



Public Health
England

Protecting and improving the nation's health

COVID-19 Infection Rates in Barrow-in-Furness: A Comparative Analysis of Testing, Adjusting for Deprivation, Age and Gender

26 June 2020

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-leading science, research, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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Executive summary

Barrow-in-Furness has a population of 67,137, and is in the most deprived 10% of local authorities in England, with an older population than the England average.

The crude COVID-19 diagnosis rate in Barrow between 1 March and 31 May 2020 was 865.4 per 100,000. Over the same period, the crude COVID-19 diagnosis rate across the North West was 512.5 per 100,000. After adjusting for age and level of deprivation, the diagnosis rate of COVID-19 in Barrow between 1 March and 31 May 2020 was 847.5 per 100,000. For the North West it was 504.9 per 100,000.

Diagnosis rates in females (1231.1 per 100,000 females) were 2.75x higher than in males (448.1 per 100,000 males). Such a difference was not observed to this extent elsewhere in the North West.

The diagnosis rate of COVID-19 in working age people (20-64 years) in Barrow is more than double that in the same age-group across the North West, at 1182.5 and 516.2 per 100,000 respectively, and 3.4x higher in working age females (1793.5 per 100,000 females) than in working age males (531.7 per 100,000 males). The diagnosis rates of COVID-19 in children and young adults were similar to that observed across the North West. In the older age groups, the diagnosis rates of COVID-19 were significantly lower than that observed across the North West.

Testing levels and systems have a significant influence on the number of confirmed cases. University Hospitals of Morecambe Bay NHS Foundation Trust implemented testing for a wider group earlier than most of England. The overwhelming majority of tests performed in Barrow went via the Pillar 1 route. In much of England, a greater number of tests and the majority of healthcare staff testing went via Pillar 2. For this reason, drawing comparisons between Barrow and other areas in the country has been difficult, until the recent publication of Pillar 2 data.

Between 01 March and 31 May 2020, 43.7% of all positive results in Barrow were from University Hospitals of Morecambe Bay employees, and 55.1% of all females diagnosed with COVID-19 in Barrow worked for the Trust. Therefore the greater diagnosis rate in females is likely to be due to testing of health care workers at the local NHS trust, where 81% of the employees are female.

In summary, the rates of COVID-19 diagnoses remained significantly higher in Barrow than across the North West, despite accounting for age and deprivation in the analysis. This can be attributed to key differences in testing capacity and approaches, with much of the disparity in rates observed between Barrow and elsewhere due to the local proactive testing pathway for a largely female cohort of key workers.

Introduction

The crude COVID-19 diagnosis rate in Barrow between 1 March and 31 May 2020 was 865.4 per 100,000. Over the same period, the crude COVID-19 diagnosis rate across the North West was 512.5 per 100,000. This disparity has caused significant concern within the local community – this report has been commissioned to try and better understand the reasons for the variation, comparing rates of testing and variation by deprivation, age and sex.

Of 317 local authorities in England, Barrow-in-Furness is the 31st most deprived by average deprivation score, and ranks 13th most deprived in the North West.¹ Furthermore, the population of Barrow older than the England average – the median age in Barrow is 45 years, whereas in England it is 40.²

Diagnosis rates of COVID-19 are known to be higher in more deprived and older populations.³

This current analysis incorporates these two factors to investigate whether they contribute to the high rates observed in Barrow between 1 March and 31 May 2020. It has been undertaken following concerns raised from local leaders.

¹ MHCLG, 2019. English Indices of Deprivation 2019. File 10 Local Authority District Summaries (lower-tier): IMD - Rank of average score

² ONS, 2020. UK population pyramid interactive.

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/ukpopulationpyramidinteractive/2020-01-08>

³ PHE, 2020. Disparities in the risk and outcomes of COVID-19.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/892085/disparities_review.pdf

The approach to COVID-19 testing in Barrow-in-Furness

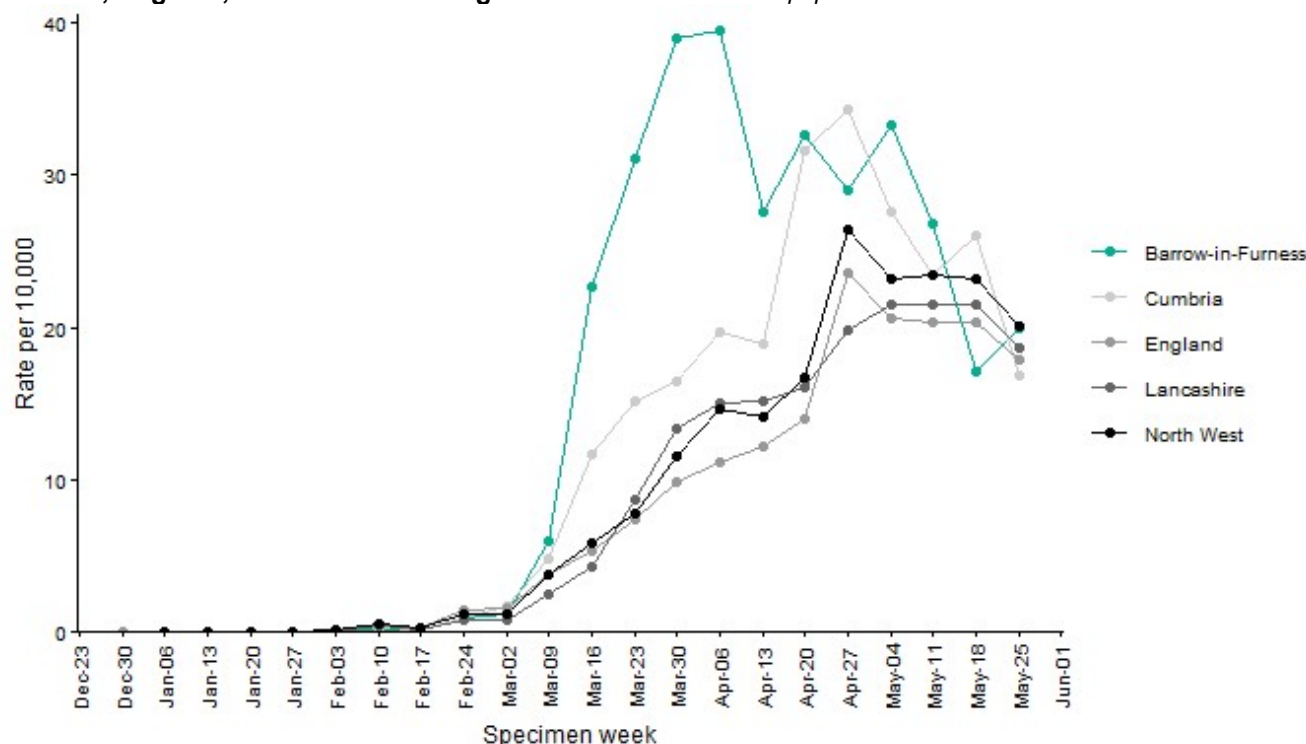
The testing approach at University Hospitals of Morecambe Bay (UHMB) NHS Foundation Trust, which manages Furness General Hospital (260 beds), the Royal Lancaster Infirmary (425 beds) and the Westmorland General in Kendal in South Lakeland (45 beds), was established in mid-March.

From the outset, the following groups in Barrow were all invited to be swabbed if they had COVID-19 symptoms, ahead of the wider roll-out to different groups nationally:

- University Hospitals of Morecambe Bay NHS Foundation Trust employees
- household members of the above;
- hospital inpatients;
- care home residents;
- care home staff;
- key workers from other organisations, and
- household members of the above.

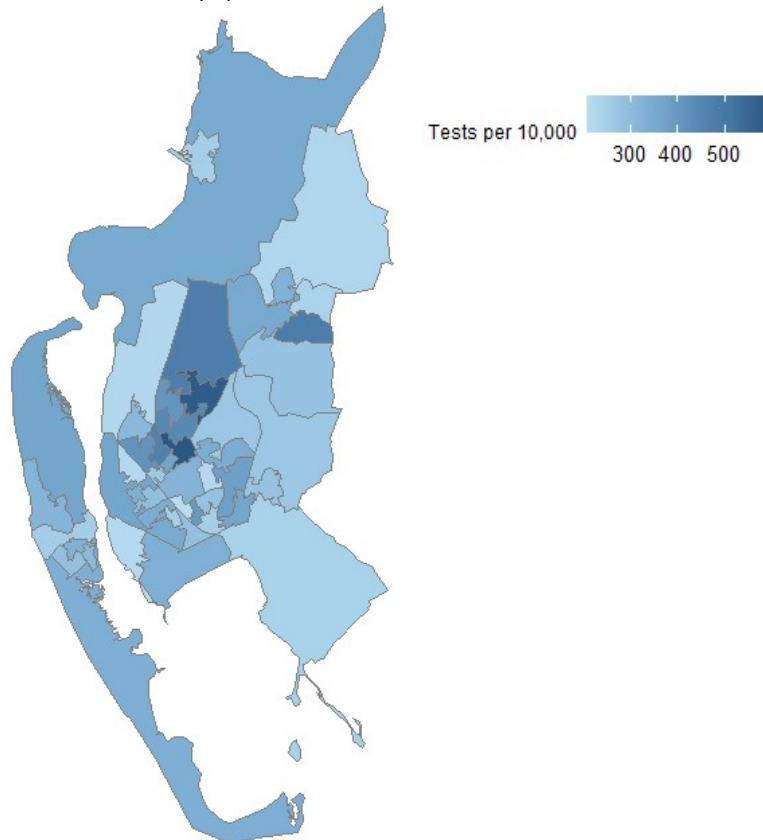
This is reflected by the fact that the testing rate in Barrow was 1.6x higher than in England from 1 March to 31 May 2020 (3886.1 and 2383.0 per 100,000 respectively). At the height of testing in Barrow at the end of March/early May, testing rates were 4x higher than in England. Within Barrow there was considerable variation in testing rates as the charts overleaf demonstrate, with the highest testing rates observed in the Hawcoat area.

Number of persons tested via Pillar 1 route per week per 10,000 population, in Barrow-in-Furness, Cumbria, England, and North West England *Note difference in the population denominator scale*



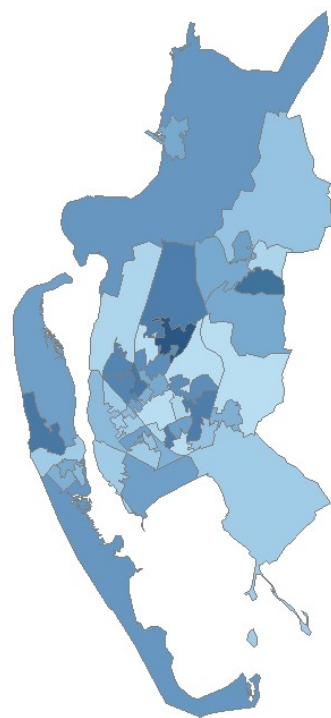
COVID-19 Infection Rates in Barrow-in-Furness: A Comparative Analysis of Testing, Adjusting for Deprivation, Age and Gender

Rate of persons who underwent Pillar 1 COVID-19 testing per 10,000 population by LSOA of residence in Barrow-in-Furness *Note difference in the population denominator scale*

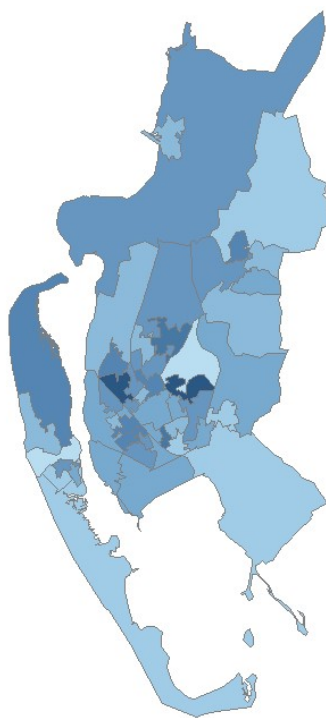


Counts of (1) Persons, (2), Males and (3) Females diagnosed with COVID-19 via the Pillar 1 route, by LSOA of residence in Barrow-in-Furness

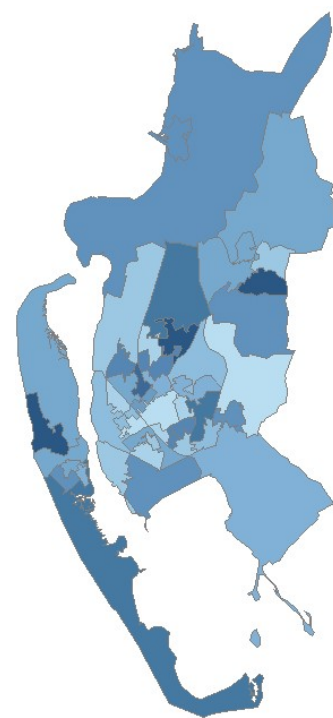
(1) Persons



(2) Males



(3) Females



COVID-19 Infection Rates in Barrow-in-Furness: A Comparative Analysis of Testing, Adjusting for Deprivation, Age and Gender

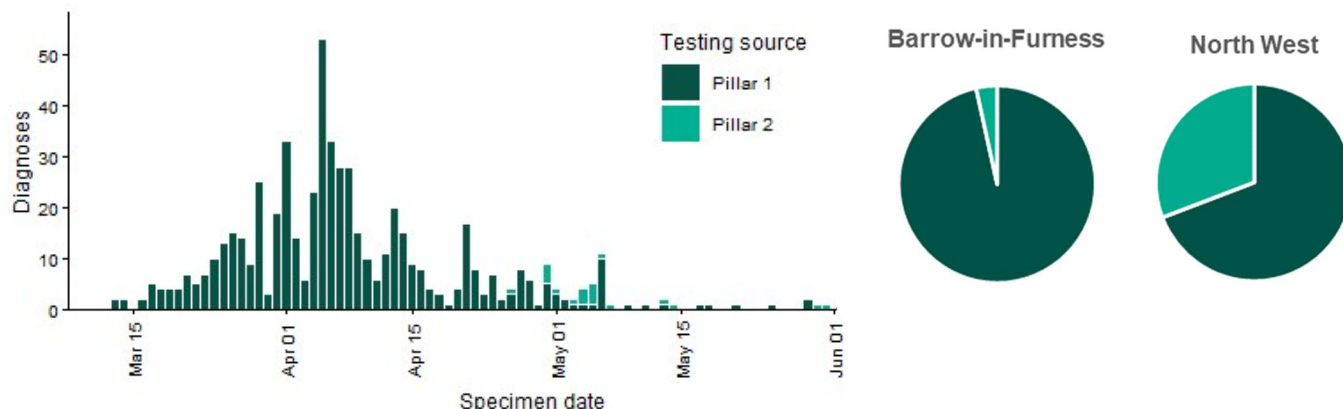
The screening approach taken in Barrow also appears to have been more sensitive - i.e. the 'right' people were being tested, indicated by the proportion of tests that were positive in Barrow being almost double that of England (25.6% and 15.2% respectively).

Pillar 1 testing data:

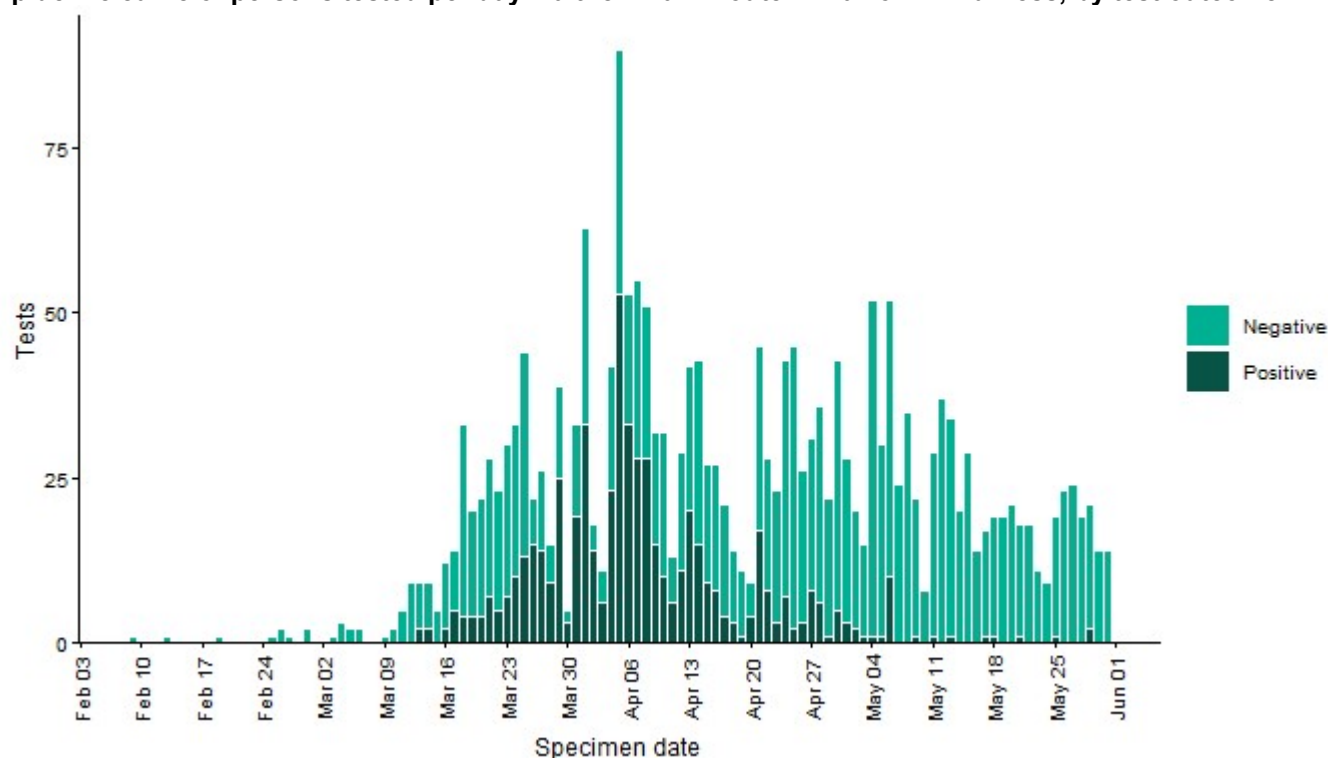
Area	Cases	Persons tested	Diagnoses per 100,000	Tests per 100,000	Positivity (%)
Cumbria	2217	12440	444.4	2493.5	17.8
- Allerdale	251	2095	257.4	2148.1	12.0
- Barrow-in-Furness	561	2196	835.6	3270.9	25.6
- Carlisle	492	2971	453.9	2741.1	16.6
- Copeland	281	1741	410.7	2544.4	16.1
- Eden	105	835	198.6	1579.0	12.6
- South Lakeland	527	2602	504.2	2489.2	20.3
Lancashire	3658	21772	302.3	1799.3	16.8
North West	25886	141312	355.0	1937.9	18.3
England	153395	1008192	259.5	1705.5	15.2

In Barrow, the overwhelming majority of COVID-19 tests performed have been through the Pillar 1 route. Indeed, only 3.4% of diagnoses were made through the Pillar 2, a tenth of that across the North West, where 30.8% of diagnoses were via Pillar 2 – as the pie charts below demonstrate.

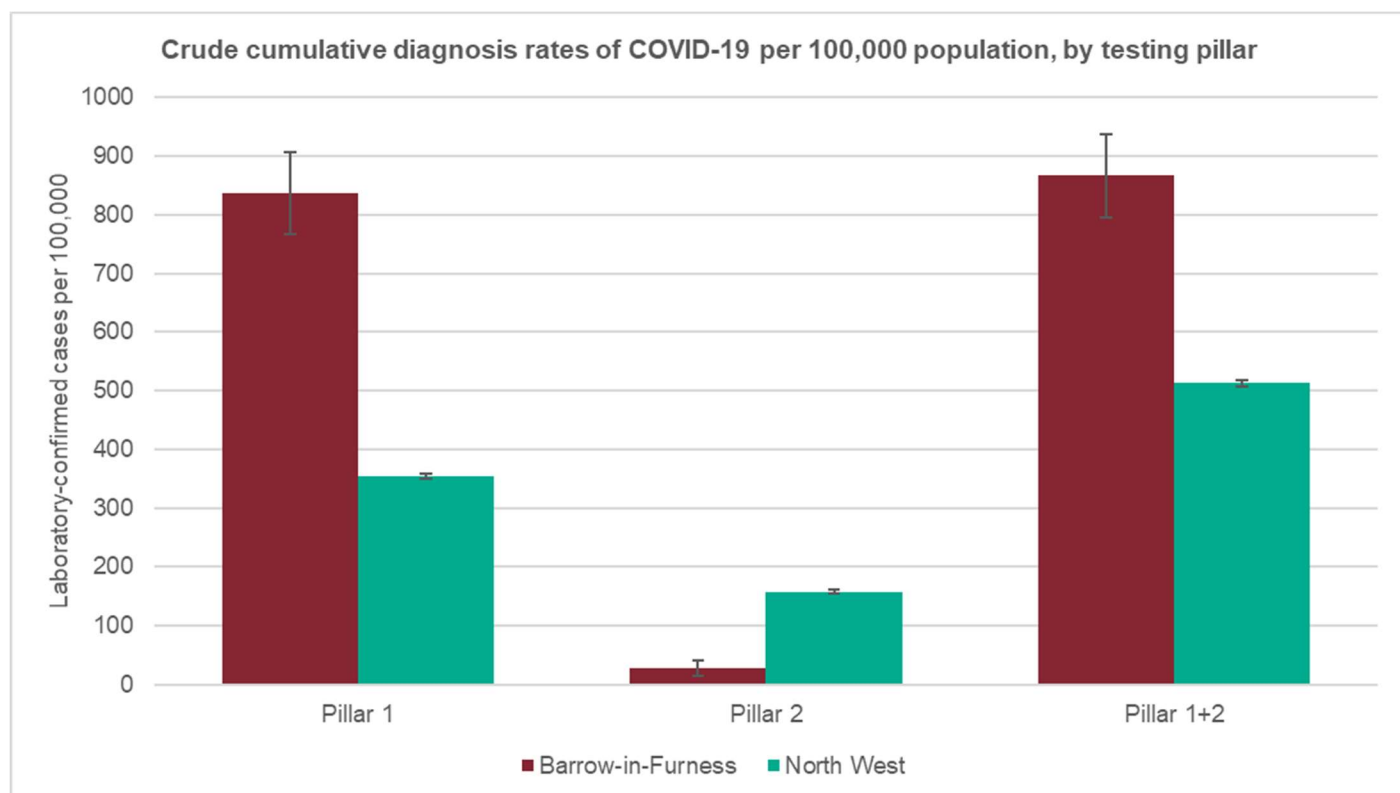
Epidemic curve of daily COVID-19 diagnoses over time in Barrow-in-Furness, and the proportion of Pillar 1 and Pillar 2 tests in Barrow-in-Furness and the North West



Epidemic curve of persons tested per day via the Pillar 1 route in Barrow-in-Furness, by test outcome



Due to issues with Pillar 2 testing data quality early in the outbreak, Pillar 2 data was not published until 22 June 2020. Before this date, comparing Pillar 1 data from Barrow with Pillar 1 data from elsewhere in England made Barrow appear to be an extreme outlier. Once Pillar 1 and Pillar 2 data are considered together however, the difference between Barrow and other localities becomes less stark, though still present. The remaining gap is likely mostly explained by differences in testing approaches, as the remaining analysis demonstrates.

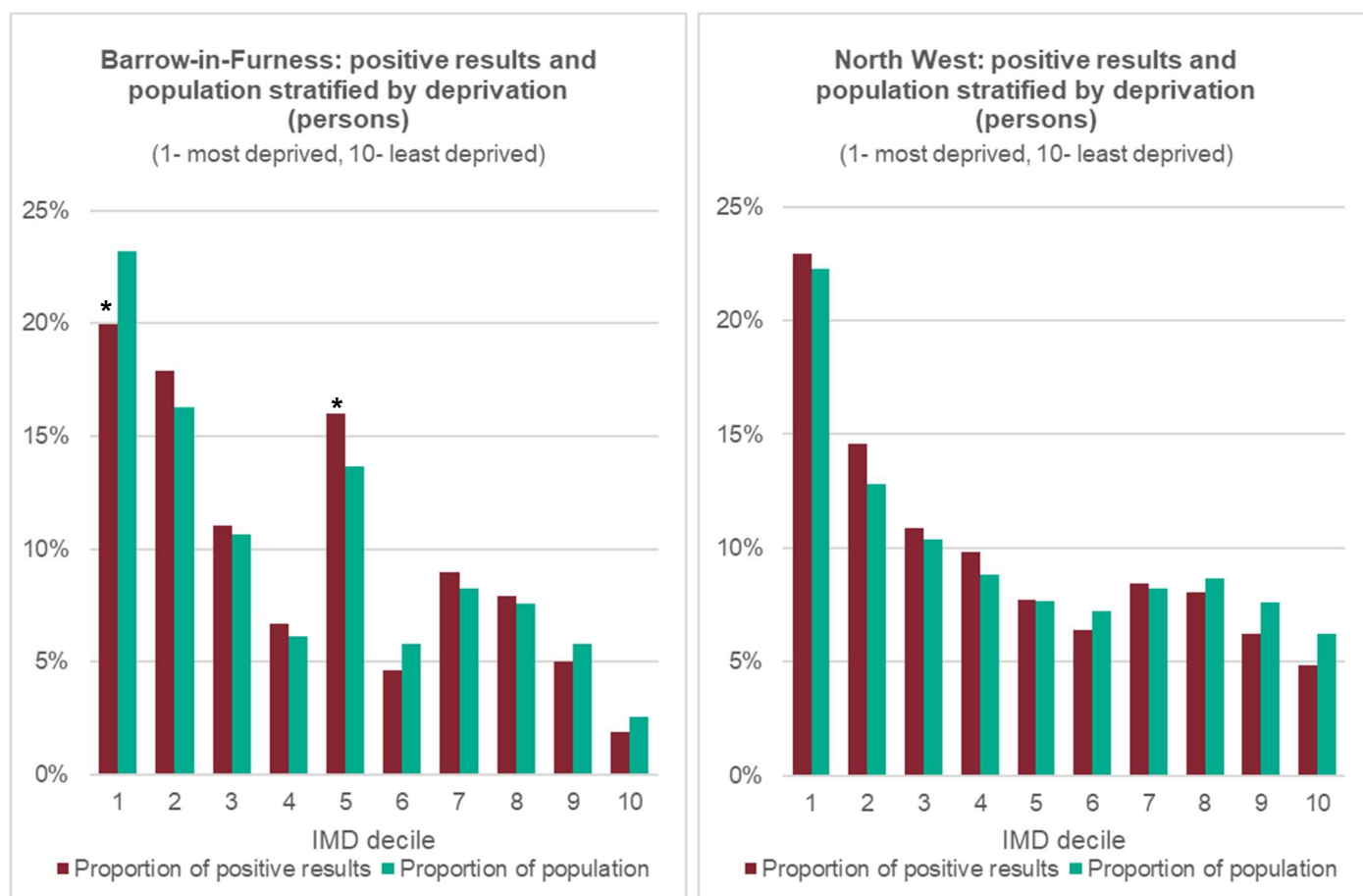


Positive COVID-19 results by deprivation decile

Just over half of Barrow's population (50.1%) live within the three most deprived deciles, compared with 45.4% of the population in the North West. However, only 48.9% of positive results came from these same three most deprived deciles in Barrow, compared with relatively more (48.5%) across the North West region.

This is visualised in the following charts, which display positive test results for COVID-19 across the Index of Multiple Deprivation (IMD) deciles, alongside the proportion of the population within each decile for Barrow and the North West. The most marked differences between Barrow and the North West, and highlighted with asterisks in the chart below, can be seen in:

1. the 1st decile (most deprived): the proportion of positive results were relatively lower compared to population size in this decile in Barrow (-3.2%), whereas in the North West they were roughly similar;
2. the 5th decile: the proportion of positive results were relatively higher than population size in this decile in Barrow (+2.3%); again in the North West, they were roughly similar.



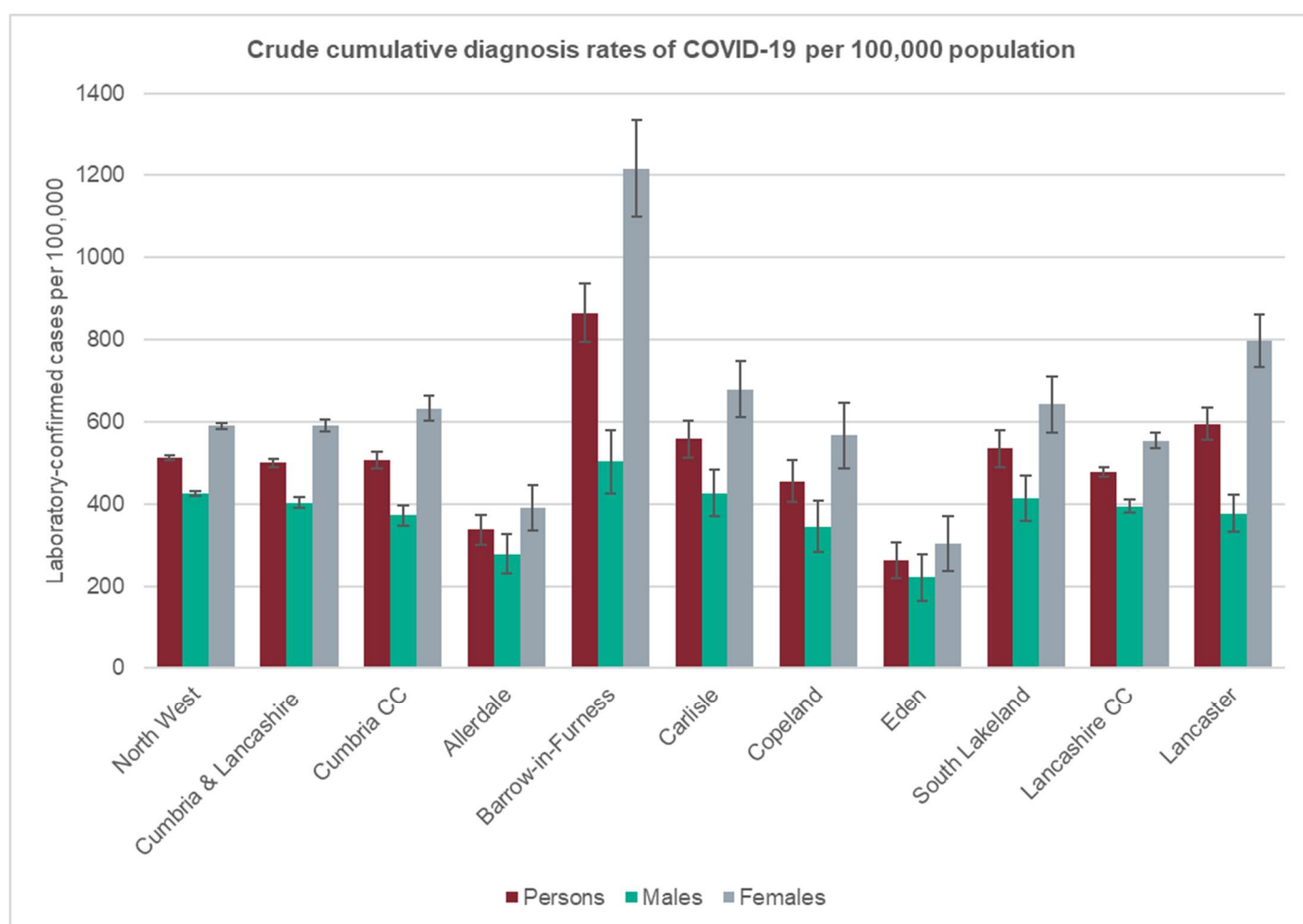
Some of this variation may be due to chance fluctuations in the data, given that the number of positive results in Barrow are only a fraction of those across the North West. However, it is also reasonable to conclude that some of the 'over-representation' of positive results in the 5th decile is because those living in areas with intermediate levels of deprivation, who are more likely to be key workers and their families, were purposefully tested more proactively in local testing processes.

Crude diagnosis rates of COVID-19 in Barrow-in-Furness

Without accounting for population age and levels of deprivation, the crude diagnosis rate of COVID-19 in Barrow between 1 March and 31 May 2020, using both Pillar 1 and Pillar 2 testing data, was 865.4 per 100,000. This was significantly higher than the North West (512.5 per 100,000) and surrounding lower tier local authorities.

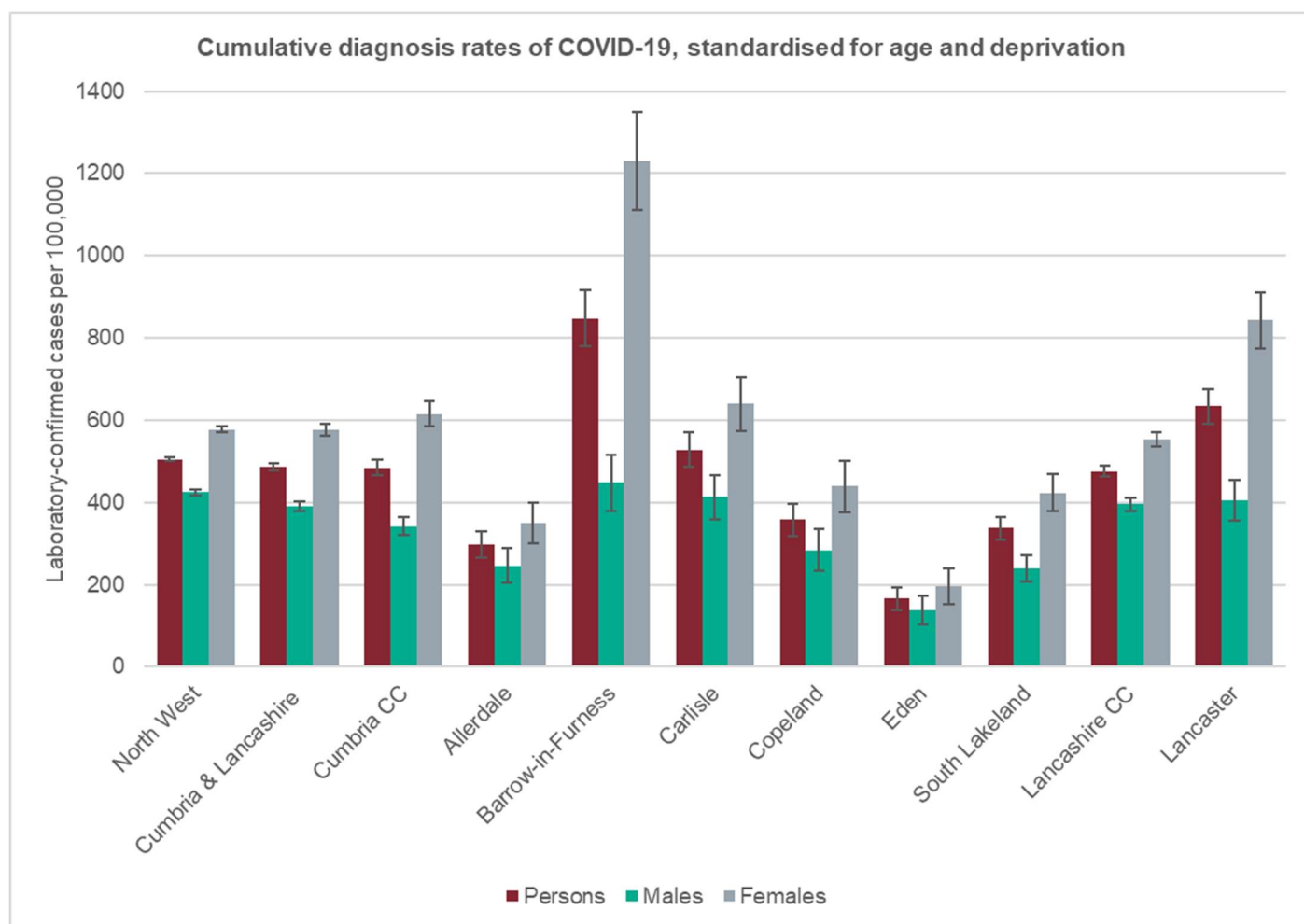
The diagnosis rate was also notably higher in females at 1216.9 per 100,000 females, however the rate observed in males (503.0 per 100,000 males) was similar to that observed elsewhere in the region.

Though not as marked a difference, over this same period, Lancaster was also a high outlier for Lancashire County Council, suggesting a continuation of the matter in Barrow over county borders in line with the UHMB footprint. A similar difference is not observed in South Lakeland, likely due to the smaller size of the Westmorland General.



Diagnosis rates of COVID-19 in Barrow-in-Furness, standardised for age and deprivation

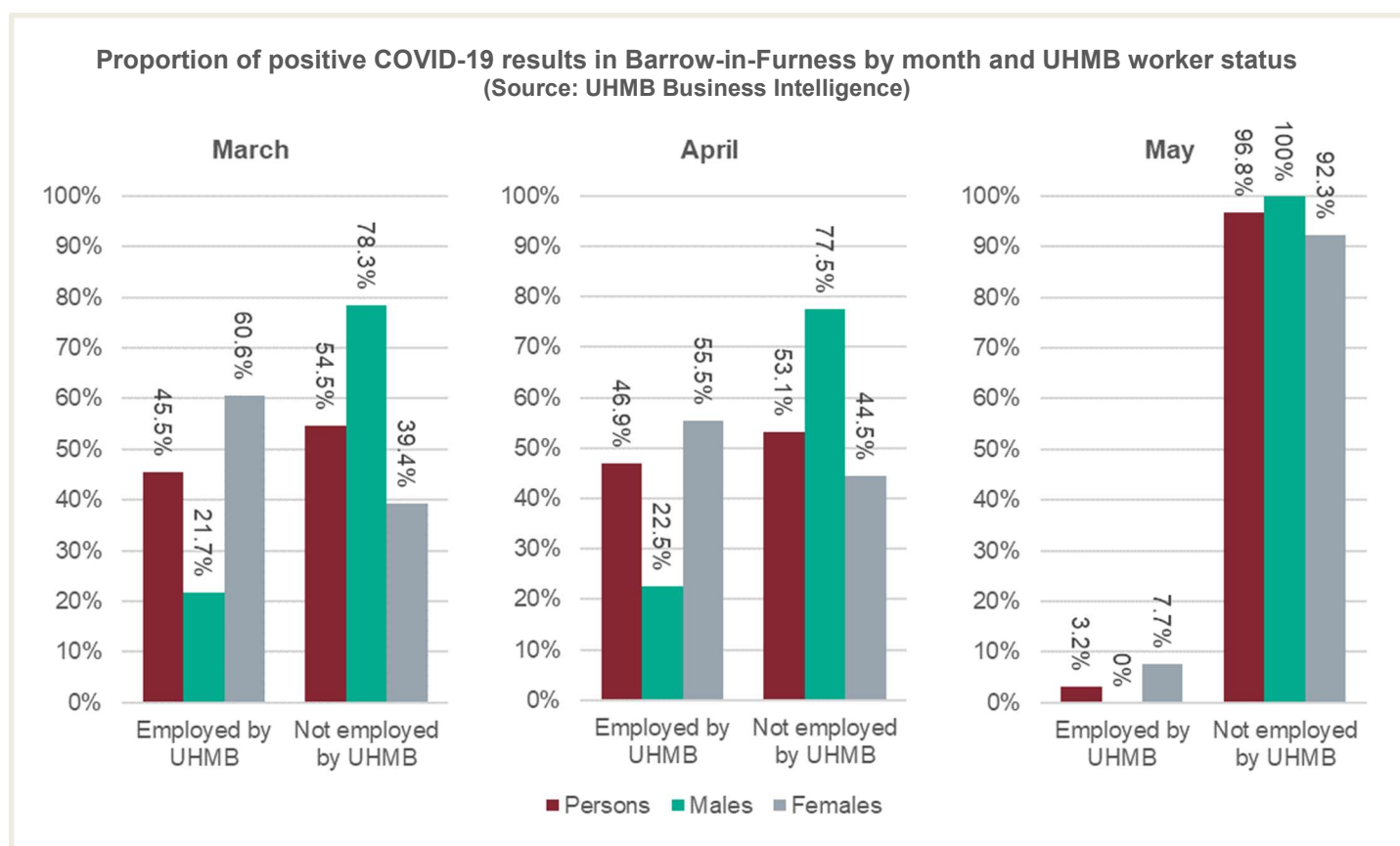
After accounting for population age and levels of deprivation, the diagnosis rate of COVID-19 in Barrow between 1 March and 31 May 2020 was 847.5 per 100,000. This means that making these adjustments only resulted in a small drop in diagnosis rates of 17.9 per 100,000. This is still significantly higher than the rates observed elsewhere in Cumbria and in the North West as a whole (484.2 and 504.9 per 100,000 respectively), suggesting that there were other influencing factors involved.



Diagnosis rates in females (1231.1 per 100,000 females) were found to be 2.75x higher than males (448.1 per 100,000 males). Such a difference was not observed to this extent elsewhere.

Like other NHS Trusts, UHMB has a largely female workforce at 81% of all trust employees, compared with 77% in the NHS workforce across England.^{4,5} The proactive approach to testing taken by UHMB early in the outbreak is again likely to explain the observed gender-difference in COVID-19 diagnoses in Barrow (and to a lesser extent in Lancaster), rather than having a particularly susceptible female population.

Between 1 March and 31 May 2020, 43.7% of all positive results in Barrow were from UHMB workers; indeed 55.1% of all females diagnosed with COVID-19 in Barrow worked for the Trust – the monthly breakdown below shows the predominance of positive results in female UHMB workers in both March and April, with a sharp drop observed in May.

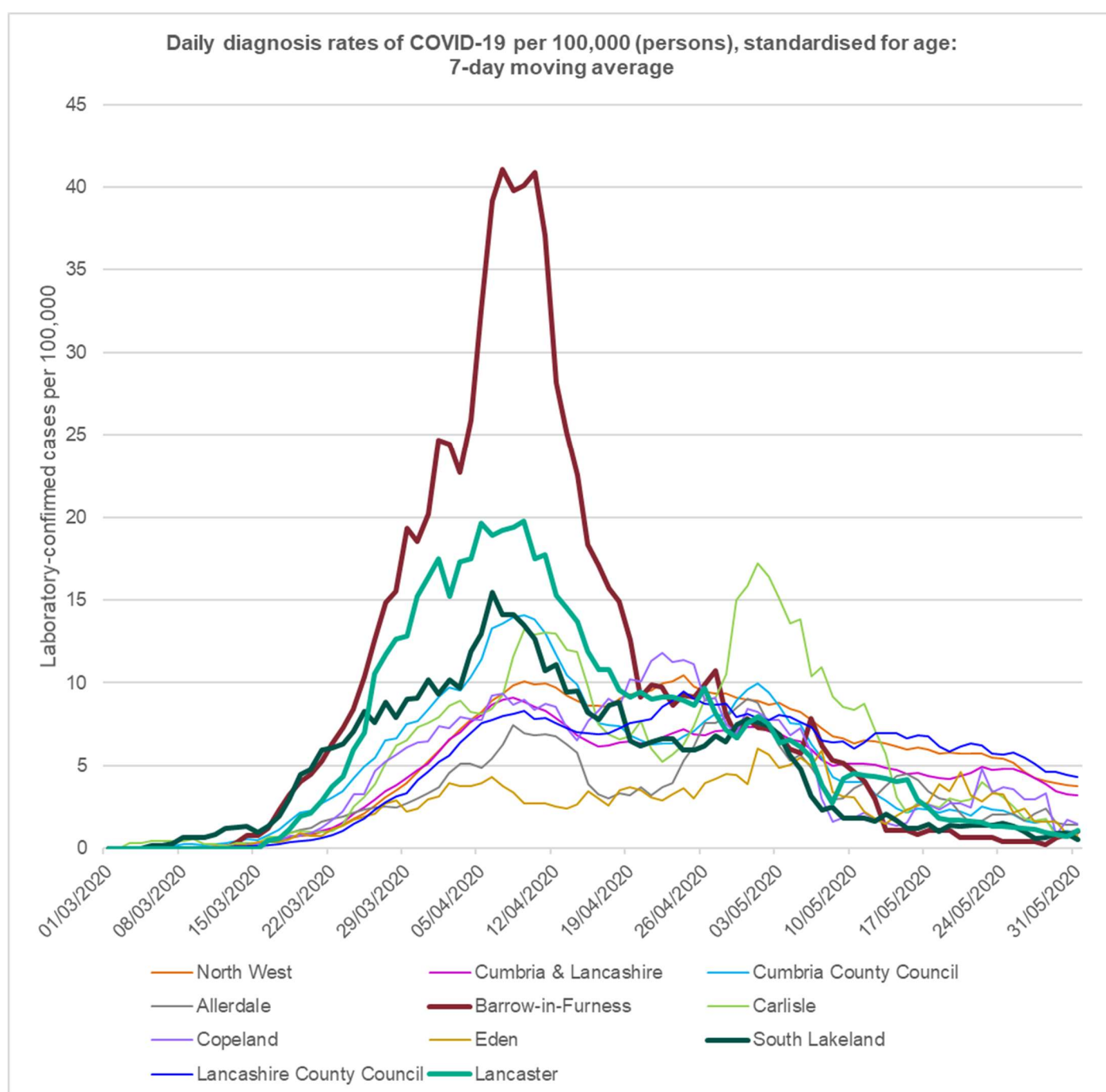


⁴ University Hospitals Morecambe Bay NHS Trust, 2019. Workforce Monitoring Annual Report, 2019-19. https://www.uhmb.nhs.uk/application/files/2015/8471/9816/Workforce_Monitoring_report_2018-19.pdf

⁵ NHS Employers, 2019. Gender in the NHS Infographic. <https://www.nhsemployers.org/case-studies-and-resources/2019/05/gender-in-the-nhs-infographic>

Daily diagnosis rates in Barrow-in-Furness, standardised for age

The peak in positive diagnoses in Barrow was observed between the end of March to mid-April, as demonstrated in the chart below. Given the earlier information that 45.5% and 46.9% of all positive results in Barrow in March and April respectively were from UHMB workers, the height of the curve at it's peak would be almost halved if UHMB staff results were removed. A smaller peak over the same time-period can be observed for Lancaster, where the Royal Lancaster Infirmary is situated, and in South Lakeland, where the Westmorland General is situated.



Age-specific diagnosis rates in Barrow-in-Furness

Those diagnosed with COVID-19 in Barrow between 1 March and 31 May 2020 were younger than in Cumbria, and across the North West and England, by 11 years, 13 years and 13 years respectively.

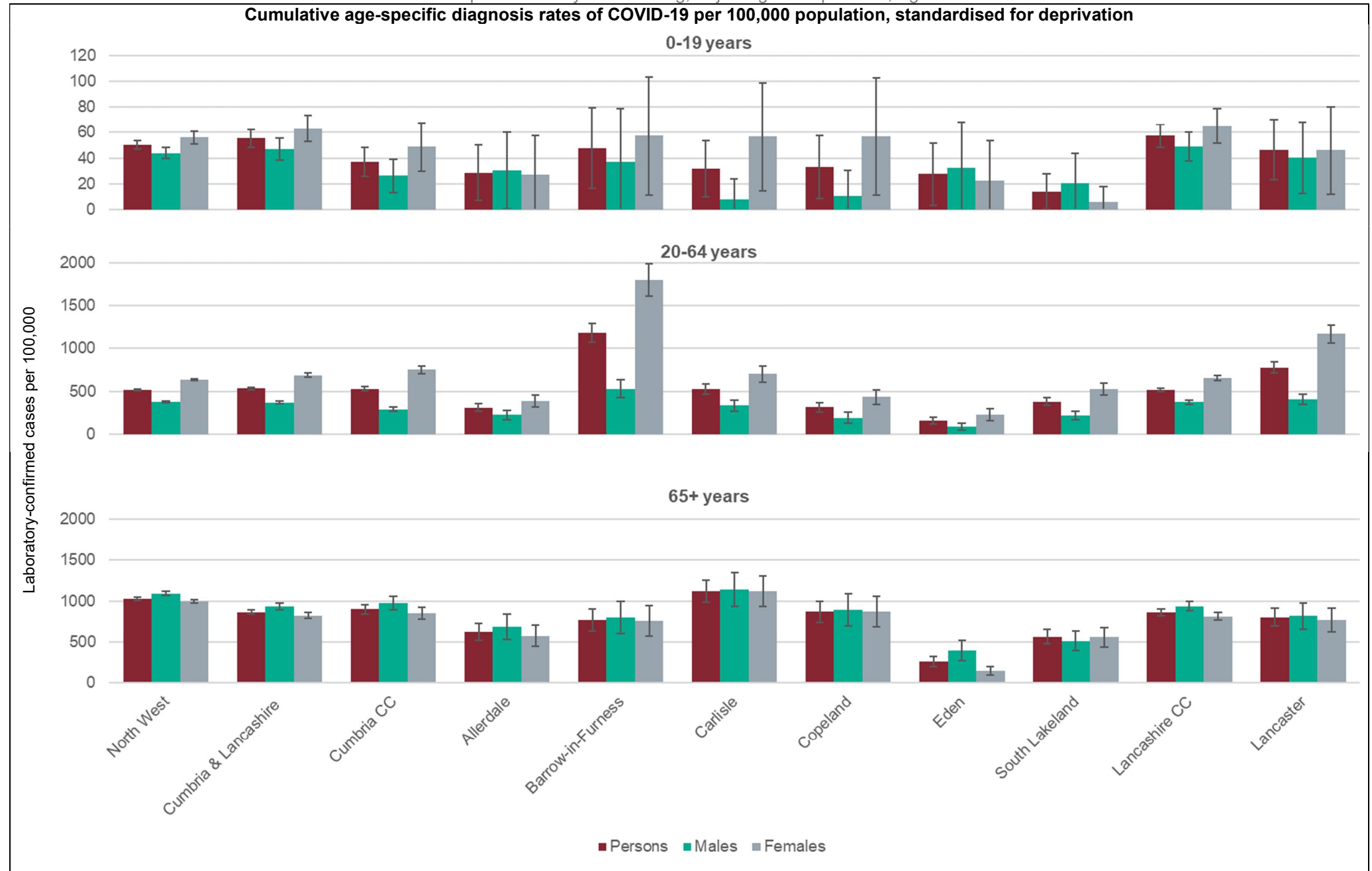
Median age of cases diagnosed via the Pillar 1 route, per area and gender

Area	Cases			Median age (years)		
	Both sexes	Female	Male	Both sexes	Female	Male
Cumbria	2217	1394	818	60	54	71
- Allerdale	251	140	111	70	65.5	72
- Barrow-in-Furness	561	401	159	49	45	58
- Carlisle	492	296	196	64	57.5	70.5
- Copeland	281	172	109	71	63.5	77
- Eden	105	61	44	74	72	76
- South Lakeland	527	324	199	63	58.5	72
Lancashire	3658	2067	1579	61	54	70
North West	25886	14553	11121	62	58	68
England	153395	81847	69470	62	58	66

When the rates of COVID-19 diagnoses are separated by age-group, important differences between localities and gender emerge, as the charts overleaf demonstrate:

- the diagnosis rates of COVID-19 in working age people (20-64 years) in Barrow is more than double that in the same age-group across the North West, at 1182.5 and 516.2 per 100,000 respectively;
- the diagnosis rate in Barrow working age females (1793.5 per 100,000 females) is 3.4x higher than that observed in working age males (531.7 per 100,000 males);
- considering children and young adults, the burden of COVID-19 is in line with that observed across the North West, and
- considering the older age groups, the burden of COVID-19 is significant lower than that observed across the North West.

All of these observations support the notion that the higher rates observed in Barrow are a function of the proactive key worker testing processes implemented by UHMB.



Conclusion

The rates of COVID-19 diagnoses for the period 01 March to 31 May were significantly higher in Barrow than across the North West, even when taking age and deprivation into account. This can be attributed to key differences in testing processes, including earlier local implementation of testing by University Hospitals of Morecambe Bay NHS Foundation Trust, and inviting a wider range of groups for testing from the outset, as opposed to the staggered approach taken nationally.

The diagnosis rates of COVID-19 in working age people in Barrow is more than double that in the same age-group across the North West, and is 3.4x higher in working age females than their male counterparts. This is consistent with the approaches targeting health and social care staff for testing. In non-working age populations, the COVID-19 burden in Barrow is similar to, or lower than, the North West.

In summary, much of the disparity in rates observed between Barrow and elsewhere in the North West and England is due to the proactive local approach to testing taken by University Hospitals of Morecambe Bay NHS Foundation Trust, including earlier implementation of COVID-19 diagnostic testing and greater testing capacity.