

Statistical bulletin

# Coronavirus (COVID-19) Infection Survey, antibody and vaccination data, UK: 7 July 2021

Estimates for England, Wales, Northern Ireland and Scotland. This survey is being delivered in partnership with University of Oxford, University of Manchester, Public Health England 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 UK Biocentre to collect and test samples.

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## Correction

**19 July 2021 11:53**

Following this release, an issue was identified with the dates used for antibody estimates by single year of age for England. This has now been corrected.

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# 1 . Main points

- In England, it is estimated that around 9 in 10 adults, or 89.8% of the adult population (95% credible interval: 88.2% to 91.3%) would have tested positive for antibodies against coronavirus (COVID-19) - SARS-CoV-2 - on a blood test in the week beginning 14 June 2021, suggesting they had the infection in the past or have been vaccinated.
- In Wales, it is estimated that 9 in 10 adults, or 91.8% of the adult population (95% credible interval: 90.1% to 93.3%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in the week beginning 14 June 2021, suggesting they had the infection in the past or have been vaccinated.
- In Northern Ireland, it is estimated that close to 9 in 10 adults, or 87.2% of the adult population (95% credible interval: 84.2% to 90.2%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in the week beginning 14 June 2021, suggesting they had the infection in the past or have been vaccinated.
- In Scotland, it is estimated that over 8 in 10 adults, or 84.7% of the adult population (95% credible interval: 82.4% to 86.9%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in the week beginning 14 June 2021, suggesting they had the infection in the past or have been vaccinated.
- Across all four countries of the UK, 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.

## About this bulletin

On 26 May 2021, we changed from presenting antibody and vaccination data in a fortnightly article to a fortnightly bulletin series. Our [previous articles presenting antibody and vaccination data](#) are still available.

In this bulletin, we refer to the following:

## Antibodies

We measure the presence of antibodies in the community population to understand who has had the coronavirus (COVID-19) 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. Having antibodies can help to prevent individuals from getting the same infection again, or if they do get infected, they 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.

## Community population

In this instance, community population refers to private residential households, and excludes those in hospitals, care homes and/or other institutional settings.

## SARS-CoV-2

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

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 in the UK. We have also included estimates from our survey on the percentage of people who reported they have received at least one dose of a vaccine against SARS-CoV-2, as well as those who have been fully vaccinated against SARS-CoV-2.

It is not yet known how having detectable antibodies, now or at some time in the past, affects the chance of becoming infected or experiencing symptoms, as other parts of the immune system (T cell response) will offer protection. Antibody positivity is defined by a fixed amount of antibodies in the blood. A negative test result will occur if there are no antibodies or if antibody levels are too low to reach this threshold.

It is important to draw the distinction between testing positive for antibodies and having immunity. Following infection or vaccination, antibody levels can vary and sometimes increase but are still below the level identified as "positive" in our test, and other tests. This does not mean that a person has no protection against COVID-19, as an immune response does not rely on the presence of antibodies alone. We also do not yet know exactly how much antibodies need to rise to give protection. [A person's T cell response will provide protection](#) but is not detected by blood tests for antibodies. [A person's immune response is affected by a number of factors](#), including health conditions and age. Additional information on the link between antibodies and immunity and the [vaccine programme](#) can be found in our [latest blog](#).

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 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)<sup>1</sup> data for England. In addition, our sampling method for Northern Ireland is different to the other nations, inviting only people that have previously participated in a Northern Ireland Statistics and Research Agency (NISRA) survey, which could result in a sample of individuals that 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. Our recently published blog provides more information on [what the Office for National Statistics \(ONS\) can tell you about the COVID-19 vaccine programme](#).

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.

## 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, which 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 are fully vaccinated since 15 February 2021.

Our antibodies and vaccination estimates are based on modelling of the people visited in the Coronavirus (COVID-19) Infection Survey in the community. 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 estimate for the most recent week in this publication includes data from 14 to 20 June 2021.

We are presenting weekly modelled antibody estimates for adults by country, grouped age and single year of age for England, Wales, Northern Ireland and Scotland, as well as by regions in England. We present the same analysis for vaccine estimates of adults who reported they have received one or more doses of a COVID-19 vaccine, and for adults who report they are fully vaccinated.

### More about coronavirus

- Find the latest on [coronavirus \(COVID-19\) in the UK](#).
- [Explore the latest coronavirus data](#) from the ONS and other sources.
- All ONS analysis, summarised in our [coronavirus roundup](#).
- View [all coronavirus data](#).
- Find out how we are [working safely in our studies and surveys](#).

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).

### Notes for: Main points

1. National Immunisation Management System (NIMS) administrative data are used to validate Coronavirus (COVID-19) Infection Survey self-reported records of vaccination for England. The equivalent of this is currently not included for other countries meaning the estimates for Wales, Northern Ireland and Scotland are produced only from Coronavirus (COVID-19) Infection Survey self-reported records of vaccination.

## 2 . Percentage of adults testing positive for COVID-19 antibodies and percentage of adults vaccinated against COVID-19 in England, Wales, Northern Ireland and Scotland

The percentage of adults who would have tested positive for coronavirus (COVID-19) antibodies continued to increase across the UK in recent weeks.

Table 1: Estimated percentage of adults who would have tested positive for SARS-CoV-2 antibodies from a blood sample, week beginning 14 June 2021, UK countries

<b>Estimated % of adults who would have tested positive for COVID-19 antibodies</b>		<b>95% credible interval</b>	
<b>Country</b>		Lower	Upper
<b>England</b>	89.8	88.2	91.3
<b>Wales</b>	91.8	90.1	93.3
<b>Northern Ireland</b>	87.2	84.2	90.2
<b>Scotland</b>	84.7	82.4	86.9

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

In the week beginning 14 June 2021, our estimates suggest the percentage of adults who reported they had received at least one dose of a COVID-19 vaccine continued to increase - estimates ranged from 84.2% to 87.8% of adults across the UK. The estimated percentage of adults who are fully vaccinated against COVID-19 varied between 54.8% and 69.0% across the UK in the week beginning 14 June 2021. These vaccination estimates for the community population will differ from [official figures](#).

#### **Figure 1: The percentage of adults testing positive for COVID-19 antibodies and the percentage of adults who reported being vaccinated in England, Wales, Northern Ireland and Scotland continued to increase**

Modelled percentage of: adults testing positive for antibodies to SARS-CoV-2, adults who have received one or more doses of a COVID-19 vaccine; and fully vaccinated adults, UK country, 7 December 2020 to 20 June 2021

#### **Notes:**

1. All results are provisional and subject to revision.
2. These statistics refer to antibody tests and vaccinations in individuals living in the community, by which we mean private households. These figures exclude individuals in hospitals, care homes and/or other institutional settings.
3. 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. 95% credible intervals are calculated so that there is a 95% probability of the true value lying in the interval.
4. 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.
5. Vaccination data for Northern Ireland start later than the other countries, from 21 December 2021.
6. 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 the data](#)

### **3 . Percentage of adults testing positive for COVID-19 antibodies and percentage of adults vaccinated against COVID-19 by regions in England**

In the week beginning 14 June 2021, the estimated percentage of adults testing positive for antibodies continued to increase across all English regions, ranging from 86.6.% in the South West to 89.4% in the North West.

In the week beginning 14 June 2021, our survey showed the estimated percentage of adults who have received one or more doses of a coronavirus (COVID-19) vaccine continued to increase across all regions, ranging from 84.5% in London to 88.6% in the South East. Those who reported they are fully vaccinated continued to increase across all regions, ranging from 55.7.% in London to 68.9% in the East Midlands.

Regional antibody positivity levels are a result of regional COVID-19 infection rates and regional vaccination rollout and uptake.

#### **Figure 2: COVID-19 antibody positivity and the estimated percentage of adults who have been vaccinated across regions in England**

Modelled percentage of: adults testing positive for antibodies to SARS-CoV-2, adults who have received one or more doses of a COVID-19 vaccine; and fully vaccinated adults, regions in England, 7 December 2020 to 20 June 2021

#### **Notes:**

1. All results are provisional and subject to revision.
2. These statistics refer to antibody tests and vaccinations in individuals living in the community, by which we mean private households. These figures exclude individuals in hospitals, care homes and/or other institutional settings.
3. 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. 95% credible intervals are calculated so that there is a 95% probability of the true value lying in the interval.
4. 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.
5. 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 the data](#)

## **4 . Percentage of adults testing positive for COVID-19 antibodies and percentage of adults vaccinated against COVID-19 by grouped age in England, Wales, Northern Ireland and Scotland**

Our survey shows that in recent weeks up to the week beginning 14 June 2021:

- In England and Northern Ireland, the percentage of adults testing positive for antibodies continued to increase in those aged between 25 and 49 years.
- In Wales and Scotland, the percentage of adults testing positive for antibodies continued to increase in those aged between 16 and 49 years.
- Across all four UK countries, estimates of the percentage testing positive for antibodies remain high for those aged 35 years and over.

Antibody positivity increases with age, with the highest percentage testing positive for antibodies in the older age groups and lowest among the youngest groups across the four UK countries; this reflects the age prioritisation in vaccination programmes in place across the UK. The percentage of adults who reported they have received at least one dose of a coronavirus (COVID-19) vaccine is lowest in the younger age groups but is increasing. Across the four UK countries, the estimated percentage of adults aged 25 to 34 years who have received one or more doses of a coronavirus (COVID-19) vaccination ranged from 75.7% to 79.6% - this has increased sharply since the end of May.

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 .

When antibodies are measured over time by age, it is possible to see the impact of the vaccination programme between first and second doses. In March 2021, antibody positivity decreased among people aged 80 years and over and has since increased as a result of second doses. A similar decrease and subsequent increase was seen in those in their 70s at the end of March 2021; for those in their 60s and 50s antibody positivity flattened before increasing in April 2021 and May 2021 respectively.



The percentage of adults testing positive for antibodies varies by age group between the four nations of the UK. This could be explained by different historical trends in COVID-19 infection rates and the approaches to vaccine distribution in different nations. This survey does not include people who live in care homes, one of the priority groups identified by the [Joint Committee on Vaccination and Immunisation \(JCVI\)](#). Daily and weekly counts of vaccine doses administered by nation can be seen in the [Public Health England \(PHE\) dashboard](#).

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 community 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 establishments such as care homes.

### **Figure 3: Percentage of adults testing positive for COVID-19 antibodies and percentage of adults who have been vaccinated by grouped age in England, Wales, Northern Ireland and Scotland**

Modelled percentage of: adults testing positive for antibodies to SARS-CoV-2, adults who have received one or more doses of a COVID-19 vaccine; and fully vaccinated adults, by grouped age, UK countries, 7 December 2020 to 20 June 2021

#### **Notes:**

1. All results are provisional and subject to revision.
2. These statistics refer to antibody tests and vaccinations reported in the community, by which we mean private households. These figures exclude individuals in hospitals, care homes and/or other institutional settings.
3. 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.
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. 95% credible intervals are calculated so that there is a 95% probability of the true value lying in the interval.
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. 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 the data](#)

## 5 . Percentage of adults testing positive for COVID-19 antibodies by single year of age in England, Wales, Northern Ireland and Scotland

The analysis in this section presents modelled daily estimates of antibody positivity by single year of age for England, Wales, Scotland and Northern Ireland separately, between 27 April and 20 June 2021. The modelled data in this section are produced using a different method to the weekly modelled estimates presented in [Section 4](#) and so cannot be compared. Each data point represents a modelled estimate of antibody positivity for a particular day.

This more granular analysis shows a similar pattern to our grouped age analysis, with antibody positivity rising for most ages in England, Wales and Northern Ireland, and for those aged 30 years and over in recent weeks in Scotland. The effect of individuals receiving the second dose of a coronavirus (COVID-19) vaccine is also observed in the older ages in this analysis, with antibody positivity flattening and then increasing most recently in those in their 50s.

### Figure 4: The percentages testing positive for COVID-19 antibodies by single year of age in England, Wales, Northern Ireland and Scotland

Modelled percentage of adults testing positive for antibodies to SARS-CoV-2, by single year of age, UK countries, 27 April to 20 June 2021

#### Notes:

1. All results are provisional and subject to revision.
2. These statistics refer to antibody tests reported in the community, by which we mean private households. These figures exclude individuals in hospitals, care homes and/or other institutional settings.
3. The method used to generate the data differs from the modelled weekly estimates of antibody positivity by age and so is not comparable.

[Download the data](#)

## 6 . Coronavirus (COVID-19) Infection Survey data

[Coronavirus \(COVID-19\) antibody data for the UK](#)

Dataset | Released 7 July 2021

Antibody data for the UK taken from the Coronavirus (COVID-19) Infection Survey.

## 7 . Collaboration

The Coronavirus (COVID-19) Infection Survey analysis was produced by the Office for National Statistics (ONS) in partnership with the University of Oxford, the University of Manchester, Public Health England 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

## 8 . 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.

## 9 . 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.

## 10 . Strengths and limitations

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

## 11 . 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 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: characteristics of people testing positive for COVID-19 in England](#)

Article | Released 20 May 2021

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: antibody and vaccination data for the UK](#)

Article | Released 13 May 2021

Previously published articles on antibody and vaccination data by UK country and English regions from the Coronavirus (COVID-19) Infection Survey. This survey is being delivered in partnership with University of Oxford, University of Manchester, Public Health England and Wellcome Trust.

### [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 University of Oxford.

### [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 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 University of Oxford.