Office for National Statistics

Statistical bulletin

COVID-19 antibody and swab positivity by population characteristics in the UK: 8 August to 4 September 2022

Antibody and swabs data broken down by population characteristics, from the Coronavirus (COVID-19) Infection Survey. Experimental Statistics. Thissurveyis delivered in partnership with University of Oxford, University of Manchester,UK Health Security Agency (UKHSA)andWellcomeTrust, working with the University of Oxfordand partner laboratories tocollect and test samples.

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Release date:
13 March 2023

Next release:
To be announced

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1 . Main points

In this new bulletin, which is separate from our regular antibody publication series, we report percentages of the population that were estimated to have antibodies against SARS-CoV-2, the specific virus that causes coronavirus (COVID-19), above varying thresholds and across multiple characteristics in a specific period of time. Additionally, we report percentages of the population that were estimated to have tested positive for COVID-19 infection over the same period, for contextual purposes.

The following points cover the UK during the period from 8 August to 4 September 2022.

- Antibody positivity was greatest in young adults aged 16 to 24 years at the 800 nanograms per millilitre (ng /ml) threshold and older adults aged 70 years and over at the 6000 ng/ml threshold; children aged 8 to 15 years consistently had the lowest antibody levels.
- For adults aged 16 to 69 years, antibody positivity at the 800 ng/ml threshold was lower in those with a disability compared with those that are non-disabled, especially for those reporting that their disability affects them “a lot”.
- For adults aged 50 to 69 years, antibody positivity at the 800 ng/ml threshold was lower in smaller households compared with larger ones.
- For adults aged 16 to 69 years, those who are employed had greater antibody positivity at the 800 ng/ml threshold compared with those not working.
- Adults aged 16 to 69 years in the least deprived Index of Multiple Deprivation (IMD) quintile had greater antibody positivity at the 800 ng/ml threshold compared with those of the same age in the most deprived quintile.
- Children aged 8 to 15 years were the least likely age group to test positive for COVID-19 infection, with all older age groups being more likely to test positive for COVID-19 infection.

About this bulletin

This publication includes estimates of antibody positivity broken down by population characteristics at the following thresholds: 179 nanograms per millilitre (ng/ml), 800 ng/ml, 2,000 ng/ml, 4,000 ng/ml, and 6,000 ng/ml. This publication also includes estimates of COVID-19 infection (based on nose and throat swabs) broken down by the same population characteristics, for contextual purposes. Characteristics explored include age, sex, household size and composition, disability status, and employment.

The antibody and swab positivity estimates used in this publication cover 8 August to 4 September 2022. These dates were chosen because they cover a period when antibody and positivity levels were relatively stable across age groups and were not being affected by an active booster vaccination campaign.

These are Experimental Statistics. The methods are currently under development, which means statistical quality could be improved in the future. We advise caution when using the data.

This bulletin does not directly mention all characteristic breakdowns. Extensive breakdowns for antibody positivity are only included at the 179 and 800 ng/ml thresholds, which can be explored in our datasets. Swab positivity estimates of COVID-19 infection can also be explored in our accompanying datasets.

As age is such an important determinant of vaccination status and previous infection, and therefore antibody levels, most estimates in this bulletin will be provided across different age groups. Overall estimates presented apply to those aged 16 years and over.

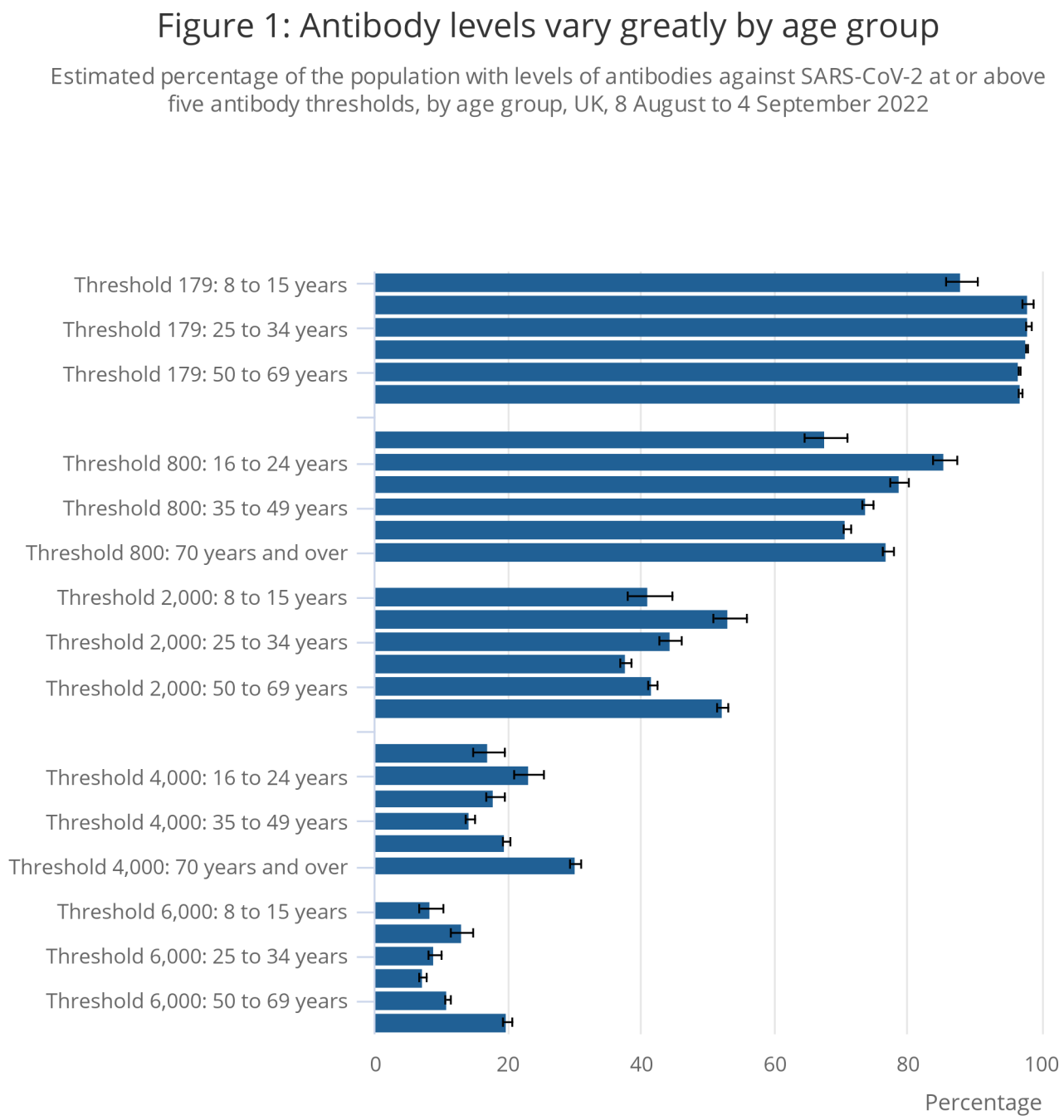
This analysis provides estimates of antibody and swab positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels. For example, if a particular household size is associated with lower antibody levels, this does not necessarily mean that household size influences antibody levels, as different characteristics associated with both antibody levels and household size could instead be the cause.

2 . Antibodies by age and sex

Estimates by age support the findings from our regular antibody publications. In the 28 days leading up to 4 September 2022, the percentage of the adult population estimated to have antibodies against SARS-CoV-2 at the 800 nanograms per millilitre (ng/ml) threshold was greatest in young adults (for instance, 85.5% for those aged 16 to 24 years) and those aged 70 years and over (76.9%). This is likely the result of different infection rates, numbers of vaccinations received, and time since last vaccination across the different age groups in the population. For example, many in the older age groups received a booster vaccination in Spring 2022. At higher antibody thresholds, those aged 70 years and over generally had greater levels of antibody positivity compared with other age groups, likely because this group has had more vaccinations. Differences in antibody positivity between younger and older adults are smaller using the 179 ng/ml threshold, potentially reflecting the generally higher COVID-19 infection rates in younger adult age groups over the course of the Coronavirus Infection Survey, and the generally high uptake of first and second vaccinations across adult age groups. Lower antibody positivity among children aged 8 to 15 years likely reflects lower vaccination rates for this age group. For swab positivity, estimates for the 28 days leading up to 4 September 2022 provide evidence that children aged 8 to 15 years were less likely to test positive for COVID-19 (1.1%) than any other age group.

Figure 1: Antibody levels vary greatly by age group

Estimated percentage of the population with levels of antibodies against SARS-CoV-2 at or above five antibody thresholds, by age group, UK, 8 August to 4 September 2022



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

Notes:

1. These statistics refer to antibody tests for individuals living in private households. They exclude those in hospitals, care homes or other communal establishments.

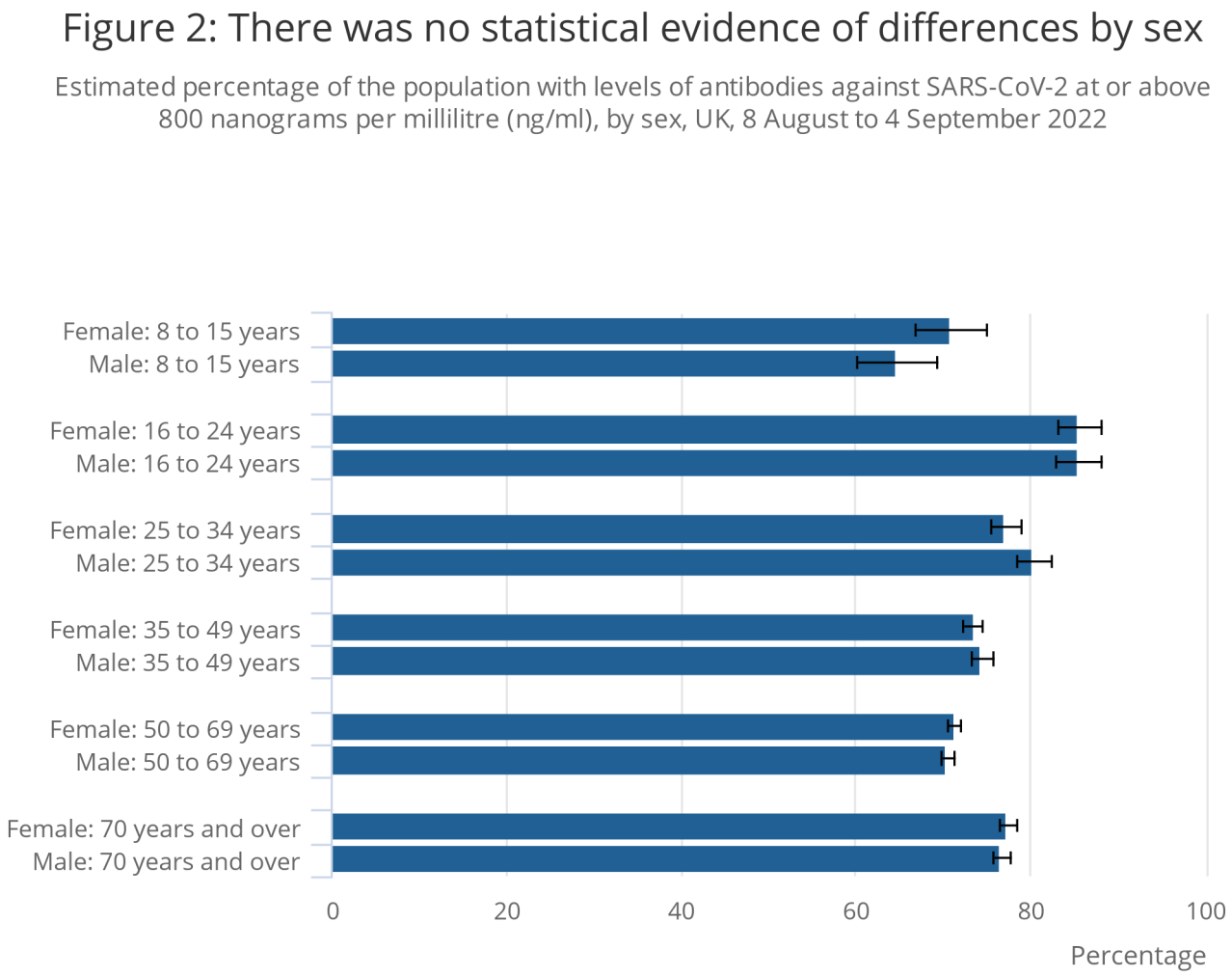
2. All estimates are subject to uncertainty, given that a sample is only part of the wider population. A confidence interval gives an indication of the uncertainty of an estimate from data analysis.

3. This analysis provides estimates of antibody positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels.

There was no statistical evidence of differences in antibody and swab positivity by sex.

Figure 2: There was no statistical evidence of differences by sex

Estimated percentage of the population with levels of antibodies against SARS-CoV-2 at or above 800 nanograms per millilitre (ng/ml), by sex, UK, 8 August to 4 September 2022



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

Notes:

1. These statistics refer to antibody tests for individuals living in private households. They exclude those in hospitals, care homes or other communal establishments.

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

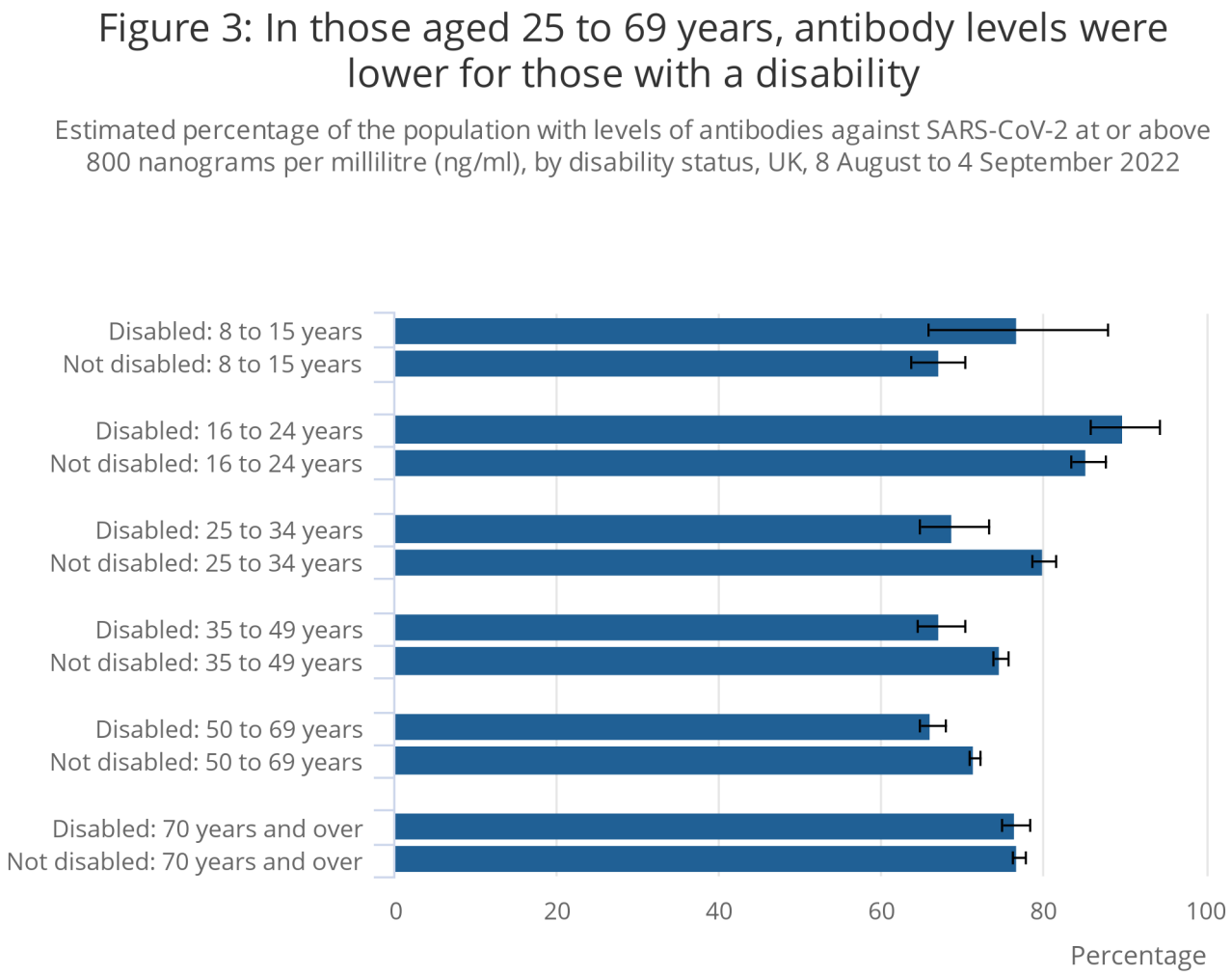
3. This analysis provides estimates of antibody positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels.

3 . Antibodies by disability status

In the 28 days leading up to 4 September 2022, the percentage of the adult population aged 16 years and over estimated to have antibodies against SARS-CoV-2 at or above the threshold of 800 nanograms per millilitre (ng /ml) was lower for those with a disability (71.8%) compared with the rest of the population (76.3%), particularly for those who reported that their conditions affected their day-to-day activities “a lot” (68.0%). The main contributor to these differences appears to be the group aged 25 to 69 years. For instance, 67.3% of disabled and 74.6% of non-disabled individuals aged 35 to 49 years tested positive for antibodies at this threshold. We did not find any statistical evidence for a difference between disabled and non-disabled individuals aged 70 years and over. For swab positivity in the 28 days leading up to 4 September 2022, there was no statistical evidence of differences by disability status.

Figure 3: In those aged 25 to 69 years, antibody levels were lower for those with a disability

Estimated percentage of the population with levels of antibodies against SARS-CoV-2 at or above 800 nanograms per millilitre (ng/ml), by disability status, UK, 8 August to 4 September 2022



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

Notes:

1. These statistics refer to antibody tests for individuals living in private households. They exclude those in hospitals, care homes or other communal establishments.

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

3. This analysis provides estimates of antibody positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels.

4. Disability status is based on the study participant response to "Do you have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more?"

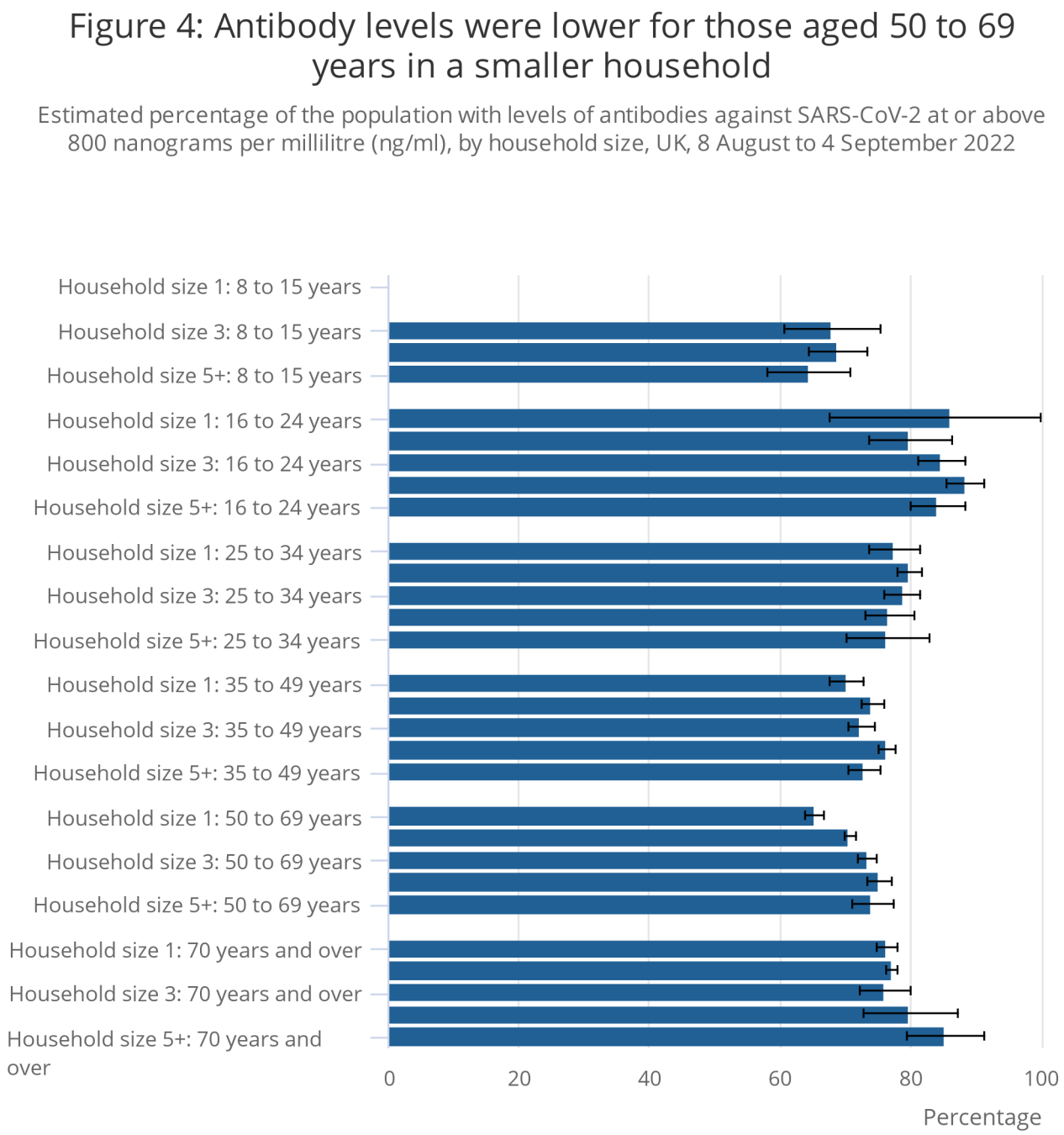
4 . Antibodies by household structure, employment, and deprivation

In the 28 days leading up to 4 September 2022, the percentage of the adult population aged 50 to 69 years estimated to have antibodies against SARS-CoV-2 at or above the threshold of 800 nanograms per millilitre (ng /ml) was generally lower in smaller households compared with larger ones (ranging from 65.2% in single-person households to 75.1% in four-person households). At the same antibody threshold, those aged 16 to 69 years similarly had higher antibody levels if they were in a multigenerational household (79.6%) when compared with those who were not (75.1%). For swab positivity in the 28 days leading up to 4 September 2022, those aged 16 years and over living in single-person households were less likely to test positive for COVID-19 (1.6%) than those living in two-person households (1.9%). There was no statistical evidence of differences in swab positivity between those aged 16 years and over living in multigenerational and non-multigenerational households.

As shown in this GOV.UK article, household structure is known to be linked to ethnicity, breakdowns for which have not been included in this analysis because further quality assurance is required. We advise caution in interpreting these experimental statistics, see Section 8: Strengths and limitations for details.

Figure 4: Antibody levels were lower for those aged 50 to 69 years in a smaller household

Estimated percentage of the population with levels of antibodies against SARS-CoV-2 at or above 800 nanograms per millilitre (ng/ml), by household size, UK, 8 August to 4 September 2022



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

Notes:

1. These statistics refer to antibody tests for individuals living in private households. They exclude those in hospitals, care homes or other communal establishments.

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

3. This analysis provides estimates of antibody positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels.

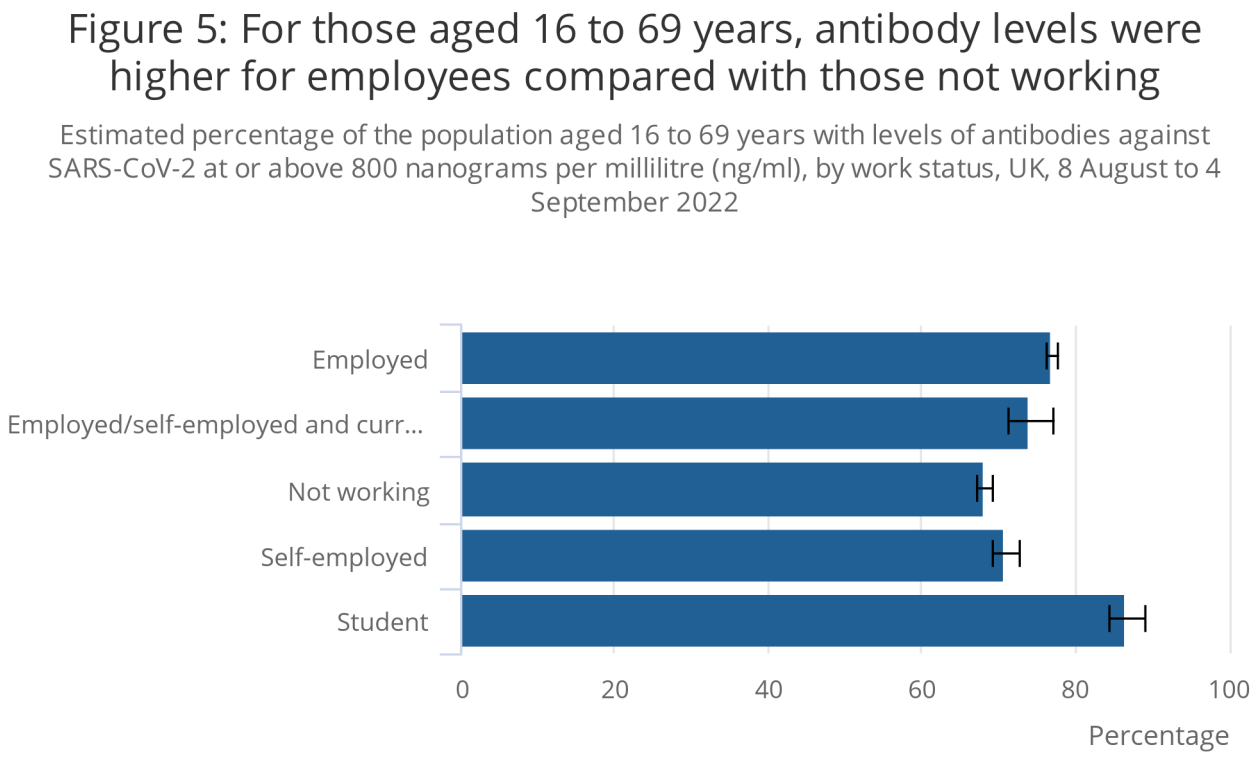
4. Estimates for some categories have been suppressed because of low sample counts.

5. Household structure is known to be linked to ethnicity, breakdowns for which have not been included in this analysis because further quality assurance is required. We advise caution in interpreting these experimental statistics.

Employees aged 16 to 69 years generally had higher antibody levels at the 800 ng/ml threshold compared with those not working. For instance, 76.9% of the employed group tested positive at the 800 ng/ml threshold, compared with 68.1% of those not working. The high antibody levels in the student category reflects the high representation of young adults in this category who generally have high antibody levels at this threshold (see Figure 1). For swab positivity in the 28 days leading up to 4 September 2022, students aged 16 to 69 years were less likely to test positive for COVID-19 (1.3%) than those who were employed (1.8%), not working (1.9%) or employed/self-employed and currently not working (2.5%). Additionally, employees aged 16 to 69 years were less likely to test positive for COVID-19 than those who were employed/self-employed and currently not working.

Figure 5: For those aged 16 to 69 years, antibody levels were higher for employees compared with those not working

Estimated percentage of the population aged 16 to 69 years with levels of antibodies against SARS-CoV-2 at or above 800 nanograms per millilitre (ng/ml), by work status, UK, 8 August to 4 September 2022



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

Notes:

1. These statistics refer to antibody tests for individuals living in private households. They exclude those in hospitals, care homes or other communal establishments.

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

3. This analysis provides estimates of antibody positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels.

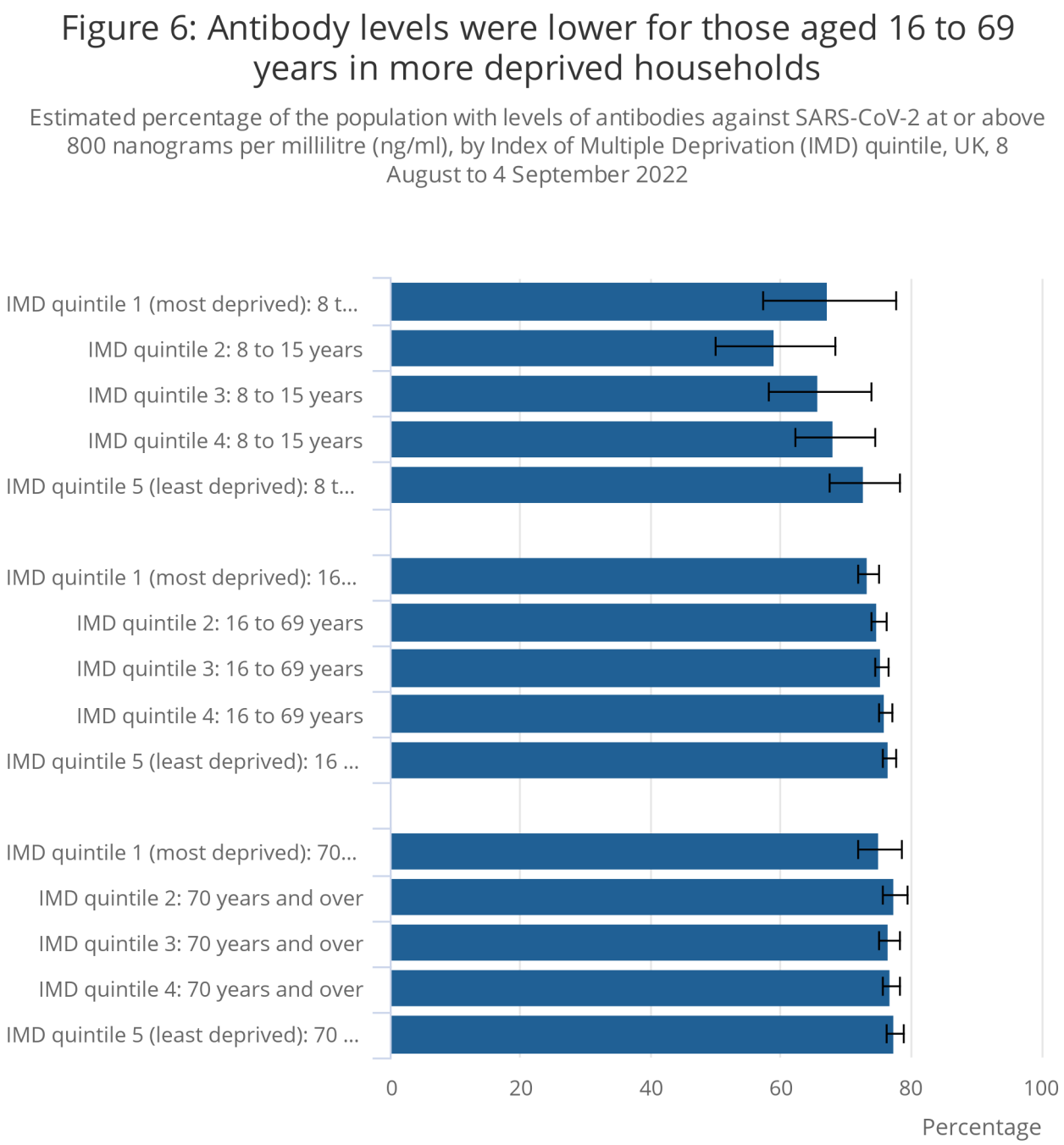
4. The high antibody levels in the student category reflects the high representation of young adults in this category who generally have high antibody levels at this threshold.

The percentage of the adult population estimated to have antibodies at the 800 ng/ml threshold was generally lower for more deprived households compared with less deprived households. For instance, 76.6% of adults aged 16 to 69 years in the least deprived Index of Multiple Deprivation (IMD) quintile (IMD quintile 5) tested positive at this threshold, compared with 73.4% of those in the most deprived quintile for the same age. For swab positivity in the 28 days leading up to 4 September 2022, there was no statistical evidence of differences by IMD quintile for those aged 16 years and over.

As shown in this GOV.UK article, Deprivation is known to be linked to ethnicity, breakdowns for which have not been included in this analysis because further quality assurance is required. We advise caution in interpreting these experimental statistics, see Section 8: Strengths and limitations for details.

Figure 6: Antibody levels were lower for those aged 16 to 69 years in more deprived households

Estimated percentage of the population with levels of antibodies against SARS-CoV-2 at or above 800 nanograms per millilitre (ng/ml), by Index of Multiple Deprivation (IMD) quintile, UK, 8 August to 4 September 2022



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

Notes:

1. These statistics refer to antibody tests for individuals living in private households. They exclude those in hospitals, care homes or other communal establishments.

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

3. This analysis provides estimates of antibody positivity levels in different population groups; however, it does not imply that these differences are causal as it does not control for the range of variables likely to influence positivity levels.

4. Deprivation is known to be linked to ethnicity, breakdowns for which have not been included in this analysis because further quality assurance is required. We advise caution in interpreting these experimental statistics.

5 . Coronavirus (COVID-19) Infection Survey data

COVID-19 Antibody and Swab positivity by population characteristics in the UK: 8 August to 4 September 2022
Dataset | Released 13 March 2023
Antibody data by UK country and regions in England from the Coronavirus (COVID-19) Infection Survey.

6 . Glossary

Antibodies

We measure the levels of antibodies in people who live in private households to understand who has had 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. Antibodies can help prevent individuals from getting the same infection again. Once infected or vaccinated, antibodies remain in the blood at low levels and can decline over time.

SARS-CoV-2

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

Confidence interval

A confidence interval, as explained in our article about how we measure for uncertainty, 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.

7 . Measuring the data

Reference dates

The antibody and contextual swab positivity estimates used in this publication cover 8 August to 4 September 2022. These dates were chosen because they cover a period when antibody and positivity levels were relatively stable across age groups and were not being affected by an active booster vaccination campaign.

Survey data

The analysis on antibodies in this bulletin is based on blood test results taken from a randomly selected subsample of individuals aged eight years and over who live in private households. The blood samples are used to test for antibodies against SARS-CoV-2. The analysis on swab positivity in this bulletin is based on nose and throat test results taken from a randomly selected subsample of individuals aged two years and over who live in private households (note that to match the antibodies analysis age groups, those aged two to seven years in the swab subsample were excluded from this analysis). The survey excludes those in hospitals, care homes and other communal establishments.

Participants completed the survey questionnaire online or by telephone and returned swab and blood sample kits through the post (or by courier for some participants), as explained in our article, The COVID-19 Infection Survey is changing. What does this mean for how the UK monitors the virus? Estimates are based on remote data collection alone.

The methods used in this publication differ from those of our regular antibody bulletin series and our regular swab positivity bulletin series. A 28-day cross-sectional dataset was produced using the COVID Infection Survey, providing a snapshot of antibody levels and swab positivity over a specific time period. Subsequent estimation is using frequentist methods instead of Bayesian methods. Therefore, uncertainty is reported using confidence intervals in this publication, in contrast to our regular bulletin series in which credible intervals are used.

For swab positivity estimates, the confidence intervals were calculated using the Korn-Graubard method to take into account the expected small number of positive cases. This is the same method that was used for 14-day weighted estimates that were produced in the earlier stages of the pandemic (last presented on 13 May 2022 and described in our methodology article).

Our Coronavirus (COVID-19) Infection Survey: methodology article provides further information around the survey design, how we process data, and how data are analysed. Our Coronavirus (COVID-19) Infection Survey QMI explains the strengths and limitations of the data, methods used, and data uses and users.

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

Antibodies and immunity

Antibody positivity is defined by having a fixed concentration of antibodies in the blood. A negative test result occurs if there are no antibodies, or if antibody levels are too low to reach a threshold at the time of testing. It does not mean that their antibody level is at zero or that a person has no protection against COVID-19. Additionally, there are other parts of the immune system that will offer protection, for example, a person's T-cell response. This will not be detected by blood tests for antibodies. A person's immune response is affected by a number of factors, including health conditions and age.

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

Measuring antibody positivity

Information on measuring antibody positivity, including the choice of thresholds, can be found in the Measuring the data section of our regular antibody bulletin series.

8 . Strengths and limitations

Strengths

This analysis is based on data from the Coronavirus (COVID-19) Infection Survey (CIS), which is a large study that provides an important indicator of national COVID-19 infection and antibody positivity. CIS responses are weighted to represent the UK population in private households according to sex, age, ethnicity (white and ethnic minorities), and country. The sampling weights are adjusted to account for non-response to the survey over the reference period.

Limitations

The reported 95% confidence intervals account for the survey weights and the household-clustered design of the CIS sample. Survey weights account for sex, age, ethnicity (white and ethnic minorities), and country. These weights do not account for vaccination, previous infection, household size, deprivation, or employment status.

Breakdowns by ethnicity were also explored, however these were not included for quality assurance reasons because of the association between vaccination and ethnicity. To incorporate in a future analysis, we would need to adjust for vaccination status to ensure the results meet our quality standards. Respondents from all ethnic groups are still included in the data. Some of the characteristics will have an association with ethnicity, which we have not adjusted for. For example, household size varies by ethnic group, as shown in this GOV.UK article. Therefore, we advise caution in the interpretation of these characteristics since ethnicity may be having an effect. However, we believe this risk to be small in terms of overall conclusions. The relationship between ethnicity, risk of infection with COVID-19 and antibodies will be investigated in future work.

9 . Related links

Coronavirus (COVID-19) Infection Survey, antibody data, UK: 18 January 2023
Bulletin | Released 18 January 2023
Antibody data, by UK country and age, from the Coronavirus (COVID-19) Infection Survey. Thissurveyis delivered in partnership with University of Oxford, University of Manchester,UK Health Security Agency (UKHSA)andWellcomeTrust, working with the University of Oxfordand partner laboratories tocollect and test samples.

Coronavirus (COVID-19) Infection Survey, Quality Report: September 2022
Article | Released 23 September 2022
This quality report presents information on the Coronavirus (COVID-19) Infection Survey data collection method change from study worker home visit to remote data collection.

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

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

Coronavirus (COVID-19) Infection Survey technical article: Characteristics associated with third vaccination uptake: 21 April 2022
Technical article | Released 21 April 2022
Analysis of populations in the UK by likelihood of having received a third vaccination against COVID-19 using 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.

Coronavirus (COVID-19) Infection Survey technical article: Cumulative incidence of the number of people who have tested positive for COVID-19, UK: 22 April 2022
Technical article | Released 22 April 2022
Analysis of the number of people in the UK who have tested positive for COVID-19 using 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.

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

Coronavirus (COVID-19) Infection Survey QMI
Methodology | Last revised 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.

10 . Cite this statistical bulletin

Office for National Statistics (ONS), released 13 March 2023, ONS website, statistical bulletin, COVID-19 Antibody and Swab positivity by population characteristics in the UK: 8 August to 4 September 2022