

Statistical bulletin

Coronavirus (COVID-19) Infection Survey, characteristics of people testing positive for COVID-19, UK: 2 February 2022

Characteristics of 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 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.

Contact:
Kara Steel and Zoë Willis
infection.survey.analysis@ons.
gov.uk
+44 1633 560499

Release date:
2 February 2022

Next release:
16 February 2022

Table of contents

1. [Main points](#)
2. [Reinfections with COVID-19, UK](#)
3. [Comparison of Cycle threshold \(Ct\) value and risk of symptoms by variant dominant period](#)
4. [Lateral flow test use and positivity](#)
5. [Characteristics of people testing positive for COVID-19 data](#)
6. [Collaboration](#)
7. [Glossary](#)
8. [Measuring the data](#)
9. [Strengths and limitations](#)
10. [Related links](#)

1 . Main points

Up to 23 January 2022:

- Among our survey participants, we have seen more reinfections with coronavirus (COVID-19) in the last month since Omicron became the dominant variant compared with the previous 18 months.
- The viral load in an individual's second infection, when the second infection was in the Delta or Omicron period, was higher (lower Cycle threshold value) compared to their first infection.
- There were similar percentages of people reporting symptoms when their second infection was either in the Delta or Omicron dominant periods.
- The risk of symptoms in an individual's second infection, when the second infection was in the Delta period, was 1.69 times higher (95% confidence interval: 1.22 times to 2.34 times) compared to their first infection.
- There was no difference in the risk of symptoms in an individual's second infection, when the second infection was in the Omicron period compared to their first infection.

About this bulletin

In this bulletin, we present the latest analysis on characteristics of coronavirus (COVID-19) reinfections by period when different variants were dominant. We also present analysis on positivity by lateral flow test usage using data from November 2021. 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 and analysis](#) from the ONS and other sources.
- 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 . Reinfections with COVID-19, UK

This section looks at the rate of coronavirus (COVID-19) reinfections in the UK, from 2 July 2020 to 23 January 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 1a to 1e 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.

The median time between positive episodes in those with reinfections was 328 days or over 10 months (Table 1b in the accompanying dataset for this bulletin).

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, we now estimate rates of reinfection up to 19 December 2021 and from 20 December 2021 onwards separately.

The rate for all reinfections and reinfections with a high viral load has increased sharply

The estimated rate of all reinfections up to 19 December 2021 and over the Omicron dominant period from 20 December 2021 onwards are presented in Table 1. There has been a sharp increase in reinfection rates since the Omicron variant became dominant in December 2021. 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: 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 pre-Omicron period; 2 July 2020 to 19 December 2021 and over the Omicron dominant period; 20 December 2021 to 23 January 2022, UK

Definition	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
Reinfections pre-Omicron	24,989	586	11.7	10.7	12.6
Reinfections in Omicron dominant period, 20 December 2021 onwards	28,678	764	180.3	167.8	193.6
Reinfections with Ct less than 30 pre-Omicron	24,989	353	7.0	6.3	7.8
Reinfections with Ct less than 30 in Omicron dominant period, 20 December 2021 onwards	28,678	584	137.9	126.9	149.5

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

Notes

1. For this analysis we define reinfection as a new positive test 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. The cut-off for defining the pre-Omicron period is 19 December 2021 after which substantial numbers of infections in the survey were compatible with the Omicron variant.
3. A confidence interval gives an indication of the degree of uncertainty of an estimate, showing the precision of a sample estimate. A wider interval indicates more uncertainty in the estimate.

3 . Comparison of Cycle threshold (Ct) value and risk of symptoms by variant dominant period

This section looks at the difference between initial infections and reinfections in terms of viral load. We classify each by the period when different variants were dominant in which the reinfection occurred. The estimated Cycle threshold (Ct) value (an approximation of viral load) at first and second coronavirus (COVID-19) infection is presented in Table 2. We also looked at the risk of symptoms at first and second COVID-19 infection during the periods when different variants were dominant, presented in Table 3. Estimated Ct value and risk of symptoms at a second COVID-19 infection compared with an individual's first infection during periods when the different variants were dominant are presented in Table 4.

Table 2: Estimated Ct value on first and second COVID-19 infections
By variant dominant period in which the second infection occurred, 2 July 2020 to 23 January 2022, UK

Variant dominant period in which the second COVID-19 infection occurred	Infection	Estimated average Ct value	Lower 95% confidence interval	Upper 95% confidence interval
Alpha	First	26.57	24.97	28.16
	Second	30.62	29.02	32.22
Delta	First	28.77	28.23	29.31
	Second	25.77	25.23	26.31
Omicron	First	26.64	26.19	27.09
	Second	24.59	24.14	25.03

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

Notes

1. 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. See glossary for full definition.
2. We define the Alpha-dominant period as prior to 17 May 2021, the Delta-dominant period as 17 May to 19 December 2021, and the Omicron-dominant period as 20 December 2021 onwards.

Table 3: Estimated proportion with symptoms on first and second COVID-19 infections
 By variant dominant period in which the second infection occurred, 2 July 2020 to 23 January 2022, UK

Variant dominant period in which the second COVID-19 infection occurred	Infection	Estimated proportion with symptoms	Lower 95% confidence interval	Upper 95% confidence interval
Alpha	First	0.63	0.51	0.75
	Second	0.20	0.11	0.32
Delta	First	0.32	0.28	0.36
	Second	0.44	0.40	0.49
Omicron	First	0.45	0.42	0.49
	Second	0.46	0.42	0.49

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

Notes

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

Table 4: Estimated Ct value and risk of symptoms at a second COVID-19 infection compared to an individual's first infection

By variant dominant period in which the second infection occurred, 2 July 2020 to 23 January 2022, UK

Variant dominant period in which the second COVID-19 infection occurred	Viral load on second COVID-19 infection compared with first infection	Risk of symptoms at a second COVID-19 infection (odds ratio; compared with first infection)	Lower 95% confidence interval	Upper 95% confidence interval
Alpha	Lower	0.14; 86% lower	0.05	0.42
Delta	Higher	1.69; 1.69 times higher	1.22	2.34
Omicron	Higher	0.99; no evidence of a difference	0.73	1.33

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

Notes

1. The strength of a positive coronavirus (COVID-19) test is determined by how quickly the virus is detected and measured by a cycle threshold (Ct) value. The lower the Ct value the higher the viral load and stronger the positive test. See glossary for full definition.
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. The risk of symptoms refers to reported symptoms at the time of the survey visit.
4. We define the Alpha-dominant period as prior to 17 May 2021, the Delta-dominant period as 17 May to 19 December 2021, and the Omicron-dominant period as 20 December 2021 onwards.

4 . Lateral flow test use and positivity

This analysis looked at reports of “regular” use of lateral flow tests (LFD tests) and if LFD tests were being regularly used by those more at risk of infection. This previously unpublished analysis covers the period between 1 and 14 November 2021 when the Delta variant of coronavirus (COVID-19) was dominant. These results are unlikely to be representative of the current period, where rates of positivity have rapidly increased and LFD test usage has changed, for example, the encouragement of LFD tests at the end of isolation periods. This analysis builds on methods used in the predictors of positivity analysis. More information on the methods used in the predictors of positivity analysis can be found in our [Coronavirus \(COVID-19\) Infection Survey technical article: predictors of positivity across countries of the UK, 28 October 2021](#).

Those who reported they “regularly” use LFD tests at both the latest and previous visit were 1.49 times more likely to test positive for COVID-19 than those who did not report “regular” LFD test use only at the latest visit (95% confidence intervals: 1.31 times to 1.70 times).

Those who reported at their latest visit in this period that they used LFD tests, but did not at their previous visit, were 2.56 times more likely to test positive than those who reported “regular” LFD test use at both visits (95% confidence intervals CI: 2.26 to 2.89). This may be on account of higher infection rates leading to increased contact with people known to have tested positive. Also, these individuals may be taking LFD tests occasionally when they are at higher risk – for example, when they have COVID-19 symptoms or attending events.

This may suggest that individuals are able to correctly identify themselves as being at higher risk and mitigate this by regularly taking LFD tests. Or this may suggest that people who are regularly taking LFD tests may take more risks.

Consistent reporting of “regular” LFD test usage appeared to be a stronger predictor of positivity in younger adults than other ages. However, reported LFD test use at the latest visit but not the previous visit, possibly indicating more intermittent LFD test use, is a stronger predictor of positivity in older adults.

There was no evidence that the impact of LFD test usage on positivity varies between work sectors, different work statuses or by whether people work at or outside their home. However, there are relatively small sample sizes within each work sector, reducing power to detect small differences.

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 2 February 2022

Characteristics of people testing positive for coronavirus (COVID-19) taken from the COVID-19 Infection Survey.

6 . Collaboration



**UK Health
Security
Agency**



The University of Manchester

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

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.

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

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.

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.

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.

Reinfections with COVID-19 analysis

All estimates of COVID-19 reinfections in this analysis were 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](#)

Article | 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: 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](#)

Methods article | Updated 26 March 2021

Information on the methods used to collect the data, process it, and calculate the statistics produced from the COVID-19 Infection Survey pilot.

[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.