Statistical bulletin

Coronavirus (COVID-19) Infection Survey, characteristics of people testing positive for COVID-19, UK: 16 February 2022

Characteristicsof people testing positive for COVID-19 from the Coronavirus (COVID-19) Infection Survey. This survey is being delivered in partnership with University of Oxford, University of Manchester, UK Health Security Agency andWellcomeTrust.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.

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1 . Main points

- In the fortnight ending 29 January 2022, people previously infected with coronavirus (COVID-19) continued to be less likely to test positive than people not previously infected.

- People who had reported receiving first, second and third COVID-19 vaccines (including booster vaccines) were generally less likely to test positive than people who were not vaccinated, in the fortnight ending 29 January 2022.

- People working in the education sector were more likely to test positive in comparison with other working adults in the fortnight ending 29 January 2022; this is likely because of the recent high infections among school children.

- The risk of reinfection was approximately 10 times higher in the time period when the Omicron variant was most common (20 December 2021 to 6 February 2022) compared with the time period when the Delta variant was most common (17 May to 19 December 2021).

- From 2 July 2020 to 6 February 2022, people who were unvaccinated were approximately twice as likely to be reinfected than people who had their second vaccine 14 to 89 days ago.

About this bulletin

In this bulletin, we present the latest analysis of the characteristics associated with testing positive for SARS-CoV-2, the coronavirus causing the COVID-19 disease in the UK. We also then focus on reinfections and present analysis on characteristics associated with getting reinfected with COVID-19. This is part of our series of analysis on the characteristics of people testing positive for COVID-19.

In this bulletin, we refer to the number of current COVID-19 infections within the population living in private residential households. We exclude those in hospitals, care homes and/or other communal establishments. In communal establishments, rates of COVID-19 infection are likely to be different.

We include current COVID-19 infections, which we define as testing positive for SARS-CoV-2, with or without having symptoms, on a swab taken from the nose and throat.

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 latest insights.
- View all coronavirus data.
- Find out how we are working safely in our studies and surveys.

More information on our headline estimates of the overall number of positive cases in England, Wales, Northern Ireland and Scotland are available in our latest weekly bulletin. Our methodology article provides more information on the methods used for our models.

2 . Characteristics associated with testing positive, UK

This analysis was first presented in our [Analysis of populations in the UK by risk of testing positive for coronavirus (COVID-19)](#) September 2021 publication, which provides a more detailed explanation of the methods used. We present findings for the most recent fortnight in this section, but a longer time series covering 15 August 2021 to 29 January 2022 is available in the [Coronavirus (COVID-19) Infection Survey, characteristics of people testing positive for COVID-19, UK dataset](#).

Estimates of the likelihood of some specific characteristics affecting an individual testing positive can fluctuate from one fortnight to another, meaning that findings that were significant in one period may not necessarily be significant in another period. This may be because the effect of a characteristic is genuinely changing, or because we do not have sufficient individuals with that characteristic in a particular fortnight to exclude any differences we find being down to chance.

Our latest data for the fortnight ending 29 January 2022 show similar conclusions to our last publication, namely:

- people who had reported receiving first, second and third coronavirus (COVID-19) vaccines (including booster vaccines) in most vaccine groups analysed were less likely to test positive than people who were not vaccinated; there was no statistical evidence that having one vaccine more than 90 days ago or a second AstraZeneca or Moderna vaccine 90 to 180 days ago affected a person's likelihood of testing positive

- those who have previously been infected with COVID-19 continued to be less likely to test positive than those who have not

- those who were previously infected with COVID-19 during the period when the Delta variant was most common (May to December 2021) continued to be even less likely to test positive again than those infected prior to this period

- people who had contact with a hospital, as well as people who live with someone who had contact with a hospital, were less likely to test positive, in comparison with those living in households where no one had contact

- people living in more-deprived areas were more likely to test positive than those living in less-deprived areas

- people living in multiple occupancy households were more likely to test positive than people living alone

- young children were most likely to test positive and people aged around 40 years were also more likely to test positive than most other age groups; older people were the least likely to test positive

- people who report regularly using lateral flow tests continued to be more likely to test positive compared with those who do not; this is likely related to those at a higher risk of infection being encouraged to take regular lateral flow tests

In the same fortnight:

- people living in rural villages were less likely to test positive than those living in major urban areas

- people aged under 70 years who live with someone aged 70 years or over were less likely to test positive than people who do not live with anyone in this older age group

- adults who live with a child aged 16 years or under were more likely to test positive than adults who do not live with a child

- ethnic minorities were more likely to test positive than people of White ethnicity

- those who travelled abroad in the last 28 days were more likely to test positive than those who had not

- people who are employed but not working were more likely to test positive than people who are employed and working

- those who work outside of the home and find it difficult to socially distance at work were more likely to test positive than those who work from home

- people working in the education sector were more likely to test positive in comparison with other working adults; this is likely because of the recent high infections among school children

People who had reported receiving first, second and third coronavirus (COVID-19) vaccines (including booster vaccines) in most vaccine groups analysed were less likely to test positive than people who are not vaccinated in the fortnight ending 29 January 2022. However, there was no statistical evidence in this fortnight that having one vaccine more than 90 days ago or a second AstraZeneca or Moderna vaccine 90 to 180 days ago affected a person's likelihood of testing positive. This is different to findings reported previously, which found that those who had received two vaccinations with any COVID-19 vaccine were less likely to test positive than those who were not vaccinated, regardless of time after the second dose. This change in findings for second vaccines may be because of the priority for vaccine rollout. The majority of those who received a second AstraZeneca vaccine were older, and most will now have received a third vaccine. This means that fewer people will have received a second AstraZeneca vaccine only (and no third vaccine) in this latest time period analysed.

Figure 1: People previously infected with COVID-19, and those who received first, second and third coronavirus (COVID-19) vaccines in most vaccine groups analysed continued to be less likely to test positive in the fortnight ending 29 January 2022

Estimated likelihood of testing positive for coronavirus on nose and throat swabs by vaccination status and previous infection, UK, 16 to 29 January 2022

Notes:

1. The core demographic variables, sex, ethnicity, age, geographical region, urban or rural classification of address, deprivation percentile, household size, and whether the household was multigenerational are included to adjust for these factors. The effect of core demographic variables reported in this section are from a separate model that includes only core demographic variables.

2. An odds ratio indicates the likelihood of an individual testing positive for COVID-19 given a particular characteristic or variable. See [glossary](#) for full definition.

3. Figures 1 and 2 present results from the same model. We have divided up the results to make the graphs more accessible.

4. The "pre-Alpha variant period" is defined as before 16 November 2020, the "Alpha variant period" is defined as 16 November 2020 to 16 May 2021, and the "Delta variant period" is defined as 17 May to 19 December 2021. The "Omicron variant period" is defined as from 20 December 2021 onwards. We use all previous positive COVID-19 swab tests, either from the COVID-19 Infection Survey or from Test and Trace data, or a self-reported positive swab test, to classify an infection as a previous infection if it occurred 120 days or more previously with a prior negative test from the survey, or after four consecutive negative survey test results. Therefore previous infection data does not currently cover the Omicron-dominant period.

5. Although included in the model, the effect of 'Any number of vaccines, 21 days or less before the last vaccine' is not included in this figure, but is presented in Table 2a of the [accompanying dataset](#).

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Figure 2: People working in the education sector were more likely to test positive in comparison with other working adults, in the fortnight ending 29 January 2022

Estimated likelihood of testing positive for coronavirus on nose and throat swabs by work and living arrangements, UK, 16 to 29 January 2022

Notes:

1. The core demographic variables, sex, ethnicity, age, geographical region, urban or rural classification of address, deprivation percentile, household size, and whether the household was multigenerational are included to adjust for these factors. The effect of core demographic variables reported in this section are from a separate model that includes only core demographic variables.

2. An odds ratio indicates the likelihood of an individual testing positive for COVID-19 given a particular characteristic or variable. See [glossary](#) for full definition.

3. Figures 1 and 2 present results from the same model. We have divided up the results to make the graphs more accessible.

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People who had physical contact with those aged under 18 years were more likely to test positive for COVID-19 than people who had not

An additional model examines the effect of behavioural characteristics on the likelihood of testing positive, while controlling for the core demographic variables and significant other characteristics shown earlier in this section. This means that we can identify which behavioural characteristics are associated with testing positive while taking other differences between people reporting different behaviours into account.

Our findings suggest that in the fortnight ending 29 January 2022:

- people who had any physical contact with those aged under 18 years were more likely to test positive than people who had no physical contact with those aged under 18 years

- people who had 1 to 10 physical contacts with 18- to 69-year-olds were more likely to test positive than people who had no physical contact with 18- to 69-year-olds

- those who spent more time socialising with others outside their household continued to be more likely to test positive

- school aged children who reported never wearing a face covering at school were more likely to test positive than children who reported always wearing a face covering

- school aged children who reported not needing to wear a face covering in enclosed spaces were more likely to test positive than children who reported always wearing a face covering

- adults who reported sometimes or never wearing a face covering at work were more likely to test positive than adults who reported always wearing a face covering

Figure 3: People who had physical contact with those aged under 18 years were more likely to test positive for COVID-19 than people who had not in the fortnight ending 29 January 2022

Estimated likelihood of testing positive for coronavirus on nose and throat swabs by behavioural characteristics, UK, 16 to 29 January 2022

Notes:

1. The core demographic variables and other characteristic variables presented in Figures 1 and 2 are included to adjust for these factors. Conclusions about the core demographic variables and screened characteristic variables are taken from separate, different models.

2. An odds ratio indicates the likelihood of an individual testing positive for COVID-19 given a particular characteristic/variable. See glossary for full definition.

3. For "time spent socialising outside the home", the odds ratio is per additional occasion spent socialising with people outside of the participant's household in the last seven days.

4. "School age" refers to those aged two years to school Year 11, and "Adults" refers to those in school Year 12 and older.

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Notes for: Characteristics associated with testing positive, UK

1. The "pre-Alpha variant period" is defined as before 16 November 2020, the "Alpha variant period" is defined as 16 November 2020 to 16 May 2021, and the "Delta variant period" is defined as 17 May to 19 December 2021. The Omicron variant period is defined as from 20 December 2021 onwards. We use all previous positive COVID-19 swab tests, either from the COVID-19 infection survey or from Test and Trace data, or a self-reported positive swab test, to classify an infection as a previous infection if it occurred 120 days or more previously with a prior negative test from the survey, or after four consecutive negative survey test results. Therefore previous infection data does not currently cover the Omicron dominant period.

3 . Reinfections with COVID-19, UK

This section looks at the rate of coronavirus (COVID-19) reinfections in the UK, from 2 July 2020 to 6 February 2022.

We first presented results of reinfection analysis in our Coronavirus (COVID-19) Infection Survey technical article: analysis of reinfections of COVID-19: June 2021. The technical article provides a more detailed explanation of the methods used, some of which have since been updated. Improvements to our modelling approach apply to data published from 6 October 2021 onwards. Tables 5a to 5d in the accompanying dataset for this bulletin contain our updated reinfections data.

The analysis presented in this section includes individuals who have had at least one positive test recorded in the survey and meet our criteria for being "at risk" of reinfection where:

- 120 days have elapsed since an individual's first positive test in the survey and their most recent test result was negative

- if 120 days have not passed since their first positive test in the survey, the individual's last positive test has been followed by four consecutive negative tests

An individual being classified as "at risk" reflects that it was possible for a test of theirs to be considered a reinfection if it turns out to be positive. The "at-risk period" refers to the period following the first time we could have defined a reinfection. A reinfection is therefore defined as when an "at risk" individual has a positive test. This analysis only includes COVID-19 Infection Survey test results, in contrast to the definition we use for previous infections in the characteristics associated with testing positive analysis presented in Section 2.

Before 17 May 2021, infections were likely to be compatible with Alpha or other variants. From 17 May to 19 December 2021, substantial numbers of infections compatible with the Delta variant were observed in the survey. From 20 December 2021 onwards, substantial numbers of infections compatible with the Omicron variant were observed in the survey. Therefore, to differentiate between the period when the Alpha or Delta and Omicron variants were most common, we now estimate rates of reinfection up to 19 December 2021 and from 20 December 2021 onwards separately.

There has been a large increase in the rate for all reinfections and reinfections with a high viral load since the Omicron variant became most common

The estimated rate of all reinfections before the Omicron variant became most common up to 19 December 2021, and after the Omicron variant became most common from 20 December 2021 onwards are presented in Table 1. There has been a large increase in reinfection rates since the Omicron variant became most common in December 2021, both for all reinfections and reinfections with a higher viral load (Cycle threshold (Ct) less than 30).

Viral load is approximated by Ct values, which are lower with a high viral load. Participant days at risk and Ct values are further defined in our Glossary.

Table 1: Rate of reinfections per 100,000 participant days at risk
Estimated rate of COVID-19 reinfections per 100,000 participant days at risk, averaged over the periods before and after the Omicron variant became most common, UK, 2 July 2020 to 6 February 2022

Definition	Period	Number of participants at risk	Number of identified reinfections	Estimated rate of reinfections (per 100,000 participant days at risk)	Lower 95% confidence interval	Upper 95% confidence interval
All reinfections	Up to 19 December 2021	24,989	586	11.7	10.7	12.6
	20 December 2021 onwards	30,546	1,141	141.1	133.0	149.5
Reinfections with Ct less than 30	Up to 19 December 2021	24,989	353	7.0	6.3	7.8
	20 December 2021 onwards	30,546	875	108.2	101.1	115.6

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

Notes

1. For this analysis we define reinfection as a new positive test in the survey 120 days or more after an individual's initial first positive test which was preceded by at least one negative test or where an individual has had a subsequent positive test following four consecutive negative tests regardless of the time since the first positive.

2. Up to 19 December 2021, infections were likely to be compatible with Alpha, Delta or other variants. From 20 December 2021 onwards, substantial numbers of infections compatible with the Omicron variant were observed in the survey.

3. A confidence interval gives an indication of the degree of uncertainty of an estimate.

4 . Risk factors associated with COVID-19 reinfections, UK

This section presents updated analysis of the risk factors associated with a coronavirus (COVID-19) reinfection identified among participants across the UK who had previously tested positive in the survey. This analysis included 29,960 participants "at risk" of reinfection and 1,727 reinfections identified between 2 July 2020 and 6 February 2022.

Coronavirus (COVID-19) Infection Survey technical article: analysis of reinfections of COVID-19: June 2021 outlines the model used to investigate how the rate of reinfection varies over time and between individuals. This model explores multiple factors including age, sex, ethnicity, Cycle threshold (Ct) value observed in the initial infection, deprivation, household size, work in patient-facing healthcare, long-term health conditions, vaccination status and the period during which an individual was at risk. For updated methodology, please refer to our technical article.

We define the Alpha variant period as prior to 17 May 2021, the Delta variant period as 17 May to 19 December 2021, and the Omicron variant period as 20 December 2021 onwards.

The risk of reinfection was approximately 10 times higher in the period when the Omicron variant was most common compared with when the Delta variant was most common

The risk of reinfection by characteristic is measured in terms of hazard ratios and presented in Figure 4. In addition to the variables presented in Figure 4, we also looked at the risk of reinfection during the periods when different variants became most common. Compared with the period when the Delta variant was most common, the risk of reinfection was approximately 10 times higher in the period when the Omicron variant was most common (95% confidence interval: 6 to 15 times higher).

People who are unvaccinated were approximately twice as likely to be reinfected than people who had their second vaccine 14 to 89 days ago (95% confidence interval: 1.6 to 2.5 times higher). People who had their second vaccine over 90 days ago were also more likely to be reinfected than people who had their second vaccine more recently from 14 to 89 days ago.

People who reported symptoms within 35 days of the first positive test in their first infection were less likely to be reinfected. People were more likely to be reinfected if they had a lower viral load (higher Ct value) in their first infection; this may be because of a weaker immune response in "milder" primary infections.

Older people were less likely to be reinfected, with a 9% lower risk (95% confidence interval: 5% to 12% lower) for every additional 10 years of age.

People who live in less-deprived areas were less likely to be reinfected than people living in more-deprived areas.

Hazard ratios for all characteristics included in the model and for Ct values can be found in Tables 6a and 6b in the accompanying dataset.

Figure 4: People who were unvaccinated were approximately twice as likely to be reinfected than people who had their second vaccine 14 to 89 days ago

Reinfection hazard ratios for characteristics included in the model, UK, 2 July 2020 to 6 February 2022

Notes:

1. A hazard ratio of greater than 1 indicates more risk in the specified group compared with the reference group, and a hazard ratio of less than 1 indicates less risk.

2. Deprivation is based on an [index of multiple deprivation (IMD)](#) score or equivalent scoring method for the devolved administrations, from 1, which represents most deprived up to 100, which represents least deprived. The hazard ratio shows how a 10 unit increase in deprivation score, which is equivalent to 10 percentiles or 1 decile, affects the likelihood of testing positive for COVID-19.

3. Although included in the model, the effect of periods in which different variants were most common and of Ct values are not included in this figure, but are presented in Tables 6a and 6b of the[accompanying dataset](#), respectively. The effect of calendar periods is not included in this figure because of the much larger scale of the effect of the period when the Omicron variant was most common in comparison with otherfindings.

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5 . Characteristics of people testing positive for COVID-19 data

[Coronavirus (COVID-19) Infection Survey, characteristics of people testing positive for COVID-19, UK](#)
Dataset | Released 16 February 2022
Characteristics of people testing positive for coronavirus (COVID-19) taken from the COVID-19 Infection Survey.

6 . 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, UK Health Security Agency and Wellcome Trust. Of particular note are:

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

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

- Thomas House - The University of Manchester, Department of Mathematics: Reader in mathematical statistics

- Anna Seale - University of Warwick, Warwick Medical School: Professor of Public Health; UK Health Security Agency, Data, Analytics and Surveillance: Scientific Advisor

7 . 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.

Cycle threshold (Ct) values

The strength of a positive coronavirus (COVID-19) test is determined by how quickly the virus is detected, measured by a cycle threshold (Ct) value. The lower the Ct value, the higher the viral load and stronger the positive test. Positive results with a high Ct value can be seen in the early stages of infection when virus levels are rising, or late in the infection, when the risk of transmission is low.

Deprivation

Deprivation is based on an [index of multiple deprivation (IMD)](#) (PDF, 2.18MB) score or equivalent scoring method for the devolved administrations, from 1, which represents most deprived up to 100, which represents least deprived. The hazard or odds ratio shows how a 10-unit increase in deprivation score, which is equivalent to 10 percentiles or 1 decile, affects the likelihood of testing positive for COVID-19.

Multigenerational household

A household was classed as multigenerational if it included individual(s) aged school Year 11 or younger and individual(s) aged school Year 12 to those aged 49 years and individual(s) aged 50 years and over.

Odds ratio

An odds ratio indicates the likelihood of an individual testing positive for COVID-19 given a particular characteristic or variable. When a characteristic or variable has an odds ratio of one, this means there is neither an increase nor a decrease in the likelihood of testing positive for COVID-19 compared with the reference category. An odds ratio greater than one indicates an increased likelihood of testing positive for COVID-19 compared with the reference category. An odds ratio less than one indicates a decreased likelihood of testing positive for COVID-19 compared with the reference category.

Hazard ratio

A measure of how often a particular event happens in one group compared with how often it happens in another group, over time. When a characteristic (for example, being male) has a hazard ratio of one, this means that there is neither an increase nor a decrease in the risk of reinfection compared with a reference category (for example, being female).

Participant days at risk

The risk of reinfection varies from person to person, depending on when they were first infected. People who were first infected in the early part of the survey have had more opportunity to become reinfected compared with someone who has experienced their first infection more recently. Therefore, this analysis uses "participant days at risk" to determine the number of reinfections.

Education sector

Work sectors are self-reported and cover a wide variety of occupations; for example, someone working in the education sector could be a teacher at a primary school or could be a chef at a college.

For more information, see our [methodology page on statistical uncertainty](#).

8 . 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.

Characteristics associated with testing positive analysis

All estimates of the likelihood of testing positive for COVID-19 by characteristic in Section 2 are unweighted. The sample for this analysis includes only those who have tested positive for COVID-19 on a swab test, and so there was no known population of which weighted estimates could be representative.

The analysis is based on statistical models at the UK level and include all participants aged two years and over. Demographic variables included in all models are age, region, sex, ethnicity, deprivation, household size, multigenerational household, and urban or rural classification. Additional variables are included only if found to be significant in the two weeks presented in the bulletin. More information on the methods used in this analysis can be found in our [Coronavirus (COVID-19) Infection Survey technical article: analysis of populations in the UK by risk of testing positive for COVID-19, September 2021.](#)

Reinfections with COVID-19 analysis

All estimates of COVID-19 reinfections in Sections 3 and 4 are unweighted. The sample for this analysis includes only those who have tested positive for COVID-19 on a swab test, and so there was no known population of which weighted estimates could be representative.

9 . Strengths and limitations

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

10 . Related links

[Coronavirus (COVID-19) Infection Survey, UK](#)
Bulletin | Updated weekly
Estimates for England, Wales, Northern Ireland and Scotland.

[Coronavirus (COVID-19) Infection Survey: antibody and vaccination data for the UK](#)
Bulletin | Updated fortnightly
Antibody and vaccination data by UK country and regions in England from the Coronavirus (COVID-19) Infection Survey.

[Coronavirus (COVID-19) Infection Survey technical article: predictors of positivity across countries of the UK, 28 October 2021](#)
Technical article | Released 28 October 2021
Analysis of predictors of positivity across countries of the UK for coronavirus (COVID-19) from the COVID-19 Infection Survey.

[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.

[COVID-19 Infection Survey: methods and further information](#)
Methodology article | Updated 7 February 2022
Information on the methods used to collect the data, process it, and calculate the statistics produced from the COVID-19 Infection Survey.

[The Coronavirus (COVID-19) Infection Survey QMI](#)
Methodology article | Updated 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 uses and users.