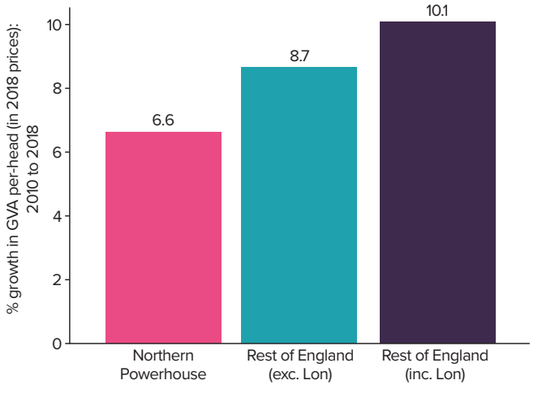
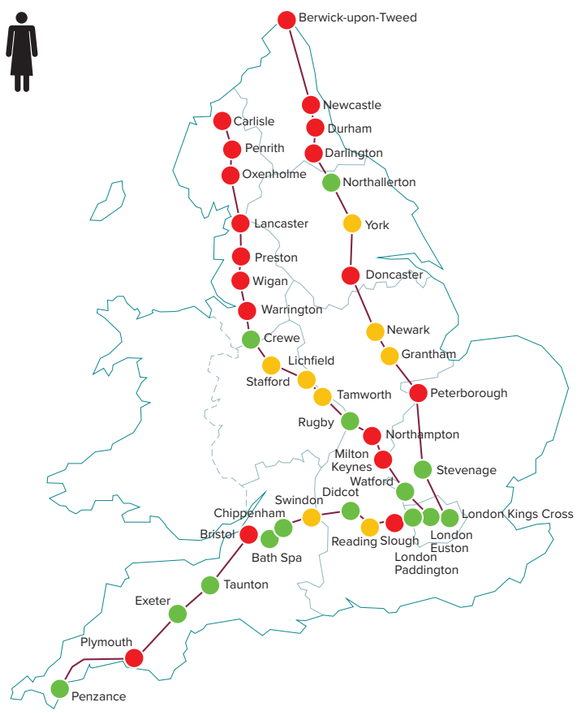


Figure 1.5: An English Journey – life expectancy for men along the East Coast, Great Western and West Coast Mainlines [27]

Figure 1.6: An English Journey – life expectancy for women along the East Coast, Great Western and West Coast Mainlines [28]



million Northerners dying earlier than if they had experienced the same lifetime health chances as those in the rest of England.[24]

Figures 1.5 and 1.6 present average life expectancy at birth for both men and women for the stops along some of the major train lines in England: the West Coast Mainline (WCM, a route of 300 miles from London Euston to Carlisle in the North West), the East Coast Mainline (ECM, a route of 335 miles from London Kings Cross to Berwick in the North East) and the Great Western Mainline (GWM, a route of 300 miles from London Paddington to Penzance in the South West).[25] The data is geo-referenced to each of the main stations along the routes using the relevant Local Authority (e.g. the data for Newark is for Nottinghamshire). The circles represent values above (green), around (amber) or below (red) the English average of 79.4 years for men and 83.1 years for women.

The visualisations show very clearly the health divides within England, particularly between the North East and South East regions, which have the lowest and highest life expectancies respectively for both men and women. There are gaps of 4 years for men and 5 years for women between the best Southern and worst Northern areas. They also demonstrate a socio-spatial gradient, with average life expectancy at birth decreasing the further North the journey takes. There are exceptions to this, with some areas that, whilst "Northern" (e.g. Cheshire), have above average health outcomes.

This health divide has been widening in recent years. Between 1965 and 1995, there was no health gap between younger Northerners aged 20-34 years and their counterparts in the rest of England. However, mortality is now 20% higher amongst young people living in the North. Similarly since 1995, for those aged 35–44 years, excess mortality in the North increased even more sharply to 49%.[29] England's regional health inequalities are now some of the largest in Europe.[30]
These regional health inequalities have important implications in the context of COVID-19 – as we explore further in the rest of this report.

1.3 Health for Wealth in the Northern Powerhouse

In our 2018 'Health for Wealth' report[31], the NHSA explored the links between the regional heath divide and the regional productivity divide. We found that: regional inequalities in health is a key reason for the productivity difference between the Northern Powerhouse and the rest of England. Long-term health conditions lead to economic inactivity, increased risk of job loss and lower wages. Improving health in the North would lead to substantial economic gains: it would reduce the £4 gap in productivity per-person per-hour between the Northern Powerhouse and the rest of England by 30% or £1.20 per-person per-hour, generating an additional £13.2 billion in UK GDP.

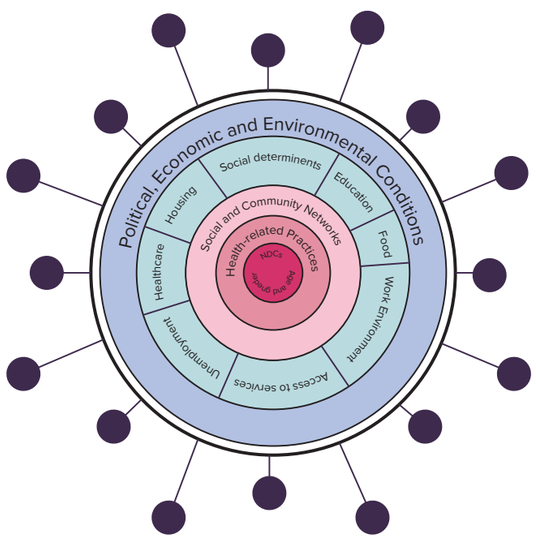
- Health is important for productivity: improving health could reduce the £4 gap in productivity between the Northern Powerhouse and the rest of England by £1.20 per-person per-hour, generating an additional £13.2 billion in UK GDP
- Reducing the number of working aged people with limiting long term health conditions by 10% would decrease rates of economic inactivity by 3 percentage points in the Northern Powerhouse
- Increasing the NHS budget by 10% in the Northern Powerhouse will decrease economic inactivity rates by 3 percentage points
- If they experience a spell of ill health, working people in the Northern Powerhouse are 39% more likely to lose their job compared to their counterparts in the Rest of England. If they subsequently get back into work, then their wages are 66% lower than a similar individual in the Rest of England.
- Decreasing rates of ill health by 1.2% and decreasing mortality rates by 0.7% would reduce the gap in gross value added (GVA) per-head between the Northern Powerhouse and the Rest of England by 10%.
- Increasing the proportion of people in good health in the Northern Powerhouse by 3.5% would reduce the employment gap between the Northern Powerhouse and the Rest of England by 10%
- So, given the relationship between health, health care and productivity in the Northern Powerhouse, then in order to improve UK productivity, we need to improve health in the North.

So, improving health in the North has the strong potential to improve UK productivity. The COVID-19 pandemic has highlighted this issue even more. We explore the unequal regional heath and productivity implications of the pandemic further in the rest of this report.

1.4 Covid-19 and Regional Inequalities

Very quickly, in the very first stages of the pandemic (March to July 2020), it became evident – from the experiences of a variety of countries – that there were significant inequalities in COVID-19 infections, symptom severity, hospitalisation and deaths. 45% of patients admitted to hospital with COVID-19 in England were from the most deprived 20% of the population - COVID-19 admissions to critical care were also far greater in the most deprived areas, with over 50% of admissions coming from the 40% most deprived areas.[32,33] A study of primary care patients in England found that people living in more deprived areas were more likely to test positive for COVID-19[34]. Likewise, wide scale analysis of positive cases by Public Health England (from 1 March to 9 May, 2020) found that diagnosis rates were highest in the most deprived quintile (over 300 cases per 100,000) - for both men and women – almost double that of the least deprived quintile (around 200 cases per 100,000)[35]. Indeed, the rate in the most deprived quintile was 1.9 times the rate in the least deprived quintile among men and 1.7 times among women. This is particularly concerning in light of growing evidence of long COVID – whereby patients have long term impacts from infection including neurological and respiratory symptoms as well as fatigue[36]. More deprived areas could also disproportionately experience these long-term impacts.

Figure 1.7: The Syndemic of Covid-19, Non-Communicable Diseases (NCDs) and the Social Determinants of Health[39]



These inequalities in COVID-19 infection and death rates are arising as a result of a syndemic of COVID-19, inequalities in chronic diseases, and the social determinants of health.[37]
A syndemic exists when risk factors or co-morbidities are intertwined, interactive and cumulative - adversely exacerbating the disease burden and additively increasing its negative effects: 'A syndemic is a set of closely intertwined and mutual enhancing health problems that significantly affect the overall health status of a population within the context of a perpetuating configuration of noxious social conditions'[38]. For the most disadvantaged communities, COVID-19 is being experienced as a syndemic - a co-occurring, synergistic pandemic which interacts with and exacerbates their existing chronic health and social conditions (Figure 1.7).

Four potential pathways that link deprivation to higher COVID-19 infection rates, cases, case severity and deaths have been identified:[40] increased vulnerability, susceptibility, exposure and transmission[41]

- **Increased vulnerability:** Due to higher burden of pre-existing health conditions (such as diabetes and respiratory conditions, heart disease, obesity) that increase the severity and mortality of COVID-19. These co-morbidities arise as a result of inequalities in the social determinants of health (e.g. working conditions, unemployment, access to essential goods and services, housing and access to health care, health-related practices).

- **Increased susceptibility:** Due to immune systems weakened by long term exposures to adverse living and environmental conditions. The social determinants of health also work to make people from deprived communities more vulnerable to infection from COVID-19 – even when they have no underlying health conditions - as adverse psychosocial circumstances (chronic stress) increase susceptibility, thereby influencing the onset, course and outcome of infectious diseases - including respiratory diseases like COVID-19.

- **Increased exposure:** As a result of inequalities in working conditions. Lower paid workers - particularly in the service sector (e.g. food, cleaning or delivery services) - were much more likely to be designated as key workers and thereby were still required to go to work during lock down, and more likely to be reliant on public transport for doing so. Likewise, people in lower skilled occupations are less likely to be able to work from home.

- **Increased transmission:** Inequalities in housing conditions may also be contributing to inequalities in COVID-19. Deprived neighbourhoods are more likely to contain houses of multiple occupation, smaller houses with a lack of outside space, as well as have higher population densities (particularly in deprived urban areas) and lower access to communal green space. These may have increased COVID-19 transmission rates - as was the case with previous influenza pandemic in 1918 and 2009 where strong associations were found with urbanity.

Table 1.3: Top and Bottom Five English Local Authorities for early Cardiovascular Disease (CVD) and Cancer deaths[45]

Bottom Five English Local Authorities				Top Five English Local Authorities			
CVD deaths (<75 years /100,000)		Cancer deaths (<75 years /100,000)[a]		CVD deaths (<75 years /100,000)		Cancer deaths (<75 years /100,000)	
Manchester	124.6	Manchester	190.3	Rutland	41.8	Harrow	94.8
Blackpool	122.7	Knowsley	185.3	Kensington and Chelsea	43.5	Elmbridge	95.9
Middlesbrough	118.6	Middlesbrough	184.8	Bracknell Forrest	46.1	West Minster	96.7
Wolverhampton	108.5	Hyndburn	181.4	Richmond upon Thames	48.2	City of London	97.0
Kingston upon Hull	107.6	Liverpool	179.4	Wokingham	48.3	Epsom and Ewell	97.7
England	71.7	England	132.3	England	71.7	England	132.3

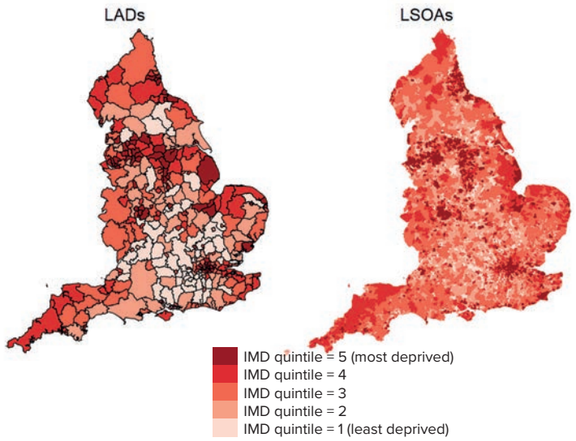
This high concentration of deprivation and chronic conditions in the North is important given the strong links with COVID-19 related outcomes. We explore this in the rest of the report.

These links between deprivation, chronic conditions and worse COVID-19 outcomes has particular significance for regional inequalities. Deprivation, measured by the 2019 update of the Index of Multiple Deprivation (IMD)[42], is not equally spread throughout the county. There is far more deprivation in the Northern Powerhouse than in the rest of England.

This is shown in Figure 1.8 which plots the IMD quintile for each local authority district (LAD, left-hand panel) and for each lower super output area (LSOA, right-hand panel).[43] The darker coloured areas are the most deprived. It can be seen that these more deprived areas are much more concentrated in the North (as well as in London), particularly in urban areas.

In particular, the Northern Powerhouse has the highest percentage

Figure 1.8: Geographic spread of deprivation among areas in England



of LADs within the most deprived quintile. 41% of all LADs within the Northern Powerhouse are in the most deprived 20% nationally, compared to only 5% of LADs in the South (Table 1.2.).

The region with the greatest percentage of LADs in the most deprived quintile is the North East (50%). The region with the lowest percentage of LADs in the most deprived quintile is the South West (3%). Conversely, The Northern Powerhouse has only 6% if its LADs within the least deprived quintile, compared to 31% in the South. Regionally, the North East has no LADs within the top two quintiles,

Table 1.2: Geographic spread of deprivation among

	IMD Quintile				
	Most deprived				Least deprived
	5	4	3	1	1
Regions					
North East (12 LADs)	50%	33%	17%	0%	0%
North West (39 LADs)	44%	23%	15%	15%	3%
Yorkshire and the Humber (21 LADs)	29%	33%	5%	19%	14%
London (33 LADs)	39%	15%	24%	15%	6%
West Midlands (30 LADs)	17%	27%	27%	20%	10%
East Midlands (40 LADs)	15%	20%	18%	30%	18%
East of England (45 LADs)	13%	18%	16%	27%	27%
South East (67 LADs)	6%	12%	22%	15%	45%
South West (30 LADs)	3%	20%	33%	27%	17%
Broader areas					
The Northern Powerhouse*	**41%**	**30%**	**12%**	**11%**	**6%**
London	39%	15%	24%	15%	6%
The Midlands **	15%	21%	20%	26%	18%
The South ***	5%	16%	28%	21%	31%

Notes: * The Northern Powerhouse is defined as North East + North West + Yorkshire and the Humber. ** The Midlands is defined as West Midlands + East Midlands + East of England. *** The South is defined as the South East + the South West.

meaning that all of the LADs within the North East are in the most deprived areas.

The Northern Powerhouse also has a significantly higher burden of chronic conditions – the key clinical risk factors for adverse COVID-19 outcomes including: hypertension, diabetes, asthma, COPD, heart, liver, renal disease, cancer, cardiovascular disease, obesity and smoking.[44]

This 'Northern' health disadvantage is particularly apparent when examining the great Northern cities. Table 1.3 shows which English local authorities perform the best and the worst in terms of deaths from cancer and cardiovascular disease – the two leading causes of death in the UK. In each case, the Top 5 local authorities with the lowest death rates are mainly in the South, and the Bottom 5 with the highest death rates are predominantly in North.

1.5 COVID-19 and the Northern Powerhouse

This report explores the implications of the COVID-19 pandemic for health and wealth in the Northern Powerhouse. It explores regional inequalities in COVID-19 outcomes and productivity; on mental and financial wellbeing; the impact of the COVID-19 economic crisis in the Northern Powerhouse; and on the future of the Northern Powerhouse through its impacts on our children. It concludes by setting out recommendations for the short, medium and longer term for levelling up the North.

CHAPTER 2: EFFECTS OF COVID-19 ON HEALTH AND PRODUCTIVITY IN THE NORTHERN POWERHOUSE

This chapter examines regional inequalities in COVID-19 outcomes. Particularly, it focuses on differences between the Northern Powerhouse and the rest of England (including and excluding London) in terms of mortality and productivity.

We show that the Northern Powerhouse experienced significantly higher mortality rates than the rest of England in the six months from March to July 2020 from (i) COVID-19 and (ii) all-cause. These regional differences persist even after we account for underlying deprivation, age structure, and ethnic composition of the populations.

As well as suffering from increased mortality, the Northern Powerhouse was disproportionately hit in terms of economic outcomes (unemployment rates).

Together, these two facts, higher mortality and higher unemployment, paint a worrying picture for the Northern Powerhouse and could cost the UK economy an additional £6.86bn in lost GDP.

CHAPTER 3: EFFECTS OF COVID-19 ON MENTAL AND FINANCIAL WELLBEING IN THE NORTHERN POWERHOUSE

This chapter examines regional inequalities in mental and financial wellbeing. We additionally consider economic outcomes (hours worked, furlough, and new universal credit claims) as well as loneliness.

We show that people living within the Northern Powerhouse (particularly the North East and Yorkshire and the Humber) experienced a large drop in mental wellbeing. People in the Northern Powerhouse were also more likely to have reduced their number of hours worked, have made new Universal Credit Claims, and reported being lonely. In general, the results were most pronounced when London was excluded from the rest of England.

CHAPTER 4: THE COVID-19 ECONOMIC CRISES AND HEALTH IN THE NORTHERN POWERHOUSE

This chapter examines how, since the last financial crisis in 2008, disinvestment in public services and welfare cuts (together known as austerity) has widened the North-South gap in life expectancy contributing to the productivity divide.

We examine how this has left places in the Northern Powerhouse more vulnerable to the current COVID-19 pandemic and ensuing economic crisis. The economic and health effects of the COVID-19 pandemic have been more severe in the North and it is likely that the current recession will hit the North hardest.

CHAPTER 5: COVID-GENERATION: CHILDREN AND THE FUTURE OF THE NORTHERN POWERHOUSE

This chapter examines the early life origins of the health and productivity gap between the Northern Powerhouse and the rest of England.

Childhood health is a key predictor of later health through the life-course as well as economic productivity during working age and there are substantial, persistent regional inequalities in child health: children living in the North have worse health outcomes than children living in the rest of England.

Child poverty rates in the Northern Powerhouse are amongst the highest in the country and this is a key determining factor of poorer health. The closing of Sure Start centres disproportionately hit the North, thus reversing any improvements in school readiness they brought about.

CHAPTER 6: LEVELLING-UP - RECOMMENDATIONS

This chapter introduces a number of key-recommendations in both the short- and medium-term. These are based on a thorough understanding of the existing evidence.

If the Government is serious about its levelling-up agenda, it is crucial it seeks to reduce the wide, and growing, health inequalities, particularly between the Northern Powerhouse and the rest of England. A healthier North is important in terms of health outcomes, but also economic outcomes too.

These benefits will lead to a much more prosperous society and economy throughout the whole of England and the UK.

CHAPTER 2
EFFECTS OF COVID-19 ON HEALTH AND PRODUCTIVITY IN THE NORTHERN POWERHOUSE

2.1 Summary

This chapter examines regional inequalities in COVID-19 outcomes. In particular, it focuses on differences between the Northern Powerhouse and the rest of England (including and excluding London) in terms of mortality and productivity. We show that the Northern Powerhouse experienced significantly higher mortality rates than the rest of England in the six months from March to July 2020 from (i) COVID-19 and (ii) all-cause.

These regional differences persist even after we account for underlying deprivation, age structure, and ethnic composition of the populations. As well as suffering from increased mortality, the Northern Powerhouse was disproportionately hit in terms of economic outcomes (unemployment rates).
Together, these two facts, higher mortality and higher unemployment, paint a worrying picture for the Northern Powerhouse. The increased mortality alone could cost the UK Economy an additional £6.86bn in lost GDP. The GDP losses from increased unemployment are expected to be large too.

Key findings:

- On average, the rates of mortality attributable to COVID-19 in the first wave (March to July 2020) were higher in the Northern Powerhouse than in the rest of the country
  - 12.4 more people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England including London (95% CI: 2.2 to 22.6)
  - 21.4 more people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England excluding London (95% CI: 12.7 to 30.2)

- On average, the rates of mortality attributable to all-causes were also much higher in the Northern Powerhouse than in the rest of the country
  - 57.7 more people per 100,000 died of all causes in the Northern Powerhouse compared to the rest of England including London (95% CI: 41.3 to 74.2)
  - 63.2 more people per 100,000 died of all causes in the Northern Powerhouse compared to the rest of England excluding London (95% CI: 46.8 to 79.5)

- The increased mortality rates in the Northern Powerhouse remain statistically significant but reduce in magnitude after deprivation, ethnicity, and the age-structure of the population is taken into account using linear models
- We estimate that this excess Northern Powerhouse mortality of 57.7 per 100,000 could cost the UK Economy an additional £6.86bn in lost GDP
- Pre-COVID unemployment rates were higher in the Northern Powerhouse, and they rose the fastest here too

2.2 Regional differences in mortality rates

We start by presenting information on mortality rates by government office region ('region' here-on-in). England is broken down into nine regions: North East (NE), North West (NW), Yorkshire and the Humber (YandH), East Midlands (EM), West Midlands (WM), East of England (EoE), London (Lon), South West (SW), and South East (SE). We further present information on differences between the Northern Powerhouse and the rest of England.

We define the rest of England in two ways (i) including London and (ii) excluding London. We do this as there are known differences in the severity and spread of COVID-19 in London compared to other areas of England.

We obtained the local authority mortality rates attributable to COVID-19 and all cause from the Office for National Statistics (ONS) for the period March to July 2020[46]. Each local authority was then mapped to its region using look-up tables, as well as to the Northern Powerhouse or not using look-up tables.

We use mortality rates as opposed to positive cases (or positive results as a percentage of tests taken) as during the first wave of the pandemic there were unequal testing procedures throughout the country. Therefore, it is not possible to meaningfully compare areas with different testing procedures, and as such we use mortality.

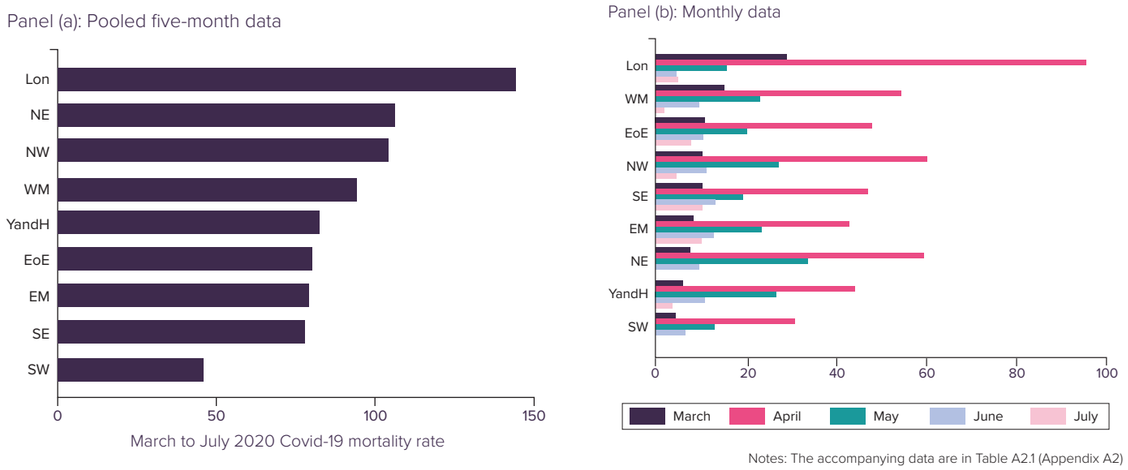
2.2.1 COVID-19 mortality rates

Regionally, the North East (106.0 per 100,000) and North West (104.4 per 100,000) had the second and third highest COVID-19 mortality rates, respectively (Figure 2.1 and Table A2.1). London had highest COVID-19 mortality rate (144.4 per 100,000). The South West (45.4 per 100,000) and South East (78.5 per 100,000) have the lowest and second lowest COVID-19 mortality rates, respectively.

The COVID-19 mortality rate in Northern Powerhouse was 98.4 per 100,000. This was 12.37 per 100,000 higher than the rest of England including London (95% CI: 2.2 to 22.6; Table A2.4) and 21.41 higher than the rest of England excluding London (95% CI: 12.7 to 30.2; Table A2.4).

To show the changing geographic spread of COVID-19 mortality over time, we plot the first three-month (March to May) mortality rates using the train-line maps introduced above (Figure 2.2). A very clear pattern emerges in panel (a); the mortality rates progressively got worse in the Northern Powerhouse, particularly into May. Large parts of the

Figure 2.1: COVID-19 mortality rates by region; March to July 2020



Notes: The accompanying data are in Table A2.1 (Appendix A2)

Northern Powerhouse are represented by red dots (mortality rates at least 10% above the English average).

2.2.2 All-cause Mortality rates

Regionally, the North East (513.6 per 100,000) and the North West (502.8 per 100,000) had the highest all-cause mortality rates (Figure 2.3 and Table A2.2) and Yorkshire and the Humber (458.7 per 100,000) had the fifth highest. Again, the South West (388.2 per 100,000) and the South East (412.7 per 100,000) had the lowest mortality rates.

The Northern Powerhouse, compared to the rest of the country including London, suffered an additional 57.7 deaths from all cause per 100,000 people (95% CI: 41.3 to 74.2; Table A2.5) rising to an additional 63.2 deaths per 100,000 if London is excluded from the rest of England (95% CI: 46.8 to 79.5; Table A2.5).
The monthly all-cause mortality rates from March to May are plotted using the Train-line maps in panel (b) of Figure #2.2NEW. Similar to COVID-19 mortality, the Northern Powerhouse experienced, on average, higher rates than the rest of England, particularly into May.

2.3 The potential effect of increased COVID-19 excess mortality on future productivity

The original Heath for Wealth report showed that around 30% of the productivity gap between the Northern Powerhouse and the rest of England was attributable to poorer health in the North. This 30% figure was comprised of 17.1% attributable to higher morbidity (ill-health) and 12.8% attributable to higher mortality.[47]

In the original Health for Wealth report, the unadjusted difference in all-cause mortality (per-year) between the Northern Powerhouse and the rest of England was 112 extra deaths per 100,000 population per-year.

During the five months from March to July 2020, the unadjusted difference in all-cause mortality between the Northern Powerhouse and the rest of England (including London, to be consistent) was an extra 57.7 deaths per 100,000 population (Table A2.5).
To make the figure comparable, the five-month excess Northern mortality rate is translated into an 'expected annual' figure by multiplying by (12/5), giving an expected excess mortality in the North

Figure 2.3: All-cause mortality rates by region; March to July 2020

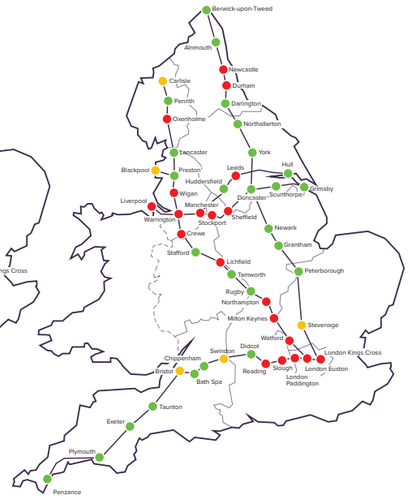
Notes: The accompanying data are in Table A2.2 (Appendix A2)

Figure 2.2: Mortality rates over time; March to May 2020

Panel (a): COVID-19 Mortality

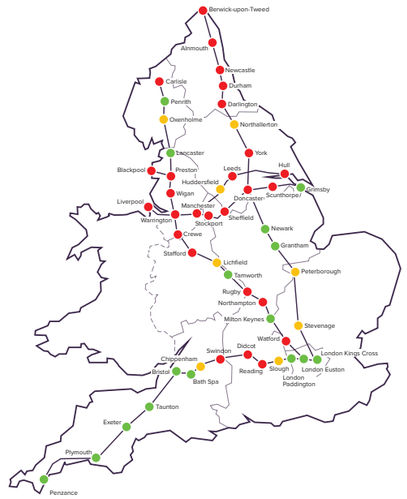
March 2020

- At least 10% above English average
- Around English average (8.4 per 100,000 people)
- At least 10% below English average



April 2020

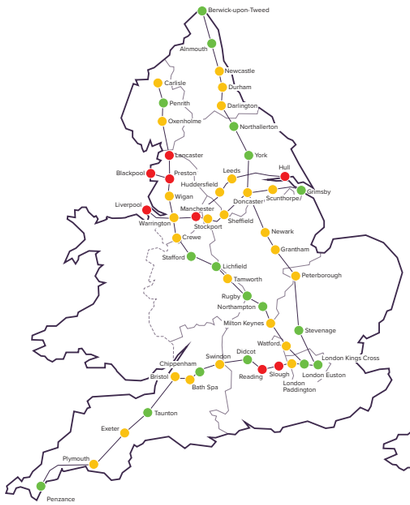
- At least 10% above English average
- Around English average (53.5 per 100,000 people)
- At least 10% below English average



May 2020

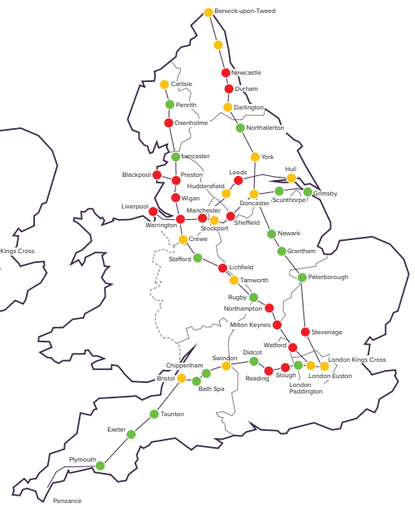
- At least 10% above English average
- Around English average (20.0 per 100,000 people)
- At least 10% below English average

Panel (b): All-cause Mortality



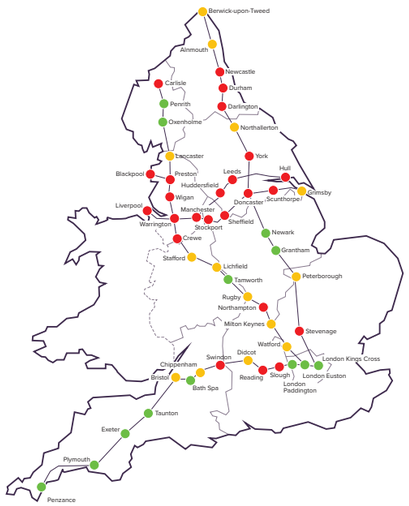
March 2020

- At least 10% above English average
- Around English average (91.1 per 100,000 people)
- At least 10% below English average



April 2020

- At least 10% above English average
- Around English average (140.5 per 100,000 people)
- At least 10% below English average



May 2020

- At least 10% above English average
- Around English average (83.3 per 100,000 people)
- At least 10% below English average

of 138.6 per 100,000 population. This is very likely to be an underestimate as the effects of COVID-19 continue to hit the North hardest during the 'second wave'.

Assuming linearity, if an additional 112 deaths per 100,000 population contributed 12.8% to the productivity gap, it can be inferred that an additional 138.6 deaths per 100,000 population will contribute 15.8% to this productivity gap.

15.8% of the productivity gap (of £44bn) between the North and the rest of England equates to a potential loss of £6.86bn in GDP brought about by unequal mortality rates in the Northern Powerhouse and the rest of England.

This figure is likely to be an underestimate, however, and should be re-evaluated at the end of the pandemic. It is also worth acknowledging here that other macroeconomic factors have changed since the original Health for Wealth report, but these are likely to exacerbate the gap in productivity between the Northern Powerhouse and the rest of England.

2.4 Unequal COVID-19 Unemployment rates

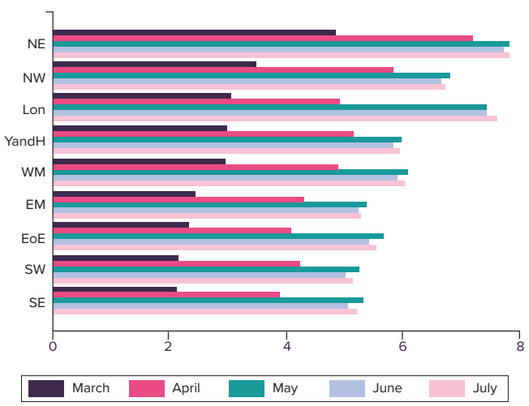
COVID-19 has affected lots of areas of people's lives, including their employment opportunities.
To investigate how COVID-19 has impacted on areas, we use data on the local authority Claimant Count, published by the ONS[48], as a proxy for unemployment rates.

The monthly claimant count rates by region are shown in Figure 2.4 (and expressed in Table A2.3).

The North East consistently experienced the highest claimant count (Figure 2.4 and Table A2.3), rising from 4.9% in March to 7.8% in July (an increase of +2.9 percentage points (p.p.)). The corresponding rises for the North West and Yorkshire and the Humber are 3.5% to 6.7% (+3.2 p.p.) and 3.0% to 6.0% (+3.0p.p.), respectively.

The regions that make up the bulk of the Northern Powerhouse (NE, NW, and YandH) experienced a much faster increase in unemployment rates in the short-term (from March to April). This was a critical period during the economic response to the pandemic, and the Northern Powerhouse was affected much faster and much harsher than the rest of the country.

Figure 2.4: Claimant count rate by region; March to July 2020



Notes: The accompanying data are in Table A2.3 (Appendix A2)

The change in the claimant count rate between March and April is potted using the Trainline maps in Figure 2.8. This, again, highlights that areas in the Northern Powerhouse experienced much faster increases in the claimant count than areas in the rest of England.

2.5 Statistical analysis of the geographical difference in outcomes

To examine if there are differential effects of the three outcomes considered in the Northern Powerhouse compared to the rest of England, we estimate the following three models

Model 1:

$Outcome_l = \beta(Northern\ Powerhouse_l) + \varepsilon_l$

Model 2:

$Outcome_l = \beta(Northern\ Powerhouse_l) + \gamma(Age\ structure_l) + \lambda(Ethnic\ structure_l) + \varepsilon_l$

Model 3:

$Outcome = \beta(Northern\ Powerhouse_l) + \gamma(Age\ structure_l) + \lambda(Ethnic\ structure_l) + \delta(IMD\ quintile_l) + \varepsilon_l$

Where:

- Subscript l refers to each unique local authority district
- 'Outcome' is one of the three outcomes we consider
    1. Five-month COVID-19 mortality rates (March to July), per 100,000 adjusted for age
    2. Five-month all-cause mortality rates (March to July), per 100,000 adjusted for age
    3. The change in the claimant count (as a proxy for the unemployment rate) between March (pre-COVID) and April (first month of COVID restrictions)
- 'Northern Powerhouse' is a binary variable that takes the value 1 if a local authority is in the Northern Powerhouse region and 0 otherwise (i.e. if a local authority is in the rest of England)
- 'Age structure' is a series of variables indicating what percentage of the local authority's population is in pre-defined age-groups. This data was taken from the 2011 Census to avoid issues associated with extrapolating to non-Census years. The base (omitted) category is the percentage of people less than 18 years of age.
- 'Ethnic structure' is a series of variables indicating what percentage of the local authority's population belong to pre-defined ethic-groups. This data was taken from the 2011 Census to avoid issues associated with extrapolating to non-Census years. The base (omitted) category is the percentage of people who are white.
- 'IMD quintile' is a categorical variable indicating the relative deprivation of the local authority.

The key parameter in each model is β; it tells us if the outcomes are statistically different in the Northern Powerhouse region when compared to the rest of England.

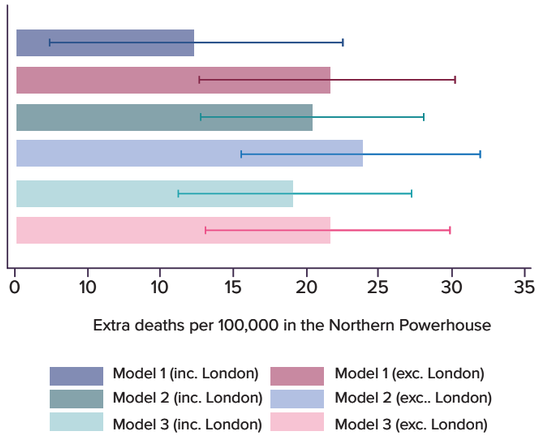
We perform all three models with two comparison groups:

1. The Northern Powerhouse vs. the rest of England (including London)
2. The Northern Powerhouse vs. the rest of England (excluding London)

2.6 Results of the statistical analysis

To ease interpretation, we present the results of the statistical models as graphics. In each case, the size of the bar represents the magnitude of the estimated coefficient (β). The lines represent the

Figure 2.5: The increased COVID-19 mortality rate in the Northern Powerhouse; March to July 2020



Full regression output is contained in Table A2.4 (Appendix A2)

95% confidence intervals. If these confidence interval lines do not cross zero, there is evidence that the effect is statistically significance ($p<0.05$)

2.6.1 COVID-19 Mortality Rates

Figure 2.5 presents the results for the COVID-19 mortality. The full results are contained in Appendix 2, Table A2.4. The COVID-19 mortality rate in the Northern Powerhouse is always statistically significantly larger than in the rest of England, regardless of whether or not the rest of England includes London.

The results when local authorities in London are excluded are larger in magnitude, as expected. Even after accounting for age, ethnicity, and deprivation, there are higher COVID-19 mortality rates in the Northern Powerhouse:

- 19.2 extra people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England, including London (95% CI: 11.2 to 27.2)
- 21.5 extra people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England, excluding London (95% CI: 13.1 to 29.9)

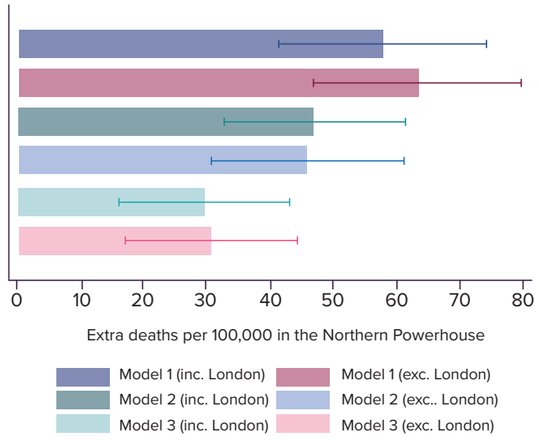
2.6.2 All-cause Mortality Rates

Figure 2.6 presents the results for all-cause mortality. The full results are contained in Appendix 2, Table A2.5. The all-cause mortality rate in the Northern Powerhouse is always statistically significantly larger than in the rest of England, regardless of whether or not the rest of England includes London.

The results when local authorities in London are excluded are larger in magnitude, as expected. Even after accounting for age, ethnicity, and deprivation, there are higher all-cause mortality rates in the Northern Powerhouse:

- 29.4 extra people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England, including London (95% CI: 16.0 to 42.9)
- 30.5 extra people per 100,000 died of COVID-19 in the Northern Powerhouse compared to the rest of England,

Figure 2.6: The increased all-cause mortality rate in the Northern Powerhouse; March to July 2020



Full regression output is contained in Table A2.5 (Appendix A2)

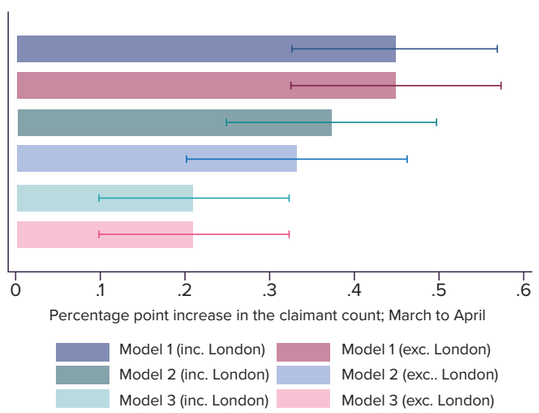
excluding London (95% CI: 16.8 to 44.1)

2.6.3 Increase in the claimant count/unemployment rate (March to April)

Figure 2.7 presents the results for the increase in the claimant count. The full results are contained in Appendix 2, Table A2.6. The unemployment rates in the Northern Powerhouse were already higher than the rest of England pre-COVID (Figure 2.3), and they rose much faster. Similar to mortality, this holds true whether or not London is included in the definition of the rest of England. Even after accounting for age, ethnicity, and deprivation, the claimant count rates in the Northern Powerhouse rose faster than the rest of England:

- An additional increase of 0.2 percentage in the Northern Powerhouse compared to the rest of England, including London (95% CI: 0.1 to 0.3)
- An additional increase of 0.2 percentage in the Northern Powerhouse compared to the rest of England, excluding London (95% CI: 0.1 to 0.3)

Figure 2.7: The additional increase in the claimant count in the Northern Powerhouse; March to April 2020



Full regression output is contained in Table A2.6 (Appendix A2)

2.6.4 The effects of Deprivation

In the models presented above, deprivation was an important predictor of outcomes. In all cases, local authorities with a higher level of deprivation had worse outcomes (increased mortality rates and faster growing rates of unemployment).

The fact that the results for the Northern Powerhouse remain, even after accounting for deprivation, is evidence that the worst outcomes are not solely attributable to higher deprivation. There are other contextual and historical factors that mean that the Northern Powerhouse is harder hit than the rest of England, and these are explored in Chapter 4.

2.7 Conclusion

This chapter has presented evidence that the Northern Powerhouse was hit the hardest by the first wave of the COVID-19 pandemic. Local authorities in the Northern powerhouse experienced:

Local authorities in the Northern powerhouse experienced:

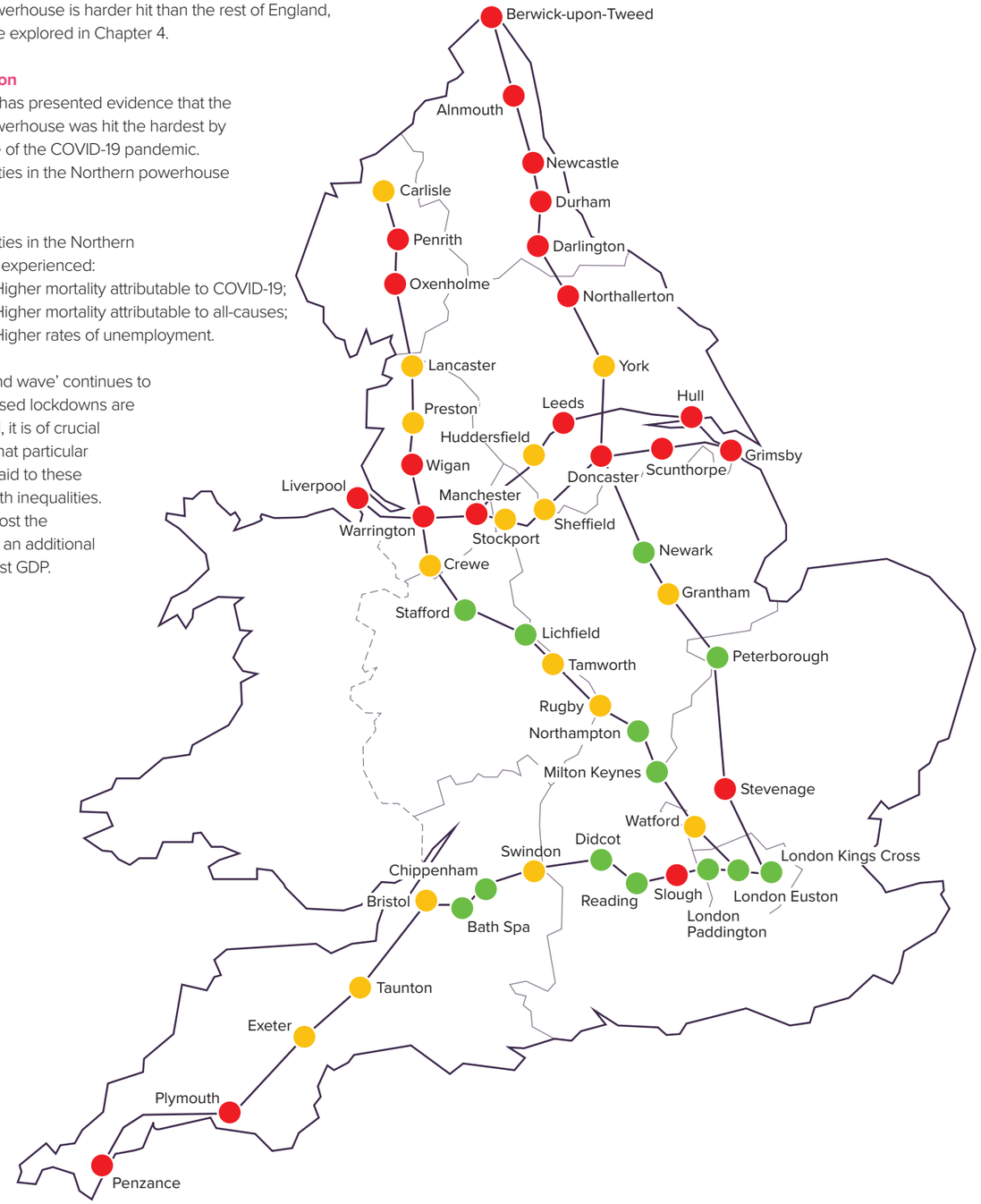
- Higher mortality attributable to COVID-19;
- Higher mortality attributable to all-causes;
- Higher rates of unemployment.

As the 'second wave' continues to hit, and localised lockdowns are implemented, it is of crucial importance that particular attention is paid to these growing health inequalities. They could cost the UK Economy an additional £6.86bn in lost GDP.

Figure 2.8: Percentage point change in the claimant count as a measure of unemployment; March to April

ONS: Change in the percentage of population aged from 16 to 64 claiming unemployment related benefits from 12th March 2020 to 9th April 2020

- At least 10% above English average
- Around English average (1.9percentage points)
- At least 10% below English average



CHAPTER 3
EFFECTS OF COVID-19 ON MENTAL AND FINANCIAL WELLBEING IN THE NORTHERN POWERHOUSE

3.1 Summary

This chapter examines regional inequalities in mental and financial wellbeing. We additionally consider economic outcomes (hours worked, furlough, and new universal credit claims) as well as loneliness.

We show that people living within the Northern Powerhouse (particularly the North East and Yorkshire and the Humber) experienced a large drop in mental wellbeing. People in the Northern Powerhouse were also more likely to have reduced their number of hours worked, have made new Universal Credit Claims, and reported being lonely. In general, the results were most pronounced when London was excluded from the rest of England.

In summary we found that individuals living within the Northern Powerhouse:

- Experienced a large drop in mental wellbeing (particularly the North East and Yorkshire and the Humber)
- We estimate that this reduction in mental wellbeing could cost the UK economy up to £5 billion in reduced productivity (measured by GVA)
- Were more likely to have reduced their number of hours worked (conditional of being employed)
- Were also more likely to have made new Universal Credit Claims
- Were no more likely to report participation in the furlough scheme than the rest of the country, although this could be attributable to the higher rates of unemployment. There was high self-reported participation in the furlough scheme in Yorkshire and the Humber, however
- Experienced more loneliness, particularly in the North East

3.2 Introduction

As well as considering mortality rates, it is important to consider other factors known to be affected by COVID-19. In this chapter, we consider a number of outcomes linked to COVID-19 including mental wellbeing, number of hours worked per week, participation in the furlough scheme, new Universal Credit claims, and loneliness. We use data from the UK Household Longitudinal Study (UKHLS: Understanding Society. UKHLS is a nationally representative sample of around 80,000 – 100,000 people from around 50,000 households in the UK.

Individuals are followed every year (from 2009 onwards) and a rich set of data is collected relating to almost every aspect of their lives. During the COVID-19 pandemic, a subset of around 42,000 eligible UKHLS respondents were invited to partake in monthly (from April onwards) short web-based survey to get real-time information about their experiences of COVID-19[49].

In April, a total of 16,379 people responded and the monthly sample sizes since have fluctuated around the 15,000 mark. The major advantage of these data are that they can be linked back to pre-COVID data and hence we can isolate changes within individuals.

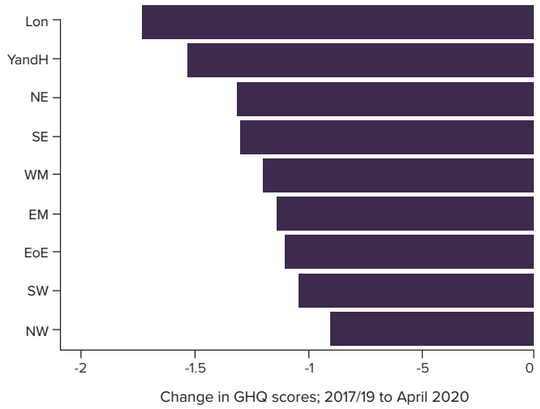
3.3 Mental Wellbeing

We measure mental wellbeing using the General Health Questionnaire (GHQ); a screening device for identifying minor psychiatric disorders in the general population and within community or non-psychiatric clinical settings such as primary care or general medical out-patients. It assesses the respondent's current state and asks if that differs from his or her usual state. It is therefore sensitive to short-term psychiatric disorders but not to long-standing attributes of the respondent.

For more information see:
https://www.gl-assessment.co.uk/products/general-health-questionnaire-ghq/

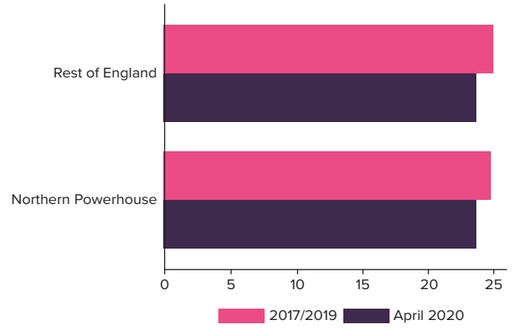
The GHQ is used to create a variable on a 0 – 36 scale, where lower scores refer to better mental wellbeing. To ease interpretation, we reverse code the GHQ here so higher scores relate to better mental wellbeing. We then look at the average within-person change in the responses to this variable for each of the nine regions of England (Figure 3.1). The change is defined as the difference in scores from the 2017/19 wave of UKHLS to the April 2020 wave. The results for using later months (May – June) are qualitatively very similar.

Figure 3.1: The change in GHQ (mental wellbeing) from pre-COVID (2017/19) to during COVID (April 2020), by region



The region with the largest reduction was London. Yorkshire and the Humber and the North East are the regions with the second and third largest reductions, respectively. The North West experienced the lowest reduction in GHQ, although the reduction was still statistically significant.

Figure 3.2: Mental wellbeing (measured by GHQ) pre-COVID (2017/19) and during COVID (April 2020); Northern Powerhouse vs. the rest of England



Note: Rest of England here includes London. If London is removed, the reductions in mental health for the rest of England become smaller.

Table 3.1: Mental wellbeing (measured by GHQ) in the Northern Powerhouse and rest of England; before COVID-19 and changes during the pandemic

	2017/2019		Change to April 2020	
	Mean	Std. dev.	Absolute	As % of std. dev.
Northern Powerhouse	24.90	5.47	-1.18	21.56
Rest of England (inc. London)	24.88	5.37	-1.22	21.96

Note: Rest of England here includes London. If London is removed, the reductions in mental health for the rest of England become smaller.

On average, the Northern Powerhouse and the rest of England experienced similar declines in mental wellbeing during the first month of the pandemic (Figure 3.2 and Table 3.1). Mental wellbeing in the Northern Powerhouse fell by 1.2 units (on a 0-36 scale), equivalent to 21.6% of a standard deviation (Table 3.1).

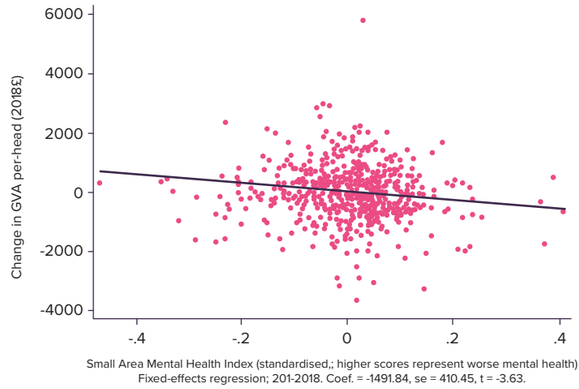
Using data from 2011 to 2018 (latest available data), we ran a fixed-effects linear model to estimate the relationship between mental wellbeing (measured using the Small Area Mental Health index (SAMHI), a composite measure of mental health[50]) and Gross Value Added (GVA) at a local authority level within the Northern Powerhouse. GVA was deflated to 2018 prices to remove any possible inflationary changes.

The use of fixed-effects models allowed us to isolate the within area changes in mental wellbeing and how they correlated with the within area changes in GVA.

This allowed us to abstract away from factors that were largely time invariant (i.e. deprivation and need). We also account for population characteristics known to be associated with GVA.

The results from this model are presented in Figure 3.3, where it can be seen that a one standard deviation increase in poor mental wellbeing was associated with a £1,491 (95% CI: £685.37 to £2,298.31) decrease in GVA per-head in the Northern Powerhouse. Results for the rest of England are qualitatively similar.
Given that COVID-19 has caused a 21.6% of a standard deviation decrease in mental wellbeing, we estimate this could translate into around a £332 (=0.216*1491) reduction in GVA per-head in the Northern Powerhouse if this reduction in the levels of mental wellbeing is maintained. Given a population size of 15.5 million people in the Northern Powerhouse, this loss in GVA this year alone is equivalent to around £5 billion (£4,991,868,000).

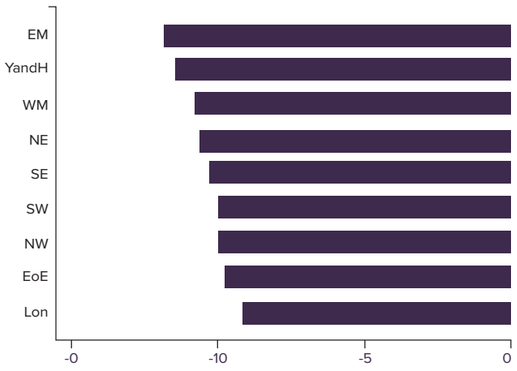
Figure 3.3: The relationship between mental health and Gross Value Added (GVA) at local authority level within the Northern Powerhouse; 2011 – 2018



Fixed-effects regression; 201-2018. Coef. = -1491.84, se = 410.45, t = -3.63.

Note: the model also includes year fixed-effects, the LAD's total population (number of people), the % of the population (aged over 16+) who have no qualifications, the % of the population (aged over 16+) who are aged 16-64, and the % of the population (aged over 16+) who are white UK nationals. GVA is deflated to 2018 prices. The regression was weighted by the size of the LAD population. Full regression results are contained in Table A3.1 (Appendix 3).

Figure 3.4: The change in number of hours worked per-week from pre-COVID (January/February 2020) to during COVID (April 2020), by region



3.4 Number of hours worked per-week

Conditional on being employed, the April sweep of the UKHLS data asked people how many hours they worked in a typical week in January or February as well as in April. We use this information to construct the change in the number of hours worked per-week, and plot this regionally in Figure 3.4. Yorkshire and the Humber experienced the second largest drop in hours (11.3 hours per-week),

Figure 3.5: Percentage of workforce who self-report being on the Government furlough scheme in April 2020, by region

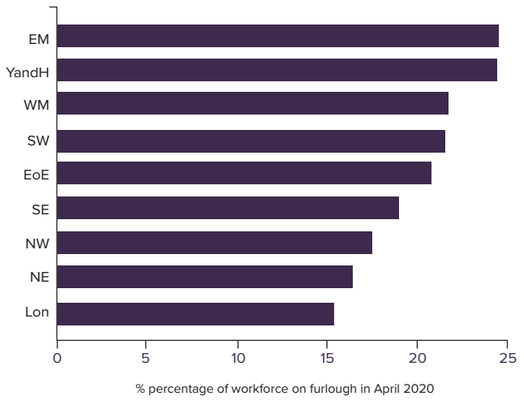


Figure 3.6: percentage of people who report feeling lonely some of the time or all of the time in April 2020, by region

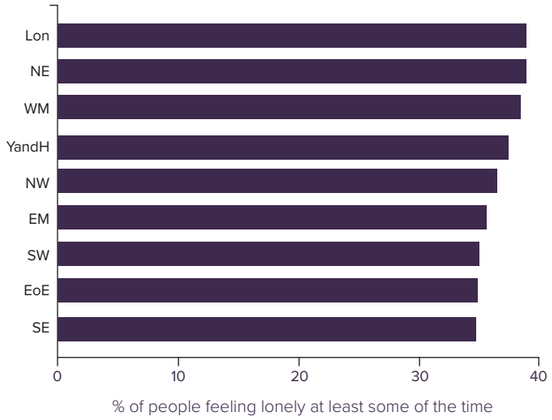
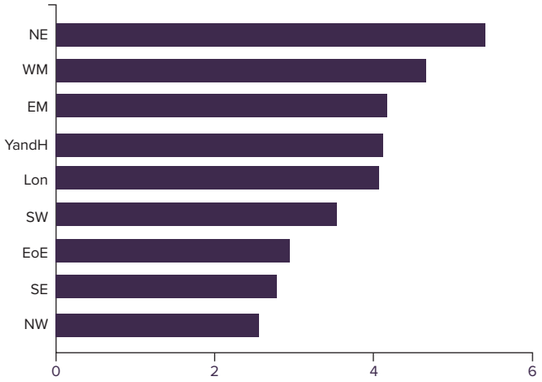


Fig 3.7: The precentage of new universal credit claims in April 2020 since March 202, by region



the North East experiences a 10.6 hour reduction, and the North West a 10 hour reduction in hours worked.

3.5 Furlough

In late March 2020, the government announced that they would introduce a furlough scheme to help mitigate against the threat of mass unemployment. This scheme enabled employers to temporarily stop paying their workforce and the government would pay 80% of their usual wage.

Employees who were part of this scheme were not allowed to do any work for their company during the period they were furloughed. Figure 3.5 shows the regional variability in the uptake of the scheme as self-reported by UKHLS respondents) in April 2020. Yorkshire and the Humber had the second highest uptake, whereas the North East and the North West had the second and third lowest rates, respectively. One possible explanation for the low numbers in the North East is the high unemployment rate (Chapter 2).

3.6 Loneliness

In April, respondents were asked “In the last 4 weeks, how often did you feel lonely?” and they could respond “Hardly ever or never”, “Some of the time”, “Often”. We used this variable to construct a measure of loneliness which took the value 0 if a person responded “Hardly ever or never” and 1 otherwise.
The region with the highest prevalence of loneliness was London (39%; Figure 3.6) and the North East had the second highest prevalence (39%). 37% of people in Yorkshire and the Humber reported feeling lonely at least some of the time as did 36% of people in the North West. The South (excluding London) typically had lower levels of loneliness than the North and Midlands.

3.7 New Universal Credit Claims

In April, individuals were also asked if they had made a new claim for universal credit since March conditional on them not having applied before. 4.3% of people in the North East reported making a new claim (Figure 3.7), the highest percentage in England. The corresponding figures for Yorkshire and the Humber and the North West were 3.3% and 2.2%, respectively.

3.8 Conclusion

In addition to the area-level effects we document in Chapter 2 (higher mortality rates and worse economic outcomes), we show here that a similar picture is obtained when using individual-level data. People living in the Northern Powerhouse were more likely to report a large reduction in mental wellbeing.

This is likely to be the effects of higher mortality and worse economic outcomes. This reduction in mental wellbeing could costs the UK up to £5billion in reduced productivity. In addition to the higher unemployment rates documented in Chapter 2, we additionally show that people living in the Northern Powerhouse were more likely to have experienced a reduction in hours worked and were more likely to have made new claims for Universal Credit.

We did not find a difference in the participation in the furlough scheme between the Northern Powerhouse and the rest of England, although Yorkshire did have a higher rate than the national average. In addition to the mental health and economic outcomes, we found evidence that people in the Northern Powerhouse were more likely to report feeling lonely. This is important and loneliness is an important predictor of future mental health.

In summary, at an individual level data, our results indicate that COVID-19 is having a disproportionate effect on people living within the Northern Powerhouse region (as well as in London).

CHAPTER 4
THE COVID-19 ECONOMIC CRISES AND HEALTH IN THE NORTHERN POWERHOUSE

4.1 Summary

This chapter examines how, since the last financial crisis in 2008, disinvestment in public services and welfare cuts (together known as austerity) has widened the North-South gap in life expectancy contributing to the productivity divide.

We examine how this has left places in the Northern Powerhouse more vulnerable to the current COVID-19 pandemic and ensuing economic crisis. The economic and health effects of the COVID-19 pandemic have been more severe in the North and it is likely that the current recession will hit the North hardest. This will only be further exacerbated by a return to austerity. Instead, the economic crisis in the Northern Powerhouse should be addressed by a reversal of local government cuts and amendments to welfare reforms so that they do not worsen debt, poverty and uncertainty around the benefit assessment, implementation and delivery.

4.2 Economic Crisis/Austerity and the Northern Powerhouse

Prior to 2010 in England there was a system of allocating local government and NHS resources to local areas based on an objective assessment of their needs. This led to more resources for these services going to the poorest areas with the greatest needs, which resulted in reducing health inequalities.[51] However, in recent years this has not been the case, with more deprived areas receiving bigger cuts, particularly in the North of England. Changes to the way public funds are allocated to the NHS and council areas have stark consequences for people's quality and length of life[52] – leading to further declines in health and mental health.

A return to austerity will exacerbate the North South productivity and health divides. The primary aim of austerity was to reduce the government's deficit and the role of the welfare state, predominately by moving people into work. Research shows that some welfare changes that aimed to move people into work were not effective at doing so.[53, 54]

We have seen that the impact of the recession and subsequent austerity program in the UK has been detrimental to the health and wellbeing of the whole population. Previous research has cemented its impact, linking it to rises in infant mortality (deaths in children under 1), child poverty, homelessness, food poverty, and a deterioration in mental health, have been observed.[55,56,57,58,59]

In our previous Health for Wealth report[60] we have shown that NHS resource allocation can lead to better economic outcomes in (1) higher employment rates, (2) lower rates of economic inactivity,(3) higher gross value added (GVA) per-head, and (4) higher median weekly pay. We found that health investment actually leads to higher employment and wages and that these effects are greater in the North compared to the rest of England. This is imperative, given the rising health and employment needs of the North.

4.2.1 Impact of Austerity on Productivity: North-South divide

Since 2008 funding for public services has experienced large cuts as part of the government's austerity programme. Funding for welfare and local government have experienced the greatest cuts. Nationally, it is estimated that the funding for working-age welfare fell by around £27 billion since 2010.[61]

These significant reductions (amounting to a 25% reduction in the 2010 welfare budget) disproportionately impacted on the Northern Powerhouse – given the higher rates of deprivation, unemployment and ill health.[62] For example, in the post-industrial areas of the North West and North East such as Blackpool or Middlesbrough, it is estimated that welfare funding has fallen by £720 and £560 respectively per person per annum (p.a).[63] In the rest of England (except London and some coastal towns), reductions have on average been more modest (e.g. places like Cambridge and Guildford in the South East lost 'just' £190 and £210 per person p.a respectively[64]). This amounts to a significant reduction in the regional economies.

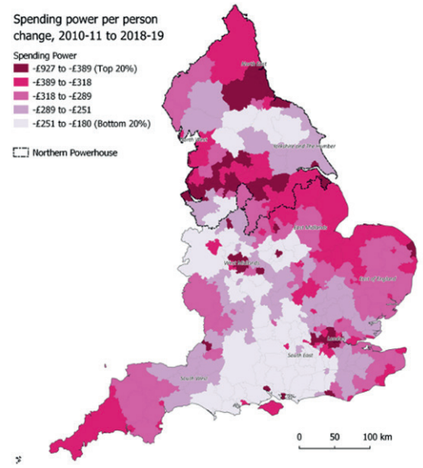
Overall, local government spending has fallen by 24% or £28.8 billion in the last ten years (2009-10 to 2018-2019), the equivalent of £532 per person on average. But these have not fallen evenly across the country.

Deprived communities with higher rates of poverty and weaker economies in the North of England saw the largest reductions in their local authority budget.
Figure 4.1 shows the change in spending power per person, for all local authority services in England over the past 10 years (2010-11 to 2018-19). Spending power is a measure of overall revenue funding available to local authorities and includes council tax and locally retained business rates.

The map shows that a large reduction in spending power per person has happened within the Northern Powerhouse regions, particularly within urban areas.

The reason why more disadvantaged areas, particularly those in the North have lost out from changes in local government funding is largely due to reductions in the Revenue Support Grant – this along with retained income from business rates in more recent years forms the main central government transfer of funds to local government.

Figure 4.1: Average per person cuts in total spending power between 2010-11 to 2018-19 by local authorities in England.

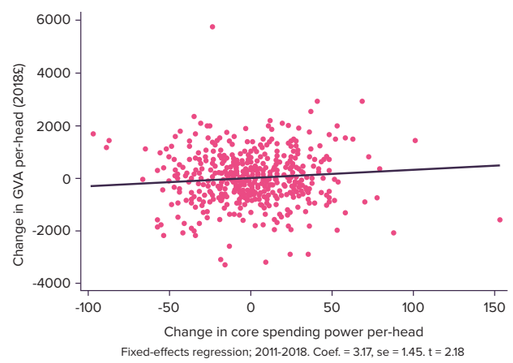


Data source: Ministry of Housing, Communities & Local Government; ONS

Using data from 2011 to 2018, we estimated the relationship between this Local Authority District (LAD) core-spending power per-head and productivity as gross-value-added (GVA) per-head. To remove possible inflationary effects, we deflated both core spending and GVA to 2018 prices.

We ran a fixed-effects linear model at a local authority level, which allowed us to isolate the within area changes in core spending power and how they correlated with the within area changes in GVA. This allowed us to abstract away from factors that were largely time invariant (i.e. deprivation and need). We also account for population characteristics known to be associated with GVA as well as weighting the regressions by the size of the population. The results from this model are presented in Figure 4.2, where it can be seen that a £1 per-person increase in core spending per-head was associated with a £3.17 (95% CI: £0.32 to £6.02) increase in GVA per-head in the Northern Powerhouse. Results for the rest of England are qualitatively very similar.

Fig 4.2: The relationship between Core Spending Power per-head and Gross Value Added (GVA) per-head at local authority level within the Northern Powerhouse; 2011-2018



Fixed-effects regression; 2011-2018. Coef. = 3.17, se = 1.45. t = 2.18

Note: the model also includes year fixed-effects, the LAD's total population (number of people), the % of the population (aged over 16+) who have no qualifications, the % of the population (aged over 16+) who are aged 16-64, and the % of the population (aged over 16+) who are white UK nationals. GVA and core spending power are deflated to 2018 prices. The regression was weighted by the size of the LAD population. Full regression results are contained in Table A4.1 (Appendix 4).

In context, this implies that a £1 per-person decrease in core spending will have caused a much larger reduction in GVA per-person; i.e. each pound saved on core-spending in the Northern Powerhouse will cost £3.20 in lost GVA.

On average, core spending power per-head fell by £41 per-person per-year in the Northern Powerhouse, from £1,065 in 2011 to £778 in 2018. This annual decrease of £41 per-person in the Northern Powerhouse is estimated to have reduced GVA by £130 per-person, per-year, equivalent to a reduction of around £2bn per-year[65], or £16bn between 2011 and 2018.

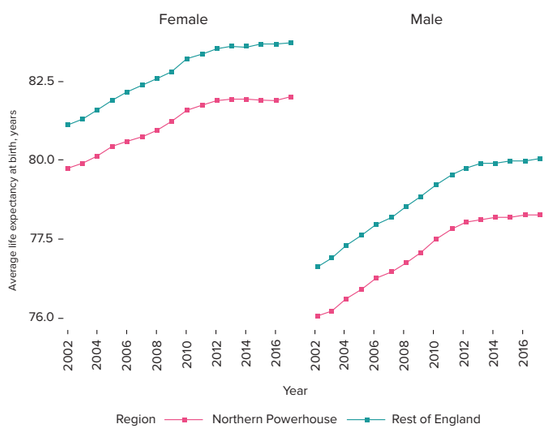
In Appendix 4, we present the results from a linear-logarithmic specification, where we show that a 10% reduction in core spending per-person would cause a £502 reduction in GVA per-person.[66] Given a mean GVA per-head of £21,920 in the Northern Powerhouse, this 10% reduction in core spending power could cause around a 2.3% reduction in GVA per-head.

4.2.2 An Increased North-South Health Divide.

Life expectancy in the UK has largely stalled since 2013, and although similar trends have been observed in other high-income countries, England stands out as the worst affected by these stagnant trends. In the most deprived areas, we are seeing a decline in life expectancy whereas in more affluent areas it has remained constant, widening health inequalities. In the last 5 years of available data (2012-14 to 2016-2018) 108 local authorities out of the 326 local authorities in England saw a fall in life expectancy at birth for men and 124 for women, while 51 areas saw a decrease within both sexes.

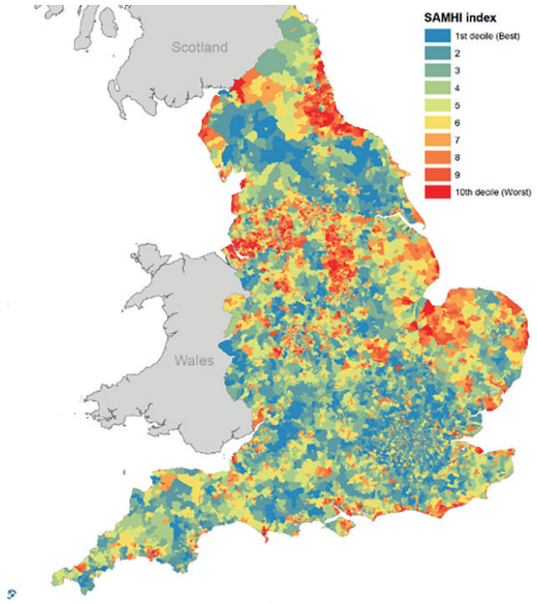
Almost half of local authorities in the North experienced such a decline (29 for male and 32 for female life expectancy). In recent years the North South health divide has widened – with the gap in life expectancy at birth increasing from 1.37 years in 2001-03 to 1.74 years in 2016-2018 and from 1.60 years in 2001-03 to 1.76 years in

Fig 4.3: Trend in life expectancy at birth in the North and the rest of England between 2002 and 2017



Year equals mid-year from 3-year rolling average

Figure 4.4: Map of the Small Area Mental Health Index for England in 2018



2016-2018 for females and males respectively (Figure 4.3).

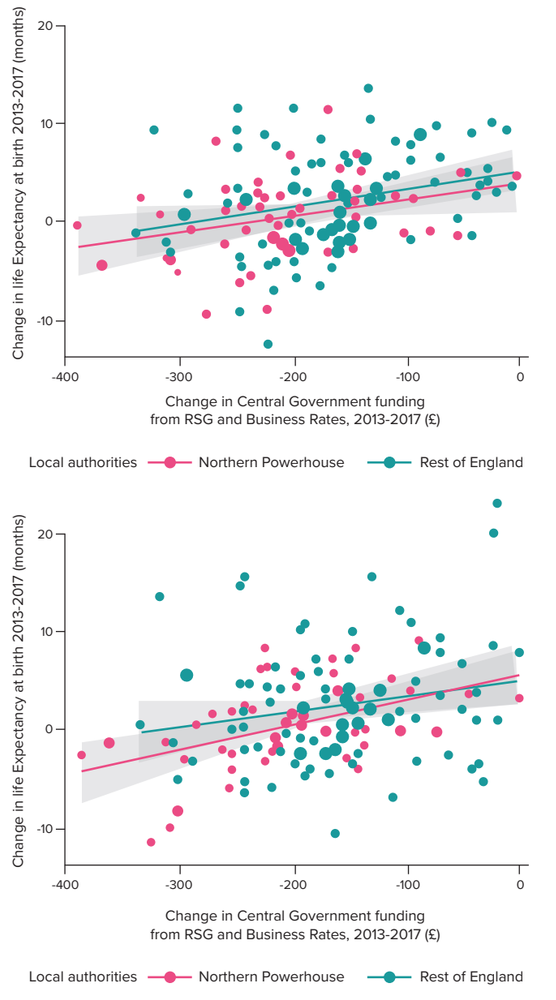
Comparing the reductions in central government grants to local government between 2013 – 2018 (the years for which we have consistent data) we find that these are closely corelated with recent adverse trends in life expectancy.

Those places that have experience the greatest reduction in funding have experiences greater declines in life expectancy (Figure 4.4). In fact, we find that the association is greater across the North than in the rest of the country. within the North (males $\rho = 0.47$, $p < 0.001$, and females $\rho = 0.33$, $p < 0.001$), particularly among males, than the rest of England (males $\rho = 0.20$, $p < 0.001$, and females $\rho = 0.27$, $p < 0.001$).

This is also reflected in mental health differences between the North and the South. The Small Area Mental Health Index (SAMHI) is a composite measure of mental health, as Figure 4.5 shows, poor mental health is clustered in the disadvantaged - post-industrial areas in the North, with mental health problems 74% higher in the North than the South, and 39% of northern neighbourhoods in the two worst deciles of SAMHI index.

There is growing evidence that these adverse health trends observed in the North in recent years are directly related to national austerity measures and welfare reforms. Research has shown that welfare reforms have had a severe impact on mental health. For example, the introduction of the Working Capabilities Assessment (WCA) in 2010, has been linked with rises in suicides, self-reported mental health difficulties and antidepressant prescribing.[67]
More recently, the introduction of Universal Credit has been associated with a rise in mental health difficulties for unemployed people[68]. As more people in the North are in receipt of these benefits (due to the demographic and health profile of the North) this will mean that the impact will have been greater in the North.

Figure 4.5: Association between change in central government funds to each local authority area and change in life expectancy for men and women between 2013 and 2017 within the Northern Powerhouse region and within the rest of England



Data sources: https://pldr.org; Public Health England.

4.3 The COVID-19 Economic Crisis and the North-South Divide

Early indications are that the North is also being hit hardest by the current crisis (Chapters 2 and 3), potentially because of the vulnerabilities arising from a decade of disinvestment.

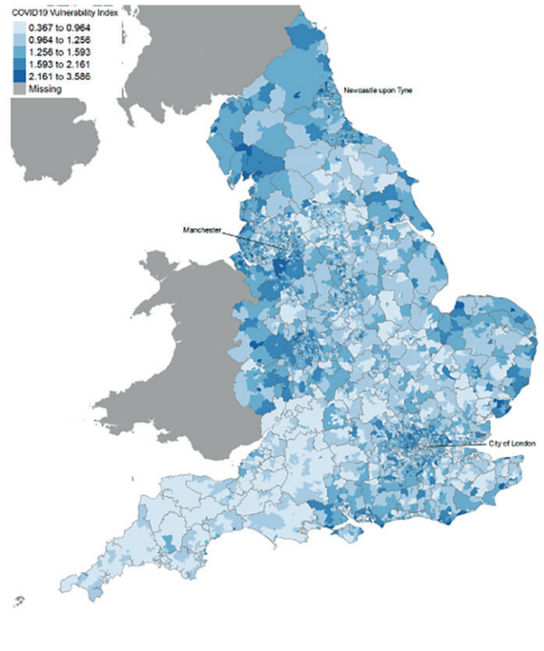
The direct effects of COVID-19 are worse in areas with higher levels of poverty, poor housing, high BAME populations, and overcrowded housing as well as in areas with an older population demographic and higher proportions of people living in care homes. Figure 4.6 shows the communities that are most vulnerable to COVID-19 based on the SAVI index. These communities are clustered within the North West, West Midlands, and North East regions (highlighted with dark blue colour). Neighbourhoods in cities such as London and Birmingham also have clusters of vulnerability. The map shows that the increased risk of COVID-19 mortality in the North is mainly driven by the clustering of underlying vulnerabilities such as overcrowded housing, pre-existing health conditions, age, care home beds per person and ethnicity. Communities in the North and Midlands tend to have a higher concentration of these risk factors compared with the South. For example, in the North, there are more communities that are deprived, with high BAME populations and relatively high population in care homes, whilst in the South these risk factors are (more) negatively correlated.[69]

Other unintended consequences are likely as the crisis unfolds – which may particularly effect the North.[70] Disruptions to health, social care and education services have led to delays in diagnoses for cancer[71], reduced screening, and vaccination[72]; and interruption to schooling and child protection services.[73] Control measures and the ensuing economic crisis have increased social isolation[74], rent arrears, homelessness[75], mental health problems[76], child poverty and food insecurity.[77]

We are already seeing increases in unemployment as measured by the claimant count increasing massively – with an additional 4.9 million people claiming UC for the period March to July 2020 compared to same period in 2019.

The number of people in receipt of working age benefits has risen by 121% since March 2020 according to the Office of National Statistics latest estimates.[78] These increases have tended to be focused in London and the cities of the North and Midlands. It remains to be seen what the long-term consequences of this will be but we know from previous recessions that they were associated with rises in infant mortality (deaths in children under 1), child poverty, homelessness, food poverty, and a deterioration in mental health.[79]

Figure 4.6: COVID-19 Vulnerability Index at Middle Layer Super Output Area in England. Greater COVID-19 vulnerability is shown as darker shade of blue.



4.4 Conclusion

In the past ten or so years, the Northern Powerhouse has been disproportionately hit by government policies, such as austerity. This has contributed to the growing North-South health divide, and therefore to the growing gap in productivity between the Northern Powerhouse and the rest of England.

Particularly, we showed that this has left places in the Northern Powerhouse more vulnerable to the current COVID-19 pandemic and ensuing economic crisis. The economic and health effects of the COVID-19 pandemic have been more severe in the North and it is likely that the current recession will hit the North hardest.

CHAPTER 5
COVID-GENERATION: CHILDREN AND THE FUTURE OF THE NORTHERN POWERHOUSE

5.1 Summary

This chapter examines the early life origins of the health and productivity gap between the Northern Powerhouse and the rest of England. Childhood health is a key predictor of later health through the life-course as well as economic productivity during working age and there are substantial, persistent regional inequalities in child health: children living in the North have worse health outcomes than children living in the rest of England.

Child poverty rates in the Northern Powerhouse are amongst the highest in the country and this is a key determining factor of poorer health. The closing and scaling back of Sure Start centres disproportionately hit the North, thus reversing any improvements in child health, education and development they brought about.

Key findings:

- Childhood health is a key predictor of later health and economic productivity
- There are substantial, persistent regional inequalities in child health: children living in the North have worse health outcomes than children living in the rest of England
- Child poverty rates in the Northern Powerhouse are amongst the highest in the country with child poverty as high as 41% in parts of the North East
- The closing of Sure Start centres disproportionately hit the North, thus reversing improvements in school readiness they brought about
- The pandemic has negatively impacted on education, employment and mental health for children and young people. In future, the productivity gap between the Northern Powerhouse and the rest of the country is likely to worsen without further action
- The productivity gap between the Northern Powerhouse and the rest of the country is likely to worsen for subsequent generations without a COVID-19 recovery strategy that prioritises families with children

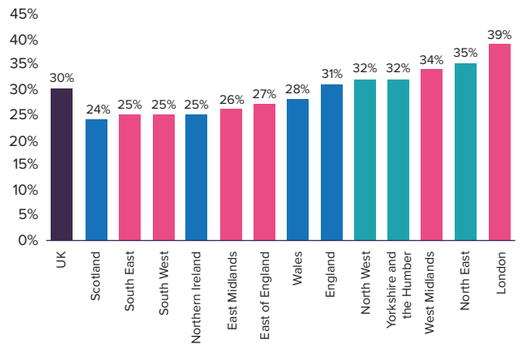
We need to invest in children to reduce inequalities in health and productivity in adulthood within the North, and between North and South. These productivity gaps are attributable to mental or physical ill health tied up with socio-economic disadvantage in childhood. The Due North report showed that worse child health is a key driver of the North-South divide in adult health and life expectancy.[80]

Although there is no quick fix to addressing this divide, which stems from historically poor policies affecting generations of children, overwhelming evidence supports the need for a 'life course' approach in tackling social inequalities and improve the health and wealth of the next generation.
In this chapter, we examine the early-life origins of the health and productivity gap between the Northern Powerhouse and the rest of England.

5.2 Child Poverty in the Northern Powerhouse

There are striking inequalities in the life chances of children based on the lottery of their place of birth, which are only likely to increase as a result of the COVID pandemic. Despite being a high-income country, the UK as a whole experiences poor child health outcomes, as a result of high overall societal inequality.[81] However, outcomes for children in the North are particularly poor, with those born in the most deprived northern areas, on average, living for almost ten years less than their counterparts in the most affluent areas in the South, and 20 years less in good health (so-called healthy life expectancy).[82]

Figure 5.1: Precentage of children living in households with <60% of median household income, by country and region 2018/19[82]



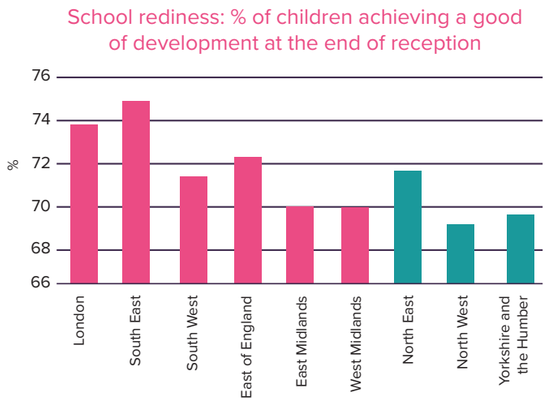
These inequalities in health and life chances are profoundly unjust and modifiable and, rather than being biologically predetermined, they are largely due to differences in the social and economic environments that give children the best start in life. Along with the West Midlands, the three northern regions of England have the highest levels of child poverty outside London (Figure 5.1). Over 32% of children in the Northern Powerhouse now grow up in poverty – compared to 25% in the South East. Since 2015, child poverty rates have increased the most in the North East with, for example, rates now as high as 41% in Middlesbrough and 39% in Newcastle.[83]

Children living in poverty are less likely to do well at school – for example, 69% of children from the most affluent neighbourhoods gain five or more GCSEs compared to only 52% from the most deprived neighbourhoods.[85] In turn, educational attainment is a strong predictor of future health, employment, income and productivity: only 58% of working age adults with GCSE or lower educational level are employed in the UK compared to more than 80% of those with university degrees.[86]

Child poverty also has long term impacts on productivity. Research from the USA estimated that the annual aggregate cost of U.S. child poverty is $1.0298 trillion, representing 5.4% of the gross domestic product and that for every dollar spent on reducing childhood poverty, the country would save at least seven dollars with respect to the economic costs of poverty.[87]

Similarly, in the UK, in a 2008 report, the Joseph Rowntree Foundation has estimated that about £12 billion a year is spent from the public purse to deal with the consequences of child poverty (e.g. personal social services, school education and police and criminal justice) and that the annual cost of below-average employment rates and earnings levels among adults who grew up in poverty is about £13 billion (of which £5 billion represents extra benefit payments and lower tax revenues; the remaining £8 billion is lost earnings to individuals), adversely impacting on UK gross domestic product (GDP).[88] They conclude that in total, in 2008 figures, child poverty costs the country at least £25 billion a year, including £17 billion that could accrue to the Exchequer if child poverty were eradicated.

Figure 5.2: Percentage of children achieving a good level of development at the end of reception



The most recent school readiness data indicates that children in the North have significantly worse levels of development at the end of reception year (Figure 5.2). These experiences in early childhood then track forward to impact on educational attainment and later employment prospects. For children in the North, the attainment gap persists throughout primary and secondary school. For example, by the time the children in Blackpool and Knowsley in the North West take their GCSEs, those worst off are over two full years of education behind their peers (26.3 months and 24.7 months respectively).[89]

Persistent poverty experienced as a child has long lasting physical and mental health impacts.[90,91] Children in the North are at greater risk of performing badly at school, growing up to be unemployed and experiencing worse health and wellbeing in both childhood and adulthood. Even when accounting for other factors, growing up in poverty is associated with a three-fold increase in the likelihood of

Figure 5.3: Percentage of children obese at reception and year 6

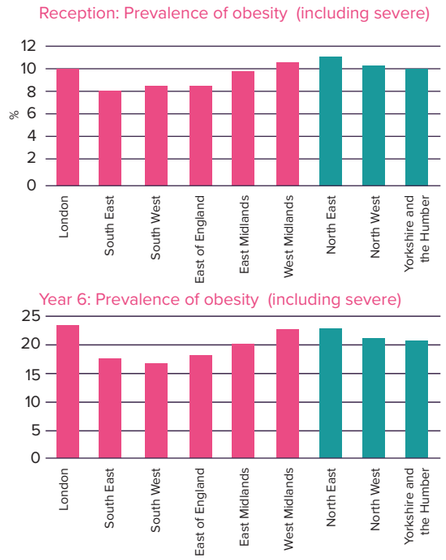
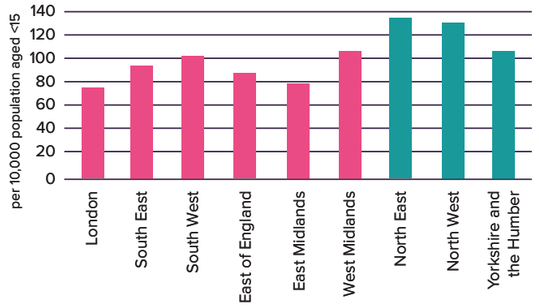


Figure 5.4: Hospital admissions by unintentional and deliberate injuries in chilfren (aged 0-14 years)



adolescent mental health problems and double the risk of obesity or chronic illness.[92]

Compelling new evidence shows the impact of even fleeting exposure to poverty in childhood to higher risk of mortality in early adulthood from suicide, accidents and cancer.[93] This adds to a large body of evidence showing that childhood is a critical period and that adversities become embedded – having long lasting and serious effects. The UK's mortality rate lags behind comparable countries in the EU, and within the UK there is a clear North-South divide. Worryingly, for the first time in nearly 40 years, there has been a sustained increase in infant mortality in the poorest areas since 2013, linked to rising poverty.[94]

Many of the poor health outcomes for children in the North are driven by the higher concentration of poverty and social disadvantage (appendix). For example, in all three northern regions (North West, North East and Yorkshire and Humberside), there are significantly higher proportions of obese year 6 children than the England average (Figure 5.3).[95] In 2014/15 hospital admissions for mental health illnesses in children aged 0-17 years were a third higher in the North West than the England average (116.2 compared to 87.4 per 100,000popn).[96] Poverty is an important risk factor for

Figure 5.5: Absolute change in per capita spend on early years prevention (£) 2010-2017

child abuse and neglect. Heightened stress due to poverty puts stain on families eroding mental health and domestic relationships, leading to negative parenting behaviours and increased risk of child abuse and neglect.[97]

In 2017/18 hospital admissions for intentional and unintentional injuries in children under 15 were a third higher in the North East than the England average (130 compared to 96 per 10,000 children). Furthermore, there has been a dramatic rise in the numbers of looked after children over recent years in poorer areas, and in areas more deeply affected by recession and austerity.[98]

5.3 Austerity, Children and the North

The Due North report found compelling evidence that quality preschool education was critical for longer-term child development.[99] UK government programmes designed to alleviate the impact of childhood poverty, such as Sure Start, showed great promise but faced systematic cuts under austerity.

These cuts have been disproportionately larger in deprived areas in the North, compromising support for the most vulnerable families. Larger per capita cuts to public funding to local authorities with higher proportions of children in poverty have also undermined the ability of the North to 'level up' child wellbeing (Figure 5.3/5.4).

5.4 The COVID-19 Context for Children and Young People

COVID-19 can be conceived as a systemic shock to the wider determinants of child health – with emerging evidence indicating profound impacts on education, mental health and employment prospects as child transition into adulthood.[100, 101, 102]

There is growing concern that child health and wellbeing in the UK will suffer further as a result, and that policy to support recovery to date provides insufficient support for the poorest children and families.[103]

5.4.1 Education and employment

Education has been significantly disrupted for children of all ages. Whilst schools remained open during lockdown for the most vulnerable children, attendance has been low. In July 2020, four months post-lockdown, only 17% of pupils were attending school or college, and only 25% of Early Years places were taken.[104] During lockdown many families struggled to maintain schooling at home and there were marked inequalities in learning hours, digital access to resources and completion of homework during this time. Since children returned to education in September 2020, teachers

Figure 5.6: Percentage of 15,641 Bradford primary school chilfren with zero, only one, or more than one vulnerability within domains of wellbeing

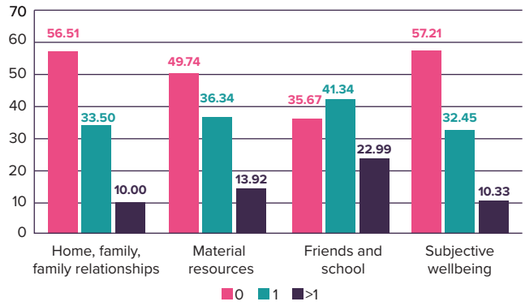
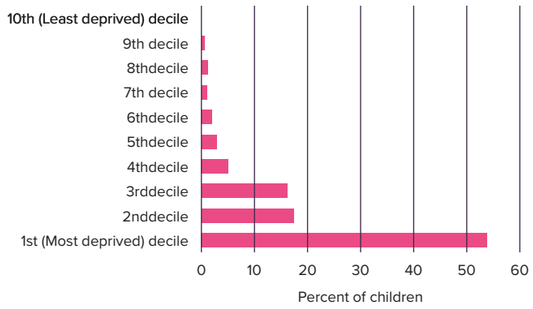


Figure 5.7: Vulnerabilities in Born in Bradfor children, % by 2019 IMD deciles



have reported a widening learning gap, with the majority of teachers in the most deprived schools reporting that their pupils were 4+ months behind, this is on top of the pre-pandemic learning deficit experienced by disadvantaged pupils, mentioned above.[105]

COVID-19 is also affecting young people transitioning into adulthood, restricting their ability to enter the job market and reducing job security. Young workers are often employed in the hospitality, retail or entertainment sectors, which have been most severely affected by the pandemic. The TUC reported that 26% of young workers in the North East were employed in industries most likely to be affected by COVID-19, compared with 20% across the UK.[106]

5.4.2 Mental health and wellbeing

Increased family stress decreased social interaction, and reduced access to support services have fuelled concern for young people's mental health during lockdown.

The majority of young people (83%) with existing mental health needs report that the pandemic has made their health worse[107], whilst many areas have seen increased demand for NHS mental health services.[108]

The implications for future mental health are also stark, with a recent review finding that young people experiencing loneliness during lockdown may be up to three times as likely to develop depression in adulthood.[109] Particularly vulnerable children also face hidden harms where opportunities for intervention by those outside the home have been reduced or have ceased entirely. The most recent official Mental Health of Children and Young People in England

reported that rates of probable mental disorders have increased from one in nine (11%) in 2017 to one in six (16%) in 2020[110]. The majority of children and young people with probably mental disorders reported that lockdown had made their mental health worse.

Prior to lockdown, researchers in Bradford examined child wellbeing in 15,641 primary school children aged 7-10 years, assessing their vulnerabilities in the home and family context, material resources, friendships and self-reported wellbeing. Although most children had good levels of wellbeing, fewer than 1 in 10 had no vulnerabilities and a worrying 1 in 10 had multiple vulnerabilities in all areas (Figure 5.6).

More than half of all children living in the tenth most deprived areas of Bradford had vulnerabilities (Figure 5.7)

Researchers in Bradford have also asked how experiences of the COVID-19 pandemic and the lockdown have affected families, revealing increasing health inequalities, with a large number of vulnerable families living in poor housing conditions (including mould/damp and vermin), being pushed into poverty, and suffering from worse mental health.

Two in five mothers had depression and the same proportion had anxiety.

One-third of families were worse off financially during lockdown, and food insecurity (20%), employment insecurity (37%) and housing insecurity (10%) were also common. Many children were very anxious about COVID-19, many had done little or no physical activity and smaller but important numbers of children were unhappy, worried about coming back to school and had significant behavioural problems.

5.5 Conclusion

Ultimately, the COVID-19, health and productivity gap for the Northern Powerhouse flows from restricted opportunities to be healthy in childhood—exposure to poverty, unhealthy environments, lower quality nutrition, poor quality air, substandard housing, and chronic stress.

For these reasons, COVID-19 recovery planning must prioritise families with children.

There is now robust evidence that welfare changes over the past ten years have put many more children into poverty and that the pandemic will make this much worse.

CHAPTER 6
LEVELLING-UP - RECOMMENDATIONS

6.1 Overview

We have a great opportunity to level up the health and wealth of the North of England as Government recognises for the country to thrive post-Brexit all parts of the country must play its part in economic success.

The COVID-19 pandemic puts the whole levelling up project in immediate danger. Instead of levelling up, without immediate action its health inequalities will see the North's towns and cities instead levelling down as ill health, child poverty and mental health issues are exacerbated by the pandemic.
We know the UK loses £13.2bn a year in lost productivity through worse health in the Northern Powerhouse. This report demonstrates a likely further £6.86bn loss already due to mortality from the pandemic and a potential additional £5bn loss from the strain on mental health. This loss has the potential to escalate if mitigating factors are not put in place.

This report clearly exposes the devastating impact health inequalities has on the health and wealth of the North of England and the multiplying effect COVID has on those. Over six months into the pandemic it has become ever clearer that health inequalities are taking a huge toll on the health and livelihoods of people in the North of England exacerbating and deepening existing divides.
Not in a generation has the relationship between physical and economic health been more crystal clear and more necessary to tackle. The United Kingdom is at a pivotal point in tackling COVID-19, one which could accelerate inter-generational health inequalities which already sees the economic divide between the North and South of England similar to that between West and East Germany during the Cold War.[111]

The Government recognises for the UK to excel post-Brexit it needs to level up the country, to tackle decades of under-investment in the regions, to support the country and future generations to grow to their full potential. There is ample opportunity to do that through investment in its excellence in health innovation, zero carbon opportunities and manufacturing.

To do that it needs a physically and mentally fit workforce. The industrialists and politicians of the 19th century recognised the population's health was key to its economic success and that remains true today, as it will for future generations. A concerted effort is required to ensure that the productivity gap experienced by today's workforce, does not persist to hamper children and young people in years to come.

Alongside the pandemic is an oncoming wave of mental and physical health problems which need effective, targeted interventions to halt the devastating sweep of COVID-19 on the North of England's economic prosperity.
As our 2018 report demonstrated you cannot separate mental and physical health from economic success: health is wealth.

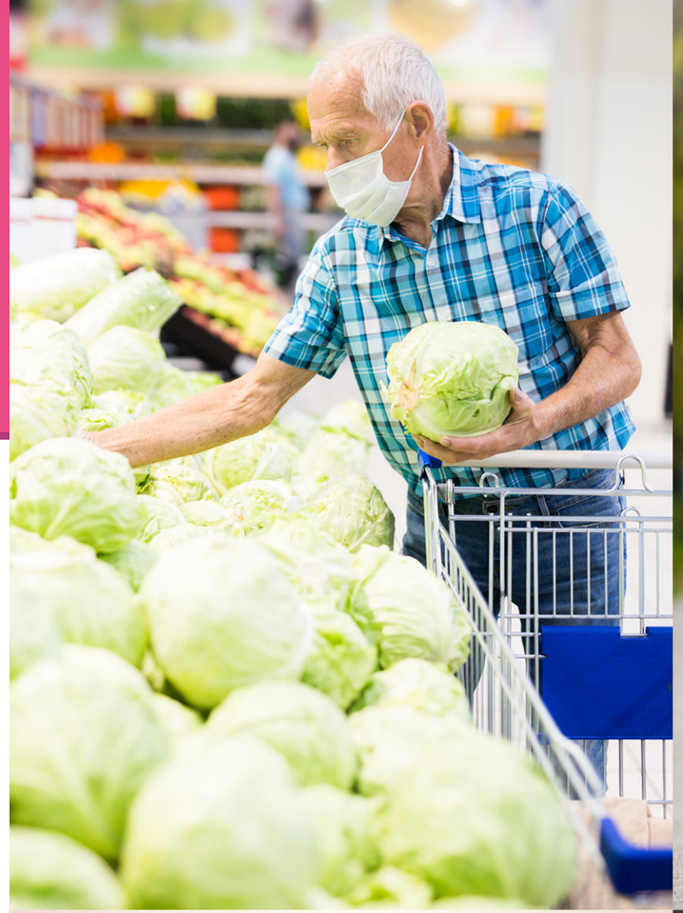
6.2 Recommendations to Government

Short-term:

1. Place additional resource into the Test and Trace system in the Northern Powerhouse and deliver through local primary care, public health, NHS labs and local authority services to ensure full population coverage
2. Target clinically vulnerable and deprived communities in the Northern Powerhouse in the first phase of the roll out of the COVID-19 vaccine
3. Increase NHS and local authority resources and service provision for mental health in the Northern Powerhouse. Invest in research into mental health interventions in the North
4. Reduce child poverty – increase child benefit, increase the child element of Universal Credit by £20 per week, extend provision of free childcare, remove the benefit cap and the two-child limit; and extend provision of free school meals. Invest in children's services by increasing government grants to local authorities in the Northern Powerhouse
5. Maintain and increase the additional £1,000 extra funding of Universal Credit

Medium term:

6. Provide additional resource to local authorities and the NHS in the Northern Powerhouse by increasing the existing NHS health inequalities weighting within the NHS funding formula in its reset and restore plans
7. Deliver a £1 billion fund ring-fenced to tackle health inequalities at a regional level and increase local authority public health funding to address the higher levels of deprivation and public health need in the North
8. Create northern 'Health for Life' centres offering a life-long programme of health and wellbeing advice and support services from pre-natal to healthy ageing programmes. Targeted to the most deprived areas in the North, they will take a preventative approach to health directly into the communities which need it most
9. Deliver health and mental health promotion interventions together with industry and employers, targeted at employee mental and physical health
10. Level up investment in health R&D in the North of England to create high value jobs and support local health and drive the economy
11. Recommit to ending child poverty
12. Develop a national strategy for action on the social determinants of health with the aim of reducing inequalities in health, with a key focus on children



TECHNICAL APPENDICES

Appendix for chapter 2

Table A2.1: Covid-19 mortality rates; by month and area/region

	March	April	May	June	July	March to July
Broad areas						
Northern Powerhouse	8.9	55.3	28.2	10.8	3.8	98.4
London	29.0	95.4	15.8	4.4	4.8	144.4
The Midlands	11.8	47.9	22.1	11.1	6.4	84.4
The South	8.8	42.0	17.5	11.7	10.1	69.9
Regions						
North East	7.6	59.3	33.7	9.5	N/A	106.0
North West	10.3	60.0	27.2	11.1	4.3	104.4
Yorks and The Humber	5.8	44.2	26.6	10.8	3.4	82.6
London	29.0	95.4	15.8	4.4	4.8	144.4
East Midlands	8.1	43.0	23.6	12.6	10.0	79.6
West Midlands	15.2	54.2	22.8	9.7	1.7	94.9
East of England	10.8	47.9	20.1	10.5	7.6	80.3
South West	4.2	30.8	12.9	6.2	N/A	45.4
South East	10.3	47.1	19.2	13.1	10.1	78.5

Table A2.2: All-cause mortality rates; by month and area/regionby month and area/region

	March	April	May	June	July	March to July
Areas						
Northern Powerhouse	95.7	151.7	101.5	74.4	68.5	492.4
London	110.6	181.0	70.6	54.6	52.3	469.0
The Midlands	91.4	137.7	88.0	66.9	63.5	449.1
The South	84.1	121.4	78.5	61.3	59.7	406.5
Regions						
North East	96.6	160.4	112.8	74.8	69.0	513.6
North West	99.0	157.1	100.1	76.9	69.7	502.8
Yorks and The Humber	89.0	136.7	97.5	69.5	66.1	458.7
London	110.6	181.0	70.6	54.6	52.3	469.0
East Midlands	89.7	128.8	91.1	69.6	66.3	445.6
West Midlands	97.4	149.9	91.8	71.8	66.5	477.2
East of England	88.9	137.5	82.6	61.3	59.0	429.2
South West	81.7	108.0	74.6	62.8	61.0	388.2
South East	85.2	127.5	80.3	60.6	59.1	412.7

Table A2.3: Claimant count; by month and area/region

	March	April	May	June	July
Areas					
Northern Powerhouse	3.6	5.9	6.8	6.6	6.7
London	3.1	4.9	7.5	7.5	7.6
The Midlands	2.6	4.4	5.7	5.5	5.6
The South	2.1	4.0	5.3	5.1	5.2
Regions					
North East	4.9	7.2	7.8	7.7	7.8
North West	3.5	5.9	6.8	6.7	6.7
Yorkshire and The Humber	3.0	5.2	6.0	5.8	6.0
London	3.1	4.9	7.5	7.5	7.6
East Midlands	2.5	4.3	5.4	5.2	5.3
West Midlands	3.0	4.9	6.1	5.9	6.0
East of England	2.4	4.1	5.7	5.4	5.6
South West	2.2	4.2	5.3	5.0	5.2
South East	2.1	3.9	5.3	5.1	5.2

Table A2.4: The increased COVID-19 mortality rate in the Northern Powerhouse; March to July 2020

	(1)	(2)	(3)	(4)	(5)	(6)
	RoE inc. London	RoE exc. London	RoE inc. London	RoE exc. London	RoE inc. London	RoE exc. London
Northern Powerhouse	12.37*	21.41***	20.37***	23.65***	19.21***	21.47***
	(2.20 to 22.55)	(12.65 to 30.17)	(12.74 to 28.00)	(15.43 to 31.88)	(11.19 to 27.22)	(13.07 to 29.87)
% of population whose ethnicity is: White (reference category)						
Mixed/multiple			4.50	3.89	4.13	2.75
			(-1.67 to 10.68)	(-4.40 to 12.18)	(-2.05 to 10.31)	(-5.55 to 11.05)
Asian/British Asian			0.79*	-0.04	0.77*	-0.15
			(0.19 to 1.40)	(-1.02 to 0.93)	(0.15 to 1.40)	(-1.13 to 0.84)
Black			1.77*	4.41*	1.61*	4.90*
			(0.41 to 3.14)	(0.64 to 8.18)	(0.24 to 2.98)	(1.05 to 8.75)
Other			0.23	7.15	0.48	7.96
			(-3.97 to 4.43)	(-6.45 to 20.75)	(-3.76 to 4.72)	(-5.60 to 21.53)
% of population who are: age less than 18 (reference category)						
Age 18 to 19			-12.01	-4.43	-12.73	-2.79
			(-25.73 to 1.71)	(-19.80 to 10.94)	(-26.75 to 1.30)	(-18.61 to 13.02)
Age 20 to 24			0.91	-2.06	1.63	-0.99
			(-5.89 to 7.70)	(-9.95 to 5.83)	(-5.32 to 8.58)	(-9.08 to 7.09)
Age 25 to 29			-3.64	-2.70	-4.87	-5.73
			(-9.41 to 2.13)	(-11.20 to 5.80)	(-10.86 to 1.12)	(-14.79 to 3.34)
Age 30 to 44			-2.01	0.47	-1.05	3.32
			(-6.38 to 2.37)	(-4.93 to 5.87)	(-6.17 to 4.07)	(-3.03 to 9.67)
Age 45 to 59			1.35	0.89	1.96	2.24
			(-3.84 to 6.53)	(-5.28 to 7.07)	(-3.62 to 7.54)	(-4.30 to 8.79)
Age 60 to 64			-22.82***	-19.90**	-24.25***	-20.28**
			(-35.39 to -10.24)	(-33.23 to -6.58)	(-37.09 to -11.42)	(-33.88 to -6.68)
Age 65 to 74			7.17	8.93	7.37	8.80
			(-1.54 to 15.87)	(-0.44 to 18.30)	(-1.35 to 16.10)	(-0.53 to 18.14)
Age 75 to 84			-2.45	-4.30	-2.08	-2.95
			(-14.48 to 9.57)	(-17.25 to 8.65)	(-14.16 to 10.00)	(-15.87 to 9.96)
Age 85 to 89			-20.04	-12.95	-22.46	-14.67
			(-57.37 to 17.29)	(-52.55 to 26.65)	(-59.79 to 14.87)	(-53.99 to 24.65)
Age 90 and over			-15.76	-19.45	-9.67	-10.77
			(-57.43 to 25.91)	(-64.28 to 25.38)	(-52.19 to 32.86)	(-56.07 to 34.54)
IMD Quintile IMD = 1 (Least deprived) (reference category)						
IMD = 2					10.29*	10.26*
					(0.99 to 19.59)	(0.30 to 20.22)
IMD = 3					6.40	7.73
					(-3.55 to 16.36)	(-3.13 to 18.60)
IMD = 4					4.75	6.74
					(-6.26 to 15.76)	(-5.62 to 19.11)
IMD = 5 (Most deprived)					10.11	18.00*
					(-2.99 to 23.20)	(3.48 to 32.52)
Constant	85.92***	76.88***	265.10*	184.09	237.42	92.81
	(81.02 to 90.81)	(72.43 to 81.33)	(54.81 to 475.40)	(-101.37 to 469.55)	(-6.14 to 480.99)	(-225.99 to 411.62)
N	311	279	306	274	306	274

95% confidence intervals in brackets. * p<0.05, ** p<0.01, *** p<0.001

Table A2.5: The increased all-cause mortality rate in the Northern Powerhouse; March to July 2020

	(1)	(2)	(3)	(4)	(5)	(6)
	RoE inc. London	RoE exc. London	RoE inc. London	RoE exc. London	RoE inc. London	RoE exc. London
Northern Powerhouse	57.74***	63.16***	46.92***	45.77***	29.41***	30.47***
	(41.25 to 74.24)	(46.81 to 79.52)	(32.57 to 61.28)	(30.43 to 61.11)	(15.96 to 42.87)	(16.81 to 44.13)
% of population whose ethnicity is:						
White (reference category)						
Mixed/multiple			5.93	0.79	2.52	-3.06
			(-5.68 to 17.55)	(-14.67 to 16.24)	(-7.85 to 12.90)	(-16.56 to 10.44)
Asian/British Asian			-0.18	0.19	0.81	0.57
			(-1.31 to 0.95)	(-1.63 to 2.01)	(-0.24 to 1.86)	(-1.04 to 2.17)
Black			0.77	5.39	-0.01	7.93*
			(-1.80 to 3.34)	(-1.64 to 12.42)	(-2.30 to 2.29)	(1.67 to 14.20)
Other			-9.32*	0.55	-12.09***	0.89
			(-17.22 to -1.42)	(-24.82 to 25.91)	(-19.21 to -4.97)	(-21.16 to 22.95)
% of population who are:						
age less than 18 (reference category)						
Age 18 to 19			-28.53*	-21.83	-19.93	-7.33
			(-54.34 to -2.73)	(-50.49 to 6.83)	(-43.46 to 3.61)	(-33.05 to 18.38)
Age 20 to 24			-4.52	-5.17	4.89	6.66
			(-17.30 to 8.26)	(-19.88 to 9.55)	(-6.77 to 16.56)	(-6.49 to 19.81)
Age 25 to 29			-0.96	11.69	-11.26*	-9.33
			(-11.81 to 9.90)	(-4.16 to 27.54)	(-21.31 to -1.21)	(-24.07 to 5.41)
Age 30 to 44			-22.90***	-17.17***	-3.53	7.90
			(-31.13 to -14.67)	(-27.25 to -7.09)	(-12.13 to 5.08)	(-2.43 to 18.22)
Age 45 to 59			-11.03*	-4.73	3.78	11.26*
			(-20.78 to -1.27)	(-16.24 to 6.78)	(-5.60 to 13.15)	(0.62 to 21.91)
Age 60 to 64			-45.46***	-38.27**	-47.00***	-38.26***
			(-69.11 to -21.81)	(-63.12 to -13.41)	(-68.55 to -25.46)	(-60.38 to -16.15)
Age 65 to 74			7.03	13.67	9.87	16.70*
			(-9.34 to 23.40)	(-3.81 to 31.15)	(-4.77 to 24.52)	(1.53 to 31.88)
Age 75 to 84			-12.35	-10.64	-3.75	-1.82
			(-34.96 to 10.27)	(-34.79 to 13.51)	(-24.02 to 16.53)	(-22.82 to 19.17)
Age 85 to 89			-13.27	-16.77	-19.79	-17.67
			(-83.48 to 56.95)	(-90.61 to 57.08)	(-82.45 to 42.87)	(-81.61 to 46.26)
Age 90 and over			-109.30**	-93.50*	-45.21	-27.19
			(-187.68 to -30.93)	(-177.11 to -9.89)	(-116.59 to 26.17)	(-100.85 to 46.48)
IMD Quintile						
IMD = 1 (Least deprived) (reference category)						
IMD = 2					36.11***	35.25***
					(20.50 to 51.72)	(19.06 to 51.44)
IMD = 3					46.50***	48.96***
					(29.79 to 63.21)	(31.30 to 66.63)
IMD = 4					64.65***	69.63***
					(46.16 to 83.13)	(49.53 to 89.73)
IMD = 5 (Most deprived)					99.85***	114.43***
					(77.86 to 121.84)	(90.82 to 138.03)
Constant	433.98***	428.56***	1623.88***	1165.48***	773.29***	182.57
	(426.04 to 441.92)	(420.25 to 436.87)	(1228.30 to 2019.46)	(633.10 to 1697.87)	(364.44 to 1182.14)	(-335.76 to 700.91)
N	311	279	306	274	306	274

95% confidence intervals in brackets. * p<0.05, ** p<0.01, *** p<0.001

Table A2.6: The additional increase in the claimant count in the Northern Powerhouse; March to April 2020

	(1)	(2)	(3)	(4)	(5)	(6)
	RoE inc. London	RoE exc. London	RoE inc. London	RoE exc. London	RoE inc. London	RoE exc. London
Northern Powerhouse	0.45***	0.45***	0.37***	0.33***	0.21***	0.21***
	(0.33 to 0.57)	(0.33 to 0.57)	(0.25 to 0.50)	(0.20 to 0.46)	(0.10 to 0.32)	(0.10 to 0.32)
% of population whose ethnicity is:						
White (reference category)						
Mixed/multiple			0.03	0.02	0.00	0.01
			(-0.07 to 0.13)	(-0.11 to 0.15)	(-0.08 to 0.09)	(-0.10 to 0.12)
Asian/British Asian			-0.02**	-0.02**	-0.00	-0.02*
			(-0.03 to -0.01)	(-0.04 to -0.01)	(-0.01 to 0.00)	(-0.03 to -0.00)
Black			0.01	-0.03	0.01	-0.02
			(-0.01 to 0.03)	(-0.09 to 0.03)	(-0.01 to 0.02)	(-0.07 to 0.03)
Other			0.03	0.16	-0.00	0.17
			(-0.03 to 0.10)	(-0.05 to 0.38)	(-0.06 to 0.05)	(-0.01 to 0.36)
% of population who are:						
age less than 18 (reference category)						
Age 18 to 19			-0.15	-0.15	-0.08	-0.07
			(-0.38 to 0.07)	(-0.39 to 0.10)	(-0.28 to 0.11)	(-0.29 to 0.14)
Age 20 to 24			-0.16**	-0.22***	-0.05	-0.09
			(-0.27 to -0.05)	(-0.34 to -0.09)	(-0.15 to 0.04)	(-0.20 to 0.02)
Age 25 to 29			0.14**	0.23***	0.03	0.02
			(0.05 to 0.23)	(0.10 to 0.36)	(-0.05 to 0.11)	(-0.11 to 0.14)
Age 30 to 44			-0.29***	-0.34***	-0.09*	-0.12**
			(-0.36 to -0.22)	(-0.42 to -0.25)	(-0.16 to -0.02)	(-0.21 to -0.03)
Age 45 to 59			-0.16***	-0.18***	-0.00	-0.03
			(-0.25 to -0.08)	(-0.28 to -0.08)	(-0.08 to 0.07)	(-0.12 to 0.06)
Age 60 to 64			-0.01	-0.02	-0.04	-0.05
			(-0.22 to 0.19)	(-0.23 to 0.20)	(-0.22 to 0.14)	(-0.24 to 0.13)
Age 65 to 74			-0.10	-0.11	-0.06	-0.07
			(-0.24 to 0.04)	(-0.26 to 0.04)	(-0.18 to 0.06)	(-0.20 to 0.05)
Age 75 to 84			-0.13	-0.15	-0.05	-0.09
			(-0.32 to 0.07)	(-0.35 to 0.06)	(-0.21 to 0.12)	(-0.26 to 0.09)
Age 85 to 89			0.46	0.45	0.40	0.44
			(-0.15 to 1.07)	(-0.17 to 1.08)	(-0.11 to 0.91)	(-0.09 to 0.97)
Age 90 and over			-0.70*	-0.73*	-0.01	-0.11
			(-1.38 to -0.02)	(-1.44 to -0.02)	(-0.60 to 0.57)	(-0.72 to 0.50)
IMD Quintile						
IMD = 1 (Least deprived) (reference category)						
IMD = 2					0.30***	0.32***
					(0.17 to 0.43)	(0.18 to 0.45)
IMD = 3					0.54***	0.55***
					(0.40 to 0.67)	(0.40 to 0.70)
IMD = 4					0.73***	0.74***
					(0.57 to 0.88)	(0.58 to 0.91)
IMD = 5 (Most deprived)					0.97***	0.98***
					(0.79 to 1.15)	(0.78 to 1.18)
Constant	1.85***	1.85***	12.97***	14.41***	4.06*	5.91**
	(1.79 to 1.91)	(1.79 to 1.91)	(9.53 to 16.40)	(9.89 to 18.93)	(0.70 to 7.41)	(1.61 to 10.21)
N	311	279	306	274	306	274

95% confidence intervals in brackets. * p<0.05, ** p<0.01, *** p<0.001

Appendix for chapter 3

Table A3.1: The relationship between mental health and Gross Value Added (GVA) per-head at local authority level within the Northern Powerhouse; 2011 – 2018

	GVA per-head (2018£)
SAMHI	-1491.839*** (-2298.310 to -685.368)
Population size (number of people)	-0.018 (-0.038 to 0.002)
% of population (aged 16+) with no qualifications	-12.785 (-64.648 to 39.078)
% of population (aged 16+) who are aged 16-64	-15.881 (-85.487 to 53.725)
% of population (aged 16+) who are white UK nationals	21.129 (-33.143 to 75.401)
Year effects (base=2011)	
2012	370.746* (28.230 to 713.263)
2013	637.368** (254.928 to 1019.808)
2014	1150.600*** (671.811 to 1629.389)
2015	1901.077*** (1353.403 to 2448.752)
2016	2160.251*** (1524.909 to 2795.593)
2017	2602.668*** (1893.408 to 3311.927)
2018	3069.439*** (2227.608 to 3911.270)
N	72
Observations (N*T)	569

Model is a fixed-effects linear model to account for within LAD variation. The model is additionally weighted by the population size of a LAD.
SAMHI = small-area mental health index, which is standardised to have mean zero and unitary standard deviation. It is increasing in poor mental health (higher scores relate to worse mental health outcomes). GVA is deflated to 2018 prices.
95% Confidence Intervals in brackets. * p<0.05; ** p<0.01; *** p<0.001.

Appendix for chapter 4

Table A4.1: The relationship between Core Spending Power per-head and Gross Value Added (GVA) per-head at local authority level within the Northern Powerhouse; 2011 – 2018

	(1)	(2)
	GVA per-head (2018£)	
Core spending power (CSP) per-head (2018£)	3.169* (0.315 to 6.024)	
log(CSP, 2018£ per-head)		5019.550* (1058.376 to 8980.725)
Population size (number of people)	0.003 (-0.018 to 0.024)	0.009 (-0.014 to 0.031)
% of population (aged 16+) with no qualifications	-19.567 (-72.006 to 32.873)	-17.708 (-69.961 to 34.545)
% of population (aged 16+) who are aged 16-64	-18.137 (-88.369 to 52.094)	-13.918 (-84.274 to 56.439)
% of population (aged 16+) who are white UK nationals	14.038 (-40.847 to 68.923)	9.932 (-45.149 to 65.013)
Year effects (base=2011)		
2012	314.884 (-45.311 to 675.078)	408.341* (21.122 to 795.560)
2013	613.638** (171.367 to 1055.910)	791.324** (275.460 to 1307.188)
2014	1082.468*** (495.172 to 1669.764)	1394.971*** (650.027 to 2139.916)
2015	1922.735*** (1156.351 to 2689.119)	2418.388*** (1374.424 to 3462.351)
2016	2150.694*** (1271.257 to 3030.131)	2770.304*** (1533.352 to 4007.257)
2017	2458.105*** (1561.987 to 3354.224)	3087.617*** (1830.926 to 4344.307)
2018	2653.405*** (1746.062 to 3560.749)	3278.619*** (2019.022 to 4538.216)
N	72	72
Observations (N*T)	569	569

Model is a fixed-effects linear model to account for within LAD variation. The model is additionally weighted by the population size of a LAD.
All financial measures are deflated to 2018 prices, using the GDP deflator.
95% Confidence Intervals in brackets. * p<0.05; ** p<0.01; *** p<0.001.

Appendix for chapter 5

Other indicators showing significant N/S Divide in child health:

Areas: All in England | Display: Table | Table and chart

Infant mortality rate 2016 - 18

Crude rate - per 1000

Export table as image | Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	7,608	3.9	3.8	4.0
West Midlands region	–	1,206	5.8	5.5	6.1
North West region	–	1,161	4.6	4.4	4.9
East Midlands region	–	628	4.0	3.7	4.4
Yorkshire and the Humber region	–	750	4.0	3.8	4.3
South East region	–	1,086	3.6	3.4	3.9
East of England region	–	711	3.4	3.1	3.6
North East region	–	277	3.3	3.0	3.8
London region	–	1,240	3.3	3.1	3.5
South West region	–	549	3.3	3.0	3.6

Source: Office for National Statistics (ONS)

Admissions for diabetes for young people aged 10 to 18 2018/19

Crude rate - per 100,000

Export table as image | Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	4,594	80.4	78.1	82.8
North East region	→	245	94.6	83.9	108.0
Yorkshire and the Humber region	→	520	92.5	84.7	100.8
South West region	→	485	89.3	81.4	97.4
North West region	→	660	88.4	81.9	95.5
East of England region	→	550	86.4	79.0	93.6
East Midlands region	→	400	82.5	74.4	90.8
West Midlands region	↓	455	72.8	66.3	79.8
London region	→	635	70.5	65.2	76.3
South East region	↓	640	67.0*	61.7	72.2

Source: Hospital Episode Statistics (HES). Copyright © 2020, Re-used with the permission of NHS Digital. All rights reserved.

Children in care 2019

Crude rate - per 10,000

Export table as image | Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↑	78,150	65	65	66
North East region	↑	5,350	101	98	104
North West region	↑	14,660	94	93	96
West Midlands region	↑	10,560	82	80	83
Yorkshire and the Humber region	↑	8,580	74	72	75
East Midlands region	↑	5,820	58	57	60
South West region	↑	6,140	56	54	57
South East region	↑	10,280	53	52	54
London region	↓	10,030	50	49	51
East of England region	→	6,740	50	49	52

Source: Children looked after in England, Department for Education.

Child mortality rate (1-17 years) 2016 - 18

Directly standardised rate - per 100,000

Export table as image | Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	3,671	11.0	10.6	11.3
North West region	–	578	13.3	12.2	14.5
North East region	–	187	12.6	10.8	14.5
West Midlands region	–	456	12.5	11.4	13.7
Yorkshire and the Humber region	–	389	11.9	10.7	13.1
London region	–	605	10.8	9.9	11.7
East Midlands region	–	300	10.8	9.6	12.0
East of England region	–	381	10.3	9.3	11.4
South West region	–	285	9.2	8.2	10.3
South East region	–	490	8.9	8.1	9.7

Source: Office for National Statistics (ONS)

Low birth weight of term babies 2018

Proportion - %

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	→	16,224	2.86	2.82	2.91
West Midlands region	→	2,017	3.31	3.17	3.46
North East region	→	787	3.26	3.04	3.49
Yorkshire and the Humber region	→	1,711	3.14	3.00	3.29
London region	→	3,382	3.07	2.97	3.18
North West region	→	2,125	2.91	2.79	3.04
East Midlands region	→	1,219	2.70	2.55	2.85
East of England region	→	1,651	2.65	2.53	2.78
South West region	→	1,241	2.52	2.38	2.66
South East region	→	2,091	2.40	2.30	2.50

Source: Office for National Statistics

Under 16s conception rate / 1,000 2018

Crude rate - per 1000

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	2,266	2.5	2.4	2.6
North East region	↓	185	4.6	3.9	5.3
North West region	↓	390	3.3	3.0	3.6
Yorkshire and the Humber region	↓	284	3.2	2.8	3.6
West Midlands region	↓	275	2.8	2.4	3.1
East Midlands region	↓	189	2.5	2.1	2.8
South West region	↓	184	2.1	1.8	2.5
East of England region	↓	206	2.0	1.8	2.3
South East region	↓	289	1.9	1.7	2.1
London region	↓	264	1.9	1.6	2.1

Source: Office for National Statistics (ONS)

Under 18s conception rate / 1,000 2018

Crude rate - per 1000

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	14,736	16.7	16.4	17.0
North East region	↓	986	24.9	23.4	26.5
North West region	↓	2,500	21.7	20.9	22.6
Yorkshire and the Humber region	↓	1,698	19.6	18.6	20.5
West Midlands region	↓	1,843	19.1	18.2	20.0
East Midlands region	↓	1,260	16.8	15.9	17.7
East of England region	↓	1,417	14.4	13.7	15.2
London region	↓	1,915	13.9	13.3	14.6
South East region	↓	1,990	13.5	12.9	14.1
South West region	↓	1,127	13.3	12.5	14.1

Source: Office for National Statistics (ONS)

Teenage mothers 2018/19

Proportion - %

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	3,734	0.6	0.6	0.7
North East region	↓	300	1.2	1.1	1.3
Yorkshire and the Humber region	↓	545	1.0	0.9	1.1
West Midlands region	↓	510	0.8	0.7	0.9
East Midlands region	↓	360	0.8	0.7	0.9
North West region	↓	605	0.8	0.7	0.9
East of England region	↓	340	0.5	0.5	0.6
South West region	↓	270	0.5	0.5	0.6
South East region	→	440	0.5	0.5	0.5
London region	↓	360	0.3	0.3	0.4

Source: Hospital Episode Statistics (HES) Copyright © 2020, Re-used with the permission of NHS Digital. All rights reserved.

Baby's first feed breastmilk 2018/19

Proportion - %

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	371,730	67.4	67.2	67.5
London region	–	73,210	76.3	75.8	76.9
South West region	–	37,030	75.3	74.5	76.0
South East region	–	60,105	72.7	72.1	73.3
East of England region	–	42,225	70.0	69.3	70.7
East Midlands region	–	28,470	64.7	63.9	65.4
West Midlands region	–	38,760	62.5	61.9	63.1
North West region	–	47,255	62.4	61.8	62.9
Yorkshire and the Humber region	–	31,590	56.4	55.8	57.0
North East region	–	13,080	50.6	49.8	51.5

Source: Maternity Services Dataset (MSDS)

Smoking status at time of delivery 2018/19

Proportion - %

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	61,399	10.6	10.5	10.7
North East region	↓	4,030	15.7*	15.3	16.2
Yorkshire and the Humber region	↓	8,163	14.4*	14.1	14.7
East Midlands region	→	6,403	14.0*	13.7	14.3
North West region	↓	9,951	12.7*	12.5	13.0
West Midlands region	→	7,287	11.9*	11.6	12.1
South West region	↓	5,563	10.9*	10.6	11.2
South East region	↓	8,744	9.7*	9.5	9.9
East of England region	↓	5,996	9.7*	9.4	9.9
London region	→	5,262	4.8*	4.7	4.9

Source: Calculated by PHE from the NHS Digital return on Smoking Status At Time of delivery (SATOD)

School-age children

Free school meals: % uptake among all pupils 2018

Proportion - %

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	1,099,810	13.5	13.5	13.5
North East region	↓	71,734	18.4	18.3	18.5
North West region	↓	176,015	16.0	16.0	16.1
West Midlands region	↓	145,412	15.9	15.9	16.0
London region	↓	200,860	15.6	15.5	15.7
Yorkshire and the Humber region	↓	127,876	15.5	15.4	15.5
East Midlands region	↓	84,826	12.2	12.1	12.2
South West region	↓	82,254	11.0	11.0	11.1
East of England region	↓	91,533	10.1	10.0	10.1
South East region	↓	119,300	9.4	9.4	9.5

Source: Department for Education School Census

Reception: Prevalence of overweight (including obesity) 2018/19

Proportion - %

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↑	135,020	22.6	22.5	22.7
North West region	↑	19,891	24.4	24.1	24.7
North East region	→	6,819	24.3	23.8	24.8
West Midlands region	→	16,038	23.8	23.4	24.1
Yorkshire and the Humber region	↑	14,164	23.7	23.3	24.0
East Midlands region	↑	11,491	22.7	22.3	23.0
South West region	→	11,884	22.0	21.7	22.4
London region	→	20,196	21.8	21.5	22.0
South East region	↑	19,946	21.2	20.9	21.5
East of England region	→	14,400	21.0	20.7	21.3

Source: NHS Digital, National Child Measurement Programme

Reception: Prevalence of obesity (including severe obesity) 2018/19

Proportion - %

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↑	57,869	9.7	9.6	9.8
North East region	↑	3,037	10.8	10.5	11.2
West Midlands region	→	7,161	10.6	10.4	10.8
North West region	↑	8,625	10.6	10.4	10.8
Yorkshire and the Humber region	↑	6,111	10.2	10.0	10.5
London region	→	9,431	10.2	10.0	10.4
East Midlands region	↑	4,720	9.3	9.1	9.6
South West region	→	4,713	8.7	8.5	9.0
East of England region	↑	5,955	8.7	8.5	8.9
South East region	↑	8,030	8.5	8.4	8.7

Source: NHS Digital, National Child Measurement Programme

Persistent absentees - Secondary school 2017/18

Percentage point - %

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	409,890	13.9	13.9	13.9
Yorkshire and the Humber region	–	47,200	15.6	15.4	15.7
North East region	–	22,380	15.4	15.2	15.6
South West region	–	41,950	14.9	14.7	15.0
North West region	–	56,855	14.4	14.2	14.5
West Midlands region	–	46,700	14.0	13.8	14.1
South East region	–	63,470	13.9	13.8	14.0
East Midlands region	–	34,590	13.6	13.5	13.7
East of England region	–	43,730	13.1	13.0	13.2
London region	–	53,020	12.0	11.9	12.1

Source: Department for Education (DfE)

Children killed and seriously injured (KSI) on England's roads 2016 - 18

Crude rate - per 100,000

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	5,665	17.7	17.3	18.2
Yorkshire and the Humber region	–	871	28.0	26.2	29.9
North West region	–	932	22.5	21.1	24.0
North East region	–	305	21.6	19.2	24.1
West Midlands region	–	654	19.0	17.6	20.5
East of England region	–	611	17.2	15.8	18.6
South East region	–	881	16.9	15.8	18.0
East Midlands region	–	406	15.3	13.9	16.9
South West region	–	352	12.0	10.8	13.3
London region	–	653	12.0	11.1	13.0

Source: Department for Transport (DfT), Road accidents and safety statistics.

Hospital admissions caused by unintentional and deliberate injuries in children (aged 0-14 years) 2018/19

Crude rate - per 10,000

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	97,479	96.1	95.5	96.7
North West region	↓	17,050	129.5	127.6	131.5
North East region	↓	5,710	127.5	124.2	130.9
West Midlands region	↓	11,910	108.8	106.9	110.8
Yorkshire and the Humber region	↓	10,185	103.2	101.2	105.2
South West region	↓	9,495	102.2	100.2	104.3
South East region	↓	14,485	87.6*	86.1	89.0
East of England region	↓	9,590	84.6	82.9	86.3
East Midlands region	↓	6,720	79.8	77.8	81.7
London region	↓	12,270	70.5	69.3	71.8

Source: Hospital Episode Statistics (HES), NHS Digital for the respective financial year, England. Hospital Episode Statistics (HES) Copyright © 2020, Re-used with the permission of NHS Digital. All rights reserved. Local Authority estimates of resident population, Office for National Statistics (ONS)

Young adults

Admission episodes for alcohol-specific conditions - Under 18s 2016/17 - 18/19

Crude rate - per 100,000

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	11,233	31.6	31.0	32.1
North East region	–	950	60.0	56.3	64.0
North West region	–	2,125	45.9	44.0	47.9
South West region	–	1,450	44.1	41.8	46.4
Yorkshire and the Humber region	–	1,120	32.2	30.4	34.2
South East region	–	1,850	31.7*	30.3	33.2
East Midlands region	–	780	26.3*	24.5	28.2
West Midlands region	–	1,005	26.1	24.5	27.8
East of England region	–	930	23.4	21.9	25.0
London region	–	990	16.5	15.5	17.5

Source: Calculated by Public Health England: Population Health Analysis (PHA) team using data from NHS Digital - Hospital Episode Statistics (HES) and Office for National Statistics (ONS) - Mid Year Population Estimates.

Hospital admissions for asthma (under 19 years) 2018/19

Crude rate - per 100,000

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Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	↓	22,449	178.4	176.1	180.7
North West region	↓	4,200	256.8	249.1	264.7
North East region	→	1,375	245.8	233.0	259.2
West Midlands region	↓	3,005	220.6	212.9	228.7
London region	↓	4,180	197.5	191.4	203.4
Yorkshire and the Humber region	↓	1,985	161.6	154.8	169.1
South West region	↓	1,705	146.4	139.7	153.7
East of England region	↓	1,970	140.3	134.1	146.5
South East region	↓	2,735	132.6*	127.7	137.7
East Midlands region	↓	1,285	122.2	115.8	129.3

Source: Hospital Episode Statistics (HES). Copyright © 2020, Re-used with the permission of NHS Digital. All rights reserved.

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