Coronavirus (COVID-19) Infection Survey, antibody and vaccination data, UK: 27 October 2021

Antibody and vaccination data by UK country and regions in England from the Coronavirus (COVID-19) Infection Survey. This analysis has been produced in partnership with University of Oxford, University of Manchester, UK Health Security Agency, and Wellcome Trust. This study is jointly led by the ONS and the Department for Health and Social Care (DHSC) working with the University of Oxford and Lighthouse Laboratories to collect and test samples.

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Notice

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The reported test sensitivity and specificity has been updated in Section 2 of this bulletin.

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1 . Main points

- In England, it is estimated that 92.2% of the adult population (95% credible interval: 90.9% to 93.3%) would have tested positive for antibodies against SARS-CoV-2, the specific virus that causes coronavirus (COVID-19), on a blood test in the week beginning 27 September 2021, suggesting they had the infection in the past or have been vaccinated.

- In Wales, it is estimated that 90.0% of the adult population (95% credible interval: 87.9% to 91.7%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in the week beginning 27 September 2021, suggesting they had the infection in the past or have been vaccinated.

- In Northern Ireland, it is estimated that 90.8% of the adult population (95% credible interval: 86.7% to 93.3%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in the week beginning 27 September 2021, suggesting they had the infection in the past or have been vaccinated.

- In Scotland, it is estimated that 91.3% of the adult population (95% credible interval: 89.6% to 92.7%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in the week beginning 27 September 2021, suggesting they had the infection in the past or have been vaccinated.

About this bulletin

This bulletin presents analysis on past infection and/or vaccination - which we define as testing positive for antibodies to SARS-CoV-2 - for England, Wales, Northern Ireland and Scotland based on findings from the Coronavirus (COVID-19) Infection Survey (CIS) in the UK. For context, we include estimates from our survey on the percentage of people who reported they have received at least one or more doses of a vaccine against SARS-CoV-2, as well as those who report having received two or more doses of a COVID-19 vaccine (including booster doses).

In this bulletin, we refer to the following:

Antibodies

We measure the presence of antibodies in people who live in private households to understand who has had coronavirus in the past, and the impact of vaccinations. It takes between two and three weeks after infection or vaccination for the body to make enough antibodies to fight the infection. Antibodies can help prevent individuals from getting the same infection again. If they do get infected, people with antibodies are less likely to have severe symptoms. Once infected or vaccinated, antibodies remain in the blood at low levels and can decline over time. The length of time antibodies remain at detectable levels in the blood is not fully known.

SARS-CoV-2

This is the scientific name given to the specific virus that causes COVID-19.

Data in this bulletin

The analysis on antibodies in this bulletin is based on blood test results taken from a randomly selected subsample of individuals aged 16 years and over, who live in private households. The survey excludes those in hospitals, care homes and/or other communal establishments. The blood samples are used to test for antibodies against SARS-CoV-2. We also present data on the percentage of people aged 16 years and over who report they have received one or more doses of a COVID-19 vaccine since 14 December 2020, and the percentage of people aged 16 years and over who report they have received two or more doses of a COVID-19 vaccine since 15 February 2021. The data include any reported booster or third jabs.

Our antibodies and vaccination estimates are based on modelling of the people visited in the Coronavirus (COVID-19) Infection Survey. Further information on our method to model antibodies and vaccinations can be found in our methods article.

We produce weekly modelled estimates using standard calendar weeks starting Monday. To provide the most timely and accurate estimates possible for antibody positivity, the model will include data for the first four to seven days of the most recent week available, depending on the availability of test results. The antibody and vaccination estimates for the most recent week in this publication includes data from 27 September to 3 October 2021.

Antibodies data are currently unavailable for the period from 26 August 2021 to 15 September 2021 because of a temporary issue in the laboratory testing process. We are working with our laboratories to resolve this issue and will receive data to cover this period in the coming weeks.

For this week's analysis, we have used a model which includes adjustments for the period of unavailable antibody data. The antibody positivity estimates in the surveillance weeks from 16 August 2021 to 26 September 2021 are modelled using fewer data points meaning there is greater uncertainty for the estimates over this period. These results may be subject to revision when we receive the data that covers the period of unavailable antibody data.

We present weekly modelled antibody estimates for adults by country, and grouped age for England, Wales, Northern Ireland and Scotland, as well as by regions in England. Single year of age analysis has not been updated in this week's publication. We also include estimates of adults who reported they have received one or more doses of a COVID-19 vaccine, and of adults who reported they have received two or more doses of a COVID-19 vaccine (including booster doses).

There is a clear pattern between vaccination and testing positive for COVID-19 antibodies but the detection of antibodies alone is not a precise measure of the immunity protection given by vaccination.

Modelled vaccine estimates are produced to provide context alongside our antibodies estimates and do not replace the official government figures on vaccinations, which are a more precise count of total vaccines issued. While we would expect the overall trend of our estimated number of people who have received vaccines to increase, it is possible that in some weeks, the estimate may remain the same or decrease as a result of sampling variability (for example, we may have a lower number of participants recording a vaccination in the latest week compared with an earlier week).

National Immunisation Management System (NIMS) administrative data is used to validate CIS self-reported records of vaccination for England. The equivalent of this is currently not included for other countries, meaning the estimates for Wales, Scotland and Northern Ireland are produced just from CIS self-reported records of vaccination.

Our vaccination estimates are explained in more detail in Section 10: Measuring the data.

2 . Understanding antibodies and immunity

Antibody positivity is defined by having a fixed concentration of antibodies in the blood. A negative test result occurs if there are no antibodies or if antibody levels are too low to reach a threshold at the time of testing. The threshold we use is 42ng/ml. This is the threshold that the test is CE marked against providing 99% sensitivity and specificity for coronavirus (COVID-19) infection. Following infection or vaccination, antibody levels can vary and sometimes increase but may still be below the level identified as positive in our test and other tests, and so give a negative result.

Most people who are vaccinated will retain a higher antibody level than before vaccination even after dropping below the standard threshold value. A negative result does not mean that the antibody level is at zero, nor that a person has no protection against COVID-19, as an immune response does not rely on the presence of antibodies alone.

There are other parts of the immune system which will offer protection, for example a person's T cell response. This will not be detected by blood tests for antibodies. A person's immune response is affected by a number of factors, including health conditions and age.

Equally, antibody levels are expected to decrease over time irrespective of vaccination or natural infection, especially when exposure to the virus is reduced. This is because our bodies stop making antibodies when they are not needed.

Our blog on antibodies and immunity gives further information on the link between antibodies and immunity and the vaccine programme. Our blogs on vaccine effectiveness provides information on the effectiveness of vaccinations against Alpha and Delta variants, which is based upon the research conducted by partners from the University of Oxford.

Our methodology article provides further information around the survey design, how we process data, and how data are analysed. The study protocol specifies the research for the study. The Quality and Methodology Information details the strength and limitations of the data.

3 . Percentages of adults testing positive for COVID-19 antibodies and vaccinated against COVID-19 in the UK

The percentage of adults who would have tested positive for coronavirus (COVID-19) antibodies remained high across the UK in recent weeks up to the week beginning 27 September 2021.

Table 1: Estimated percentage of adults who would have tested positive for SARS-CoV-2 antibodies from a blood sample, week beginning 27 September 2021, UK countries

Country	Estimated % of adults who would have tested positive for COVID-19 antibodies	95% credible interval	
		Lower	Upper
England	92.2	90.9	93.3
Wales	90.0	87.9	91.7
Northern Ireland	90.8	86.7	93.3
Scotland	91.3	89.6	92.7

Source: Source: Office for National Statistics – Coronavirus (COVID-19) Infection Survey

Notes

1. All estimates are subject to uncertainty, given that a sample is only part of the wider population. The model used to provide these estimates is a Bayesian model: these provide 95% credible intervals.

In the week beginning 27 September 2021, our estimates suggest the percentage of adults who reported they had received at least one dose of a COVID-19 vaccine remained high, ranging from 93.8% to 95.2% of adults across the UK. The estimated percentage of adults in the UK who had received two or more doses of a COVID-19 vaccine also remained high or continued to increase, ranging from 82.0% to 88.8% of adults across the UK in the week beginning 27 September 2021. These vaccination estimates will differ from official figures as explained in Section 1.

Figure 1: The percentage of adults testing positive for COVID-19 antibodies in the UK remained high

Modelled percentage of adults: who tested positive for antibodies to SARS-CoV-2, who have received one or more doses of a COVID-19 vaccine; and who have received two or more doses of a COVID-19 vaccine, UK countries, 7 December 2020 to 3 October 2021

Notes:

1. All results are provisional and subject to revision.

2. Estimates for dates between 16 August 2021 and 26 September 2021 are based on a modified method because of a temporary issue at the laboratory. See "data in this bulletin" for more information.

3. These statistics refer to antibody tests and reported vaccinations for individuals living in private households. These figures exclude individuals in hospitals, care homes and/or other communal establishments.

4. All estimates are subject to uncertainty, given that a sample is only part of the wider population. A credible interval gives an indication of the uncertainty of an estimate from data analysis.

5. The denominators used for vaccinations are the total people in the sample at that particular time point, then post-stratified by the mid-year population estimate.

6. Vaccination data for Northern Ireland start later than the other countries, from 21 December 2021.

7. Our estimates of vaccination are provided for context alongside our antibodies estimates but are likely to be different from the official figures. The daily official government figures provide the recorded actual numbers of vaccines against SARS-CoV-2 issued.

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4 . Percentages of adults testing positive for COVID-19 antibodies and vaccinated against COVID-19 by regions in England

The estimated percentage of adults who have received at least one coronavirus (COVID-19) vaccine, remained at a high level across all regions of England in the week beginning 27 September 2021. Regional data can be found in our accompanying dataset.

5 . Percentages of adults testing positive for COVID-19 antibodies and vaccinated against COVID-19 by grouped age in the UK

Our survey shows that in the week beginning 27 September 2021, the percentage of adults testing positive for coronavirus (COVID-19) antibodies remained high. It has increased in younger adults and is showing signs of a slow decline in older adults.

Many of the participants who have tested negative for antibodies in the most recent week, received their vaccinations in the early stages of the vaccination programme. Along with age, the early stages of the vaccination programme prioritised individuals on a range of factors (such as long-term health conditions and type of employment) and this may help to explain the declining trend appearing in different age groups now.

Across all four UK countries, antibody positivity remains high in older age groups (those aged 65 years and over) but has been declining in these age groups since the end of July 2021. It is important to note that antibody positivity is defined by a fixed concentration of antibodies in the blood. Most people who are vaccinated will retain higher antibody levels than before vaccination but may have a lower number of antibodies than this threshold at the time of testing. This does not mean that these people have no protection against new infection. More information on antibodies and immunity can be found in our blog and in Section 2 of this bulletin.

We estimate that the antibody positivity for those aged 16 to 24 years increased steadily across all four UK countries, with estimates ranging between 95.4% and 95.8% across the UK, for the week beginning 27 September 2021.

The percentage of adults who reported they have received at least one dose of a COVID-19 vaccine is lowest in the younger age groups but is increasing.

Across the four UK countries, the estimated percentage of adults aged 16 to 24 years who have received one or more doses of a COVID-19 vaccine ranged from 79.1% to 82.8%; this has increased sharply since the end of June. These estimates of vaccination are based on reported vaccination status in our survey and are likely to be different from the official figures for the UK.

In the data used to produce estimates for Wales, Northern Ireland and Scotland, the number of people sampled who tested positive for antibodies to SARS-CoV-2 or who have been vaccinated is low compared with England. This means there is a higher degree of uncertainty in estimates for these nations when our analysis splits the sample into smaller groups (for example, age groups) as indicated by larger credible intervals.

Modelled antibody estimates and modelled vaccine estimates relate to the adult population (aged 16 years and over) who live in private households. The true figure among the older age groups in the population may be different. In England, an estimated 90% of people aged 80 years and over live in private households and 10% live in other communal establishments such as care homes.

Figure 2: The percentage of adults testing positive for COVID-19 antibodies continued to remain high, has increased in younger adults and is showing signs of a slow decline in older adults

Modelled percentage of adults: who tested positive for antibodies to SARS-CoV-2, who have received one or more doses of a COVID-19 vaccine, and those who have received two or more doses of a COVID-19 vaccine, by grouped age, UK countries, 7 December 2020 to 3 October 2021

Notes:

1. All results are provisional and subject to revision.

2. Estimates for dates between 16 August 2021 and 26 September 2021 are based on a modified method, due to a temporary issue at the laboratory. See 'data in this bulletin' for more information.

3. These statistics refer to antibody tests and reported vaccinations for individuals living in private households. These figures exclude individuals in hospitals, care homes and/or other communal establishments.

4. In Northern Ireland, the number of people sampled who tested positive for antibodies to SARS-CoV-2 or reported receiving a COVID-19 vaccination is low compared with England, Wales and Scotland; therefore, people aged 50 to 69 years are included in the same age group, and those aged 70 years and over are included in the same age group.

5. All estimates are subject to uncertainty, given that a sample is only part of the wider population. A credible interval gives an indication of the uncertainty of an estimate from data analysis.

6. The denominators used for vaccinations are the total people in the sample at that particular time point, then post-stratified by the mid-year population estimate.

7. Our estimates of vaccination are provided for context alongside our antibodies estimates but are likely to be different from the official figures. The daily official government figures provide the recorded actual numbers of vaccines against SARS-CoV-2 issued.

Download this chart

.XLSX

6 . Further academic research on antibodies and vaccinations using COVID-19 Infection Survey data

Antibody and vaccination data from the Coronavirus (COVID-19) Infection Survey was analysed in a research paper produced by our partners at Oxford University and published as preprint on 16 September 2021. The paper looks at how much antibodies change over time and how this varies between the Pfizer and AstraZeneca vaccines, by key characteristics. We summarise some of the relevant findings.

On average, antibody levels are initially higher and decline more slowly in people who have received two doses of the Pfizer vaccine compared with those who have received two doses of the AstraZeneca vaccine. In people who had received the Pfizer vaccine, the speed of decline in antibodies was faster in:

- men

- older people

- those reporting white ethnicity

- those with long-term health conditions

People with a greater length of time between receiving their first and second AstraZeneca dose experienced a slightly higher peak in antibodies compared with those who had a shorter time between doses (considering gaps between 7 to 13 weeks). For people with a greater length of time between receiving their first and second Pfizer vaccine, the peak level of antibodies was slightly lower compared with those who had a shorter gap between doses. Those aged over 70 years had a much faster decline if they had received their second vaccination only three weeks after their first.

With both vaccines, prior infection significantly increased the peak in antibody levels after the second dose and slowed the decline in antibodies.

After second doses of both vaccines, the peak level of antibodies was also higher in:

- women

- people in patient-facing healthcare roles

- people without long-term health conditions

Further detail and comparisons are available in [SARS-CoV-2 anti-spike IgG antibody responses after second dose of ChAdOx1 or BNT162b2 in the UK general population](#).

7 . Coronavirus (COVID-19) Infection Survey data

[Coronavirus (COVID-19) antibody and vaccination data, UK](#)
Dataset | Released 27 October 2021
Antibody and vaccination data by UK country and regions in England from the Coronavirus (COVID-19) Infection Survey. This analysis has been produced in partnership with the University of Oxford, University of Manchester, Health Security Agency and Wellcome Trust. This study is jointly led by the ONS and the Department for Health and Social Care (DHSC) working with the University of Oxford and Lighthouse Laboratory to collect and test samples.

8 . Collaboration

The Coronavirus (COVID-19) Infection Survey analysis was produced by the Office for National Statistics (ONS) in collaboration with our research partners at the University of Oxford, the University of Manchester, Public Health England (PHE) and Wellcome Trust. Of particular note are:

- Sarah Walker - University of Oxford, Nuffield Department for Medicine: Professor of Medical Statistics and Epidemiology and Study Chief Investigator

- Koen Pouwels - University of Oxford, Health Economics Research Centre, Nuffield Department of Population Health: Senior Researcher in Biostatistics and Health Economics

- Thomas House - University of Manchester, Department of Mathematics: Reader in Mathematical Statistics

9 . Glossary

Confidence interval

A confidence interval gives an indication of the degree of uncertainty of an estimate, showing the precision of a sample estimate. The 95% confidence intervals are calculated so that if we repeated the study many times, 95% of the time the true unknown value would lie between the lower and upper confidence limits. A wider interval indicates more uncertainty in the estimate. Overlapping confidence intervals indicate that there may not be a true difference between two estimates.

For more information, see our methodology page on statistical uncertainty.

Credible interval

A credible interval gives an indication of the uncertainty of an estimate from data analysis. A 95% credible interval is calculated so that there is a 95% probability of the true value lying in the interval.

10 . Measuring the data

More information on [measuring the data](#) is available in the Coronavirus (COVID-19) Infection Survey statistical bulletin.

Our [methodology article](#) provides further information around the survey design, how we process data, and how data are analysed. The [Quality and Methodology Information](#) explains the strengths and limitations of the data, methods used, and data uses and users.

Vaccination estimates

While the [daily official government figures](#) provide the recorded actual numbers of vaccines against SARS-CoV-2 issued, our vaccination estimates are likely to be different from the official figures. This is because they are estimates based on a sample survey of reported vaccine status and are provided for context alongside our antibodies estimates. We control for the effect of ethnicity by post-stratifying our analysis by White and non-White ethnic groups, rather than individual ethnicities, because of our current sample size. This could result in differences between our survey estimates and the government figures in the numbers of vaccines received for some ethnic minority groups.

Importantly, our survey collects information from the population living in private households and does not include people living in communal establishments such as care homes, hospitals or prisons.

The value of showing our estimates of vaccines alongside our estimates of people testing positive for antibodies is to illustrate the relationship between the two.

Differences between official figures and the estimates from this survey differ in scale across each of the four UK nations (some survey estimates are closer to the official reported figures than others) because of differences in reporting dates and the inclusion of National Immunisation Management System (NIMS) data for England. In addition, our sampling method for Northern Ireland is different to the other nations, inviting only people who have previously participated in a Northern Ireland Statistics and Research Agency (NISRA) survey, which could result in a sample of individuals who are more likely to get vaccinated. This should be taken into consideration if comparing vaccine and antibody estimates across the four nations, as vaccine status and antibody positivity are related.

In addition, as our analysis develops, our survey-based estimates will enable possible future analysis of people who have received a vaccine with other characteristics collected in the survey.

11 . Strengths and limitations

More information on strengths and limitations of the data is available in [Coronavirus (COVID-19) Infection Survey QMI](#) and in the [Coronavirus (COVID-19) Infection Survey statistical bulletin](#).

12 . Related links

[Coronavirus (COVID-19) Infection Survey, UK](#)
Bulletin | Updated weekly
Estimates for England, Wales, Northern Ireland and Scotland. This survey is being delivered in partnership with the University of Oxford, University of Manchester, Public Health England and Wellcome Trust.

[Coronavirus (COVID-19) Infection Survey: characteristics of people testing positive for COVID-19 in England](#)
Bulletin | Updated fortnightly
Characteristics of people testing positive for COVID-19 from the Coronavirus (COVID-19) Infection Survey, including antibody data by UK country, and region and occupation for England. Antibodies data published before 3 February 2021 are available in this series.

[Coronavirus (COVID-19) Infection Survey Technical Article: Impact of vaccination on testing positive in the UK: October 2021](#)
Technical article | Released 18 October 2021
The reduction in risk of testing positive for COVID-19 associated with vaccination overall and by different vaccine types using data from the Coronavirus (COVID-19) Infection Survey. Two time periods were analysed; when the Alpha variant was dominant in the UK (1 December 2020 to 16 May 2021), and when the Delta variant was dominant (17 May to 14 August 2021).

[Coronavirus (COVID-19) Infection Survey technical article: waves and lags of COVID-19 in England, June 2021](#)
Technical article | Released 29 June 2021
Data about the waves and lags of coronavirus from the Coronavirus (COVID-19) Infection Survey. This analysis has been produced in partnership with the University of Oxford.

[Coronavirus (COVID-19) Infection Survey technical article: analysis of reinfections of COVID-19: June 2021](#)
Technical article | Released 29 June 2021
Data about reinfections from the Coronavirus (COVID-19) Infection Survey. This analysis has been produced in partnership with the University of Oxford.

[Coronavirus (COVID-19) Infection Survey technical article: analysis of positivity after vaccination](#)
Technical article | Released 17 June 2021
Data about positivity after vaccination from the Coronavirus (COVID-19) Infection Survey. This analysis has been produced in partnership with the University of Oxford.

[Coronavirus (COVID-19) Infection Survey QMI](#)
QMI | Released 16 July 2021
Quality and Methodology Information for the Coronavirus (COVID-19) Infection Survey (CIS), detailing the strengths and limitations of the data, methods used, and data and users.