Office for National Statistics

Article

Regional and sub-regional estimates of coronavirus (COVID-19) positivity over time, UK: 12 January 2023

Percentage of people testing positive for coronavirus (COVID-19) in private residential households by region and sub-region, over time.

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1 . Main points

This article considers three time periods during the coronavirus (COVID-19) pandemic when the Alpha, Delta and Omicron variants were dominant and how infections varied across parts of the UK.

- In the period when the Alpha variant was dominant, of all English regions, London had the highest peak positivity estimate (2.89%, 95% credible interval: 2.68% to 3.11%) on 13 January 2021.
- In the period when the Delta variant was dominant, the North East was the first English region to reach its peak percentage of people testing positive for COVID-19.
- In the period when the Omicron BA.1 variant was dominant, the North East, North West, Yorkshire and The Humber, and London, were the first English regions to reach their peak COVID-19 positivity.
- In the period when the Omicron BA.2 variant was dominant, all regions peaked at a similar level around 7% to 9%, in the 14 days between 23 March and 6 April 2022.
- In the period when the Omicron BA.5 variant was dominant, all regions peaked in early July 2022, at around 4% to 6%.

Across regions, sub-regions and time periods, different factors have influenced COVID-19 positivity estimates, such as restrictions in place at the time. This analysis does not account for all of these factors, and therefore should not be considered as providing statistical evidence for differences in positivity estimates.

2 . Overview

In this article, we present analysis of estimates of coronavirus (COVID-19) positivity over time for English regions and UK sub-regions. We refer to the number of COVID-19 infections within the population living in private residential households. We exclude those in hospitals, care homes and other communal establishments.

This publication combines weekly estimates of COVID-19 positivity for regions in England and sub-regions in England, Northern Ireland, Scotland and Wales already published in our weekly Coronavirus (COVID-19) Infection Survey bulletin. These estimates have already been published as part of our weekly bulletin, however this is the first time these results are being presented over a longer time series.

It is important to note there is a higher degree of uncertainty for data which is broken down by smaller population groups compared with England as a whole. Our Coronavirus (COVID-19) Infection Survey: methods and further information methodology article provides more information on the methods used for our models.

In this article, we consider three periods of COVID-19 positivity:

- the first, from the week ending 18 December 2020 to the week ending 15 May 2021, when the Alpha variant was dominant
- the second, from the week ending 22 May 2021 to the week ending 19 December 2021, when the Delta variant was dominant
- the third, from the week ending 23 December 2021 to the week ending 5 September 2022, when the Omicron variants were dominant

Generally, within each of these variant periods an estimated 60% or greater of COVID-19 infections were compatible with the dominant variant.

Other variants were also in circulation in each of these time periods. Furthermore, these time periods are defined based on the dominant variant at national levels, which may not reflect regional and sub-regional variant levels.

Estimates of positivity in this article include all variants of COVID-19.

Throughout this article we refer to peak levels of positivity as being the highest level of COVID-19 positivity reached by a region, in a given period of interest.

Omicron variants BA.1 and BA.2 are no longer in circulation, however other Omicron variants BA.4 and BA.5 are still in circulation, so this period is ongoing.

We provide regional positivity over time for England only.

3 . The period when the Alpha variant was dominant

In this section, we consider the period from the week ending 18 December 2020 to the week ending 15 May 2021. During this period, the Alpha variant was dominant, however, other variants were also in circulation at the time.

Of all English regions, London had the highest peak positivity estimates (2.89%, 95% credible interval: 2.68% to 3.11%) on 13 January 2021, in the period when the Alpha variant was dominant.

Figure 1: The percentage of people testing positive for coronavirus (COVID-19) peaked in January 2021 across regions of England, in the period when the Alpha variant was dominant

Estimated percentage of the population testing positive for COVID-19 on nose and throat swabs by region, England, week ending 18 December 2020 to the week ending 15 May 2021

Notes:

1. There is a higher degree of uncertainty in our estimates for English regions compared with England overall, shown by wider credible intervals.
2. The percentage of people testing positive by region was calculated using a similar modelling approach to the national daily estimates in our weekly bulletin.

Download the data

.xlsx

4 . The period when the Delta variant was dominant

In this section, we consider the period from the week ending 22 May 2021 to the week ending 19 December 2021. During this period, the Delta variant was dominant, however, other variants were also in circulation at the time.

During the period when the Delta variant was dominant, the North East was the first English region to reach its highest estimated percentage of coronavirus (COVID-19) positivity (3.20%, 95% credible interval: 2.51% to 3.93%) on 21 July 2021. This was one of the highest levels of positivity of all English regions during this period. It was not until 13 October 2021 that a second English region, the North West, reached its peak estimated COVID-19 positivity (2.24%, 95% credible interval: 1.96% to 2.54%).

Higher positivity was sustained over a longer period of time than in the period when the Alpha variant was dominant. Positivity levels remained relatively high across all regions from July to December 2021. Although the Delta variant was the most common COVID-19 variant during this time, a proportion of COVID-19 infections in December 2021 were compatible with the Omicron BA.1 variant.

Figure 2: The percentage of people testing positive for coronavirus (COVID-19) remained high for several months across regions of England, in the period when the Delta variant was dominant

Estimated percentage of the population testing positive for COVID-19 on nose and throat swabs by region, England, week ending 22 May 2021 to the week ending 19 December 2021

Notes:

1. There is a higher degree of uncertainty in our estimates for English regions compared with England overall, shown by wider credible intervals.

2. The percentage of people testing positive by region was calculated using a similar modelling approach to the national daily estimates in our weekly bulletin.

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5 . The period when the Omicron variants were dominant

In this section, we consider the period from the week ending 23 December 2021 to the week ending 5 September 2022. During this period, the Omicron variants were dominant.

From 20 December 2021 to 1 March 2022 the Omicron BA.1 variant was dominant. The Omicron BA.2 variant was dominant from 2 March to 15 June 2022, while the Omicron BA.4 and BA.5 variants were dominant from 16 June 2022 onwards. Other variants were also in circulation over these time periods.

Omicron BA.1

During the period when the Omicron BA.1 variant was dominant, London was the English region which had the first peak in coronavirus (COVID-19) positivity (8.79%, 95% credible interval: 8.26% to 9.33%) on 28 December 2021. The North West (9.81%, 95% confidence intervals: 9.19% to 10.45%), Yorkshire and The Humber (8.44%, 95% confidence intervals: 7.76% to 9.11%), and the North East (8.41%, 95% confidence intervals: 7.53% to 9.38%) were also the regions with the highest peaks in January 2022. In February 2022, the East of England (5.41%, 95% confidence intervals: 4.94% to 5.89%), South East (5.76%, 95% confidence intervals: 5.36% to 6.17%) and South West (4.77%, 95% confidence intervals: 4.30% to 5.26%) reached lower and later peaks than all other English regions.

Omicron BA.2

All regions peaked at a similar level around 7% to 9%, in the 14 days between 23 March and 6 April 2022.

Omicron BA.4 and BA.5

All regions peaked in early July 2022, at around 4% to 6%.

Figure 3: The percentage of people testing positive for coronavirus (COVID-19) across regions of England, in the period when the Omicron variants were dominant

Estimated percentage of the population testing positive for COVID-19 on nose and throat swabs by region, England, week ending 23 December 2021 to week ending 5 September 2022

Notes:

1. There is a higher degree of uncertainty in our estimates for English regions compared with England overall, shown by wider credible intervals.

2. The percentage of people testing positive by region was calculated using a similar modelling approach to the national daily estimates in our weekly bulletin.

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6 . Sub-regional COVID-19 positivity over time

Sub-regional areas are defined by pooling local authorities together, for further information refer to our Coronavirus (COVID-19) Infection Survey: methods and further information methodology article.

Figure 4 shows the modelled estimates for sub-regions of England, Wales, Northern Ireland, and Scotland over time. These estimates are available from 8 November 2020 to 5 September 2022.

Figure 4: The percentage testing positive for coronavirus (COVID-19) by UK sub-regions over time

Modelled percentage of the population testing positive for COVID-19 on nose and throat swabs by sub-regional geography, UK, 8 November 2020 to 5 September 2022

Notes:

1. Throughout the coronavirus pandemic, reference weeks have sometimes varied between UK countries. Additionally, because of low levels of infection, it has not always been possible to provide sub-regional estimates for England, Northern Ireland, Scotland, and Wales, resulting in gaps in estimates over time.

2. Sub-regional estimates are based on a different model to our headline estimates. Our sub-regional estimates are calculated as an average over a seven-day period and should not be compared with our headline positivity estimates, which are for a single reference date. Therefore, the sub-regional figures may differ from the headline estimates because they are averaged over a longer time period.

3. In this publication we have used the same colour scale from 8 November 2020 to 5 September 2022. An adjusted colour scale was used in our bulletins from 7 January to 13 May 2022, and from 24 June to 8 July 2022, to accommodate increased infection levels. Sub-regional charts from our bulletins over these publication dates are therefore not comparable with this publication.

4. England, Northern Ireland, Scotland, and Wales estimates are based on official estimates.

5. Since 12 February 2021 estimates are provided based on modelling the most recent seven-day period. Before this date estimates were based on a six-day period and were aggregated from two three-day models.

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7 . Main findings

Across regions, sub-regions and time periods, different factors have influenced coronavirus (COVID-19) positivity estimates, such as restrictions in place at the time. This analysis does not account for all of these factors, and therefore should not be considered as providing statistical evidence for differences in positivity estimates.

Of all three periods of interest, the highest peaks for all regions were during the period when the Omicron variants were dominant.

During the period when the Alpha variant was dominant, regions reached peak positivity ranging from approximately 1.5% to 3.0%.

During the period when the Delta variant was dominant, regions reached peak positivity ranging from approximately 2.0% to 3.5%.

During the period when the Omicron BA.1 variant was dominant, regions reached peak positivity ranging from approximately 5% to 10%.

During the period when the Omicron BA.2 variant was dominant, regions reached peak positivity ranging from approximately 7% to 9%.

Acknowledgements

This work was conducted in collaboration with Data Visualisation colleagues:

- Micheal Slade
- Claire Pereira

8 . Regional and sub-regional estimates of coronavirus (COVID-19) positivity over time, UK data

Coronavirus (COVID-19) Infection Survey, UK
Dataset | Updated weekly
Findings from the Coronavirus (COVID-19) Infection Survey for the UK.

9 . Glossary

Credible interval

A credible interval gives an indication of the uncertainty of an estimate from data analysis. The 95% credible intervals are calculated so that there is a 95% probability of the true value lying in the interval. A wider interval indicates more uncertainty in the estimate. Overlapping credible intervals indicate that there may not be a true difference between two estimates. For more information, see our methodology page on statistical uncertainty.

COVID-19 positivity rate

The positivity rate is the percentage of people who have tested positive for coronavirus (COVID-19) on a polymerase chain reaction (PCR) test at a point in time. We use current COVID-19 infections to mean testing positive for SARS-CoV-2, with or without having symptoms, on a swab taken from the nose and throat.

10 . Data sources and quality

These statistics have been produced quickly in response to developing world events. On behalf of the UK Statistics Authority, the Office for Statistics Regulation (OSR) reviewed the Coronavirus (COVID-19) Infection Survey (CIS) on 14 May 2020 and the OSR reviewed CIS again on 17 March 2021 against several important aspects of the Code of Practice for Statistics. They regard them as consistent with the Code's pillars of trustworthiness, quality and value.

The estimates presented in this article contain statistical uncertainty. There are many sources of uncertainty, including uncertainty in the test, in the estimates and in the quality of data collected in the questionnaire. Information on the main sources of uncertainty is presented in our Coronavirus (COVID-19) Infection Survey Quality and Methodology Information report, our Coronavirus (COVID-19) Infection Survey: methods and further information methodology article, and our blog explaining why we trust the data from the Coronavirus (COVID-19) Infection Survey.

Strengths and limitations

More information on strengths and limitations is available in our Coronavirus (COVID-19) Infection Survey statistical bulletin.

11 . Future developments

We continue to monitor coronavirus (COVID-19) infections by region and sub-region, and will publish these results as part of our routine bulletins when helpful.

12 . Related links

Coronavirus (COVID-19) Infection Survey quality report: December 2022
Methodology | Released 21 December 2022
This quality report presents information on the Coronavirus (COVID-19) Infection Survey data collection method change from study worker home visit to remote data collection.

Coronavirus (COVID-19) Infection Survey quality report: September 2022
Methodology | Released 23 September 2022
This quality report presents information on the coronavirus (COVID-19) Infection Survey data collection method change from study worker home visit to remote data collection.

Coronavirus (COVID-19) Infection Survey quality report: August 2022
Methodology | Released 18 August 2022
This quality report presents information on the Coronavirus (COVID-19) Infection Survey data collection method change from study worker home visit to remote data collection.

Coronavirus (COVID-19) Infection Survey, characteristics of people testing positive for COVID-19, UK
Bulletin | Updated monthly
The characteristics of people testing positive for coronavirus (COVID-19) from the COVID-19 Infection Survey. This survey is being delivered in partnership with the University of Oxford, the University of Manchester, UK Health Security Agency and Wellcome Trust.

Coronavirus (COVID-19) Infection Survey, UK
Bulletin | Updated weekly
Estimates for England, Wales, Northern Ireland and Scotland, including regional and age breakdowns. This survey is being delivered in partnership with the University of Oxford, University of Manchester, UK Health Security Agency and Wellcome Trust.

Coronavirus (COVID-19) latest insights
Interactive tool | Updated as and when data become available
The latest data and trends about the coronavirus (COVID-19) pandemic from the Office for National Statistics (ONS) and other official sources.

Deaths registered weekly in England and Wales, provisional
Bulletin | Updated weekly
Provisional counts of the number of deaths registered in England and Wales, including deaths involving COVID-19, by age, sex and region, in the latest weeks for which data are available.

Coronavirus (COVID-19) Infection Survey technical article: Cumulative incidence of the number of people who have tested positive for COVID-19, UK
Technical article | Released 22 April 2022
Analysis of the number of people in the UK who have tested positive for COVID-19 using the Coronavirus (COVID-19) Infection Survey. This survey is being delivered in partnership with University of Oxford, University of Manchester, UK Health Security Agency and Wellcome Trust.

13 . Cite this article

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