Office for National Statistics

Statistical bulletin

Coronavirus (COVID-19) Infection Survey, characteristics of people testing positive for COVID-19, UK: 30 March 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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Table of contents

1 . Main points

- Most people who reported having been vaccinated continued to be less likely to test positive for coronavirus (COVID-19) than those who reported not being vaccinated, in the fortnight up to 12 March 2022.
- People previously infected with COVID-19 continued to be less likely to test positive than those who had not experienced a prior infection, in the fortnight up to 12 March 2022.
- People who reported that they had travelled abroad in the last 28 days continued to be more likely to test positive for COVID-19 than those who had not, in the fortnight up to 12 March 2022.
- People working in a care or nursing home were more likely to test positive for COVID-19 in comparison with other working adults, in the fortnight up to 12 March 2022.
- The risk of re-infection was approximately 10 times higher in the time period when the Omicron variants were most common (20 December 2021 to 20 March 2022), when compared to the time period when the Delta variant was most common (17 May to 19 December 2021).
- From 2 July 2020 to 20 March 2022, people who were unvaccinated were more likely to be re-infected than people who reported they had been vaccinated.

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 present analysis on re-infections and risk factors associated with re-infection. 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.

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.

Please note that the previous release of this bulletin was 2 March 2022. A data only release was published on 16 March 2022. All references within this release stating "in our last publication" refer to the bulletin published on 2 March 2022.

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 data time series covering 26 September 2021 to 12 March 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 are statistically significant in one period may not necessarily be statistically 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 12 March 2022 shows similar conclusions to our last publication 2 March 2022, specifically that:

- people who received a third vaccine 15 to 90 days ago, a second Pfizer vaccine 15 to 90 days ago or more than 180 days ago, a second AstraZeneca vaccine more than 180 days ago, one vaccine 15 to 180 days ago, or any vaccine up to 14 days ago, were less likely to test positive than those who reported not being vaccinated; there was no statistical evidence that having one vaccine more than 180 days ago, a second Pfizer vaccine 91 to 180 days ago or a third vaccine more than 90 days ago affected a person's likelihood of testing positive
- people who had previously been infected [note 1] with coronavirus (COVID-19) continued to be less likely to test positive than those who had not been previously infected
- people who were previously infected with COVID-19 during the period when the Delta variant was most common (May to December 2021) continued to be less likely to test positive than those infected prior to this period
- people who had contact with hospitals, or shared a household with someone who had, continued to be less likely to test positive, compared with those living in households where no one had contact with hospitals
- people who reported that they travelled abroad in the last 28 days continued to be more likely to test positive than those who had not
- people who reported regularly using lateral flow tests continued to be more likely to test positive compared with those who did 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 from ethnic minority groups were less likely to test positive than those reporting White ethnicity
- people who were not working were less likely to test positive than those who were employed and working
- people living in multigenerational households were less likely to test positive than people not living in multigenerational households
- females were less likely to test positive than males
- people who were impacted "a lot" by a disability were less likely to test positive than those who were not impacted by a disability
- people who work in a care or nursing home were more likely to test positive than those who did not
- those living in larger households in Northern Ireland and Scotland were more likely to test positive, but this was not the case in many other parts of the UK
- children and those aged around 30 years were more likely to test positive than people of other ages

Figure 1: People previously infected with COVID-19 and those vaccinated were generally less likely to test positive in the fortnight ending 12 March 2022

Estimated likelihood of testing positive for coronavirus on nose and throat swabs by vaccination status and previous infection, UK, 27 February to 12 March 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 when comparing characteristics. When we report on the effect of these core demographic variables only, they are from a separate model that includes only these 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 presented the results separately 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 from 17 May 2021 onwards.
5. When identifying previous infection, we use all previous positive COVID-19 swab tests, either from the COVID-19 Infection Survey or from Test and Trace data in England, 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 variants period.

Download the data

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Figure 2: People reporting travel abroad in the last 28 days continued to be more likely to test positive for COVID-19 in the fortnight ending 12 March 2022

Estimated likelihood of testing positive for coronavirus on nose and throat swabs by work and living arrangements, UK, 27 February to 12 March 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 when comparing characteristics. When we report on the effect of these core demographic variables only, they are from a separate model that includes only these 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 presented the results separately to make the graphs more accessible.

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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 12 March 2022:

- people who reported having physical contact with those aged under 70 years were more likely to test positive than people who had no physical contact with those aged under 70 years

- people who reported that they spent more time socialising outside their home continued to be more likely to test positive

Figure 3: People who had physical contact with those aged under 70 years were more likely to test positive for coronavirus in the fortnight ending 12 March 2022

Estimated likelihood of testing positive for coronavirus on nose and throat swabs by behavioural characteristics, UK, 27 February to 12 March 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 or 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.

Download the data

.xlsx

Notes for: Characteristics associated with testing positive, UK

1. 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 variants period.

3 . Re-infections with COVID-19, UK

This section looks at the rate of coronavirus (COVID-19) re-infections in the UK, from 2 July 2020 to 20 March 2022.

We first presented results of re-infection analysis in our Coronavirus (COVID-19) Infection Survey technical article: analysis of re-infections 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 re-infections data.

We have updated our definition of a re-infection in this analysis to reflect the shorter time between re-infections that have occurred during the Omicron variants period, compared with earlier variants.

A re-infection was identified in this analysis if any one of the following three conditions were met.

Time since previous infection and number of negative tests, either:

- a positive test 120 or more days after an initial first positive test and following one or more negative tests
- a positive test 90 or more days after an initial first positive test and following two or more negative tests
- a positive test 60 or more days after an initial first positive test and following three or more negative tests
- a positive test after an initial first positive test and following four or more negative tests
- for positive tests on or after 20 December 2021, when Omicron was the main variant, we also include positive tests 90 or more days after an initial first positive test and following one negative test.

High viral load:

Where both the first positive test and subsequent positive test have a high viral load, or there has been an increase in viral load between first positive test and subsequent positive tests.

Evidence of different variant types:

Where there is evidence, based on either genetic sequencing data or gene positivity from the PCR swab test that the variant differs between positive tests.

This analysis includes individuals who have had at least one positive test recorded in the survey and meet our criteria for being "at risk" of re-infection. An individual is classified as "at risk" if it is possible for a test of theirs to be considered a re-infection if it turns out to be positive. The "at-risk period" refers to the period following the first time we could have defined a re-infection based on condition one. A re-infection is therefore only identified 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, which uses data from other sources, and uses a different definition.

From 20 December 2021 onwards, substantial numbers of infections compatible with the Omicron variants were observed in the survey. Therefore, to differentiate between the period when the earlier Alpha or Delta variants were most common from the Omicron variants period, we now estimate rates of re-infection up to 19 December 2021 and from 20 December 2021 onwards separately (see Table 1).

There has been a large increase in the rate for all re-infections and re-infections with a high viral load since the Omicron variants became most common.

Viral load is approximated by Cycle threshold (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: Estimated rate of COVID-19 re-infections per 100,000 participant days at risk, over the periods before and after the Omicron variants became most common, UK, 2 July 2020 to 20 March 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	30,108	702	11.7	10.8	12.5
	20 December 2021 onwards	38,000	2,838	120.0	115.6	124.5
Reinfections with Ct less than 30	Up to 19 December 2021	30,108	415	6.9	6.2	7.6
	20 December 2021 onwards	38,000	2,170	91.8	87.9	95.7

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

Notes

1. In this analysis we define a new positive test as a re-infection based on a combination of the number of days between initial and subsequent positive tests and the number of immediately preceding negative tests and the viral load and variant type of initial and subsequent positive tests.

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 re-infections, UK

This section presents updated analysis of the risk factors associated with a coronavirus (COVID-19) re-infection identified among participants across the UK who had previously tested positive in the survey. This analysis included 37,298 participants "at risk" of re-infection and 3,540 re-infections identified between 2 July 2020 and 20 March 2022.

Coronavirus (COVID-19) Infection Survey technical article: analysis of re-infections of COVID-19: June 2021 outlines the model used to investigate how the rate of re-infection 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
- working in patient-facing healthcare
- long-term health conditions
- vaccination status
- 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 variants period as 20 December 2021 onwards.

The risk of re-infection was approximately 10 times higher in the period when the Omicron variants were most common, compared with when the Delta variant was most common

The risk of re-infection 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 re-infection during the periods when different variants became most common.

- Compared with the period when the Delta variant was most common, the risk of re-infection was approximately 10 times higher in the period when the Omicron variants were most common (95% confidence interval: 8 to 14 times higher).
- People who were unvaccinated were more likely to be re-infected than people who had been vaccinated.
- People who reported symptoms within 35 days of the first positive test in their first infection were less likely to be re-infected. People were more likely to be re-infected if they had a lower viral load (higher Ct value) in their first infection; both of these findings may be because of a weaker immune response in "milder" primary infections.
- Older people were less likely to be re-infected.
- People who live in less deprived areas were less likely to be re-infected than people living in more deprived areas.

Hazard ratios for all characteristics included in the model, including for age and for Ct values separately, can be found in Tables 6a to 6c in the accompanying dataset. Estimated rates of re-infection over time can be found in table 6d in the accompanying dataset.

Figure 4: People who were unvaccinated were more likely to be re-infected compared with people who had been vaccinated.

Re-infection hazard ratios for characteristics included in the model, UK, 2 July 2020 to 20 March 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 the effect of age and of Ct values, are not included in this figure but are presented in Tables 6a to 6c 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 variants were most common in comparison with otherfindings.

Download the data

.xlsx

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 30 March 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 re-infection compared with a reference category (for example, being female).

Participant days at risk

The risk of re-infection 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 re-infected compared with someone who has experienced their first infection more recently. Therefore, this analysis uses "participant days at risk" to determine the number of re-infections.

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.

Re-infections with COVID-19 analysis

All estimates of COVID-19 re-infections 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 re-infections of COVID-19: June 2021
Technical article | Released 29 June 2021
Data about re-infections 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.