Office for National Statistics

Statistical bulletin

Coronavirus (COVID-19) Infection Survey pilot: England and Wales, 7 August 2020

Initial data from the COVID-19 Infection Survey. This survey is being delivered in partnership with IQVIA, Oxford University and UK Biocentre.

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To be announced

Notice

14 August 2020

Estimates of positive COVID-19 cases for the South East are incorrect in Coronavirus (COVID-19) Infection Survey pilot bulletins published between 25 June and 7 August 2020. The correct estimates including a back series can be found in publications and accompanying datasets from 14 August 2020 onwards. We apologise for any inconvenience caused.

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1 . Main points

- An estimated 28,300 people (95% credible interval: 18,900 to 40,800) within the community population in England had the coronavirus (COVID-19) during the most recent week, from 27 July to 2 August 2020, equating to around 1 in 1,900 individuals.
- Modelling shows rates of people testing positive for COVID-19 have risen since the lowest recorded estimate, which was at the end of June, but there is evidence that this trend may be levelling off when compared with last week's headline estimate.
- There is no clear evidence from this survey to say whether COVID-19 infection rates differ by region in England, nor whether infection rates have increased in different regions over the past six weeks.
- During the most recent week (27 July to 2 August 2020), we estimate there were around 0.68 (95% credible interval: 0.38 to 1.17) new COVID-19 infections for every 10,000 people in the community population in England, equating to around 3,700 new cases per day.
- Modelling shows that the incidence rate has increased since the lowest recorded estimate, which was at the end of June, but there is evidence this trend may be levelling off when compared with last week's headline estimate.
- We have extended the survey to Wales. During the most recent week (27 July to 2 August 2020), we estimate that 1,400 people in Wales had COVID-19 (95% credible interval: 400 to 3,400). This is around 1 in 2,200 people.

In this bulletin, we refer to the number of current COVID-19 infections within the community population; community in this instance refers to private residential households, and it excludes those in hospitals, care homes or other institutional settings.

We use current COVID-19 infections to mean testing positive for SARS-CoV-2, with or without having symptoms, on a swab taken from the nose and throat.

How the data in this bulletin can be used

The data can be used for:

- estimating the number of current positive cases in the community, including cases where people do not report having any symptoms
- identifying differences in numbers of positive cases between different regions
- estimating the number of new cases and change over time in positive cases

The data cannot be used for:

- measuring the number of cases and infections in care homes, hospitals and other institutional settings
- estimating the number of positive cases and new infections in smaller geographies, such as towns and cities
- providing information about recovery time of those infected

2 . Number of people in England who had COVID-19

Number of people in England testing positive for COVID-19 has increased since the low point at the end of June, but may be levelling off.

During the most recent week of the study[1], we estimate that 28,300 people in England had COVID-19 (95% credible interval: 18,900 to 40,800)[2]. This equates to 0.05% (95% credible interval: 0.03% to 0.07%) of the population in England or around 1 in 1,900 people (95% credible interval: 1 in 2,900 to 1 in 1,300). This is based on exploratory modelling of throat and nose swab results.

In response to requests for clarity on previous official estimates, we have reviewed our approach to presenting previous data. In order to provide stability in estimates, we advise using estimates we published in previous bulletins as these are our official estimates of the rate and spread of COVID-19 infections in the community in England.

The modelled estimates should still be used to analyse change over time, but as the model works by smoothing the series to see a trend, the at-point-in-time estimates will be revised each week. As this is a pilot study where the analysis is developed at pace, we always look to improve the quality and coherence of our estimates, which may lead to minor changes.

Figure 1 presents modelled estimates of infection rates over time. While the percentage of individuals testing positive for COVID-19 has decreased since the start of the study (26 April 2020), modelling suggests it has been rising[3] since the lowest recorded estimate, which was at the end of June. There is now evidence to suggest that this trend may have levelled off.

The modelled estimates for the latest six-week period are based on 119,853 swab tests collected over this period. During these weeks, 53 individuals from 53 households tested positive.

Using data from only the most recent six weeks in the model enables us to increase the speed at which we can produce estimates, and will allow us to continue to provide timely results[4]. More information about the methods used in the regression model is available in our methodology article.

As this is a household survey, our figures do not include people staying in hospitals, care homes or other institutional settings. In these settings, rates of COVID-19 infection are likely to be different. More information about rates of COVID-19 in care homes can be found in Impact of coronavirus in care homes in England: 26 May to 19 June 2020.

Figure 1: Number of people in England testing positive for COVID-19 has increased since the low point at the end of June, but may be levelling off

Estimated percentage of the population in England testing positive on nose and throat swabs for the coronavirus (COVID-19) daily since 22 June 2020

Notes:

1. These results are provisional and subject to revision.

2. The break distinguishes between the latest six-week estimates, and the earlier periods, which were modelled on 22 July.

3. All estimates are subject to uncertainty, given that a sample is only part of the wider population. The model used to provide these estimates is a Bayesian model: these provide 95% credible intervals. A credible interval gives an indication of the uncertainty of an estimate from data analysis. 95% credible intervals are calculated so that there is a 95% probability of the true value lying in the interval.

4. This analysis was produced with our research partners at the University of Oxford.

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We also present the estimates in non-overlapping 14-day periods in the dataset that accompanies this bulletin. The 14-day estimates are provided for context. While the confidence intervals for these estimates are overlapping, they show a similar trend to the modelled estimates in Figure 1: that the percentage of people testing positive for COVID-19 has increased in recent weeks.

Information about how the 14 day non-overlapping estimates are calculated can be found in our methods article.

More about coronavirus

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

Notes for Number of people in England who had COVID-19:

1. This is based on model estimates from the week's midpoint, Thursday 30 July.

2. These results are provisional and subject to revision.

3. We have done some additional analysis to explore the likelihood that this is a real increase. Based on our best estimates, it is likely (82% probability) that the latest modelled rate is higher than it was at the lowest modelled point in the most recent six-week period.

4. Historical estimates, provided here for context, were modelled on 22 July.

3 . Regional analysis

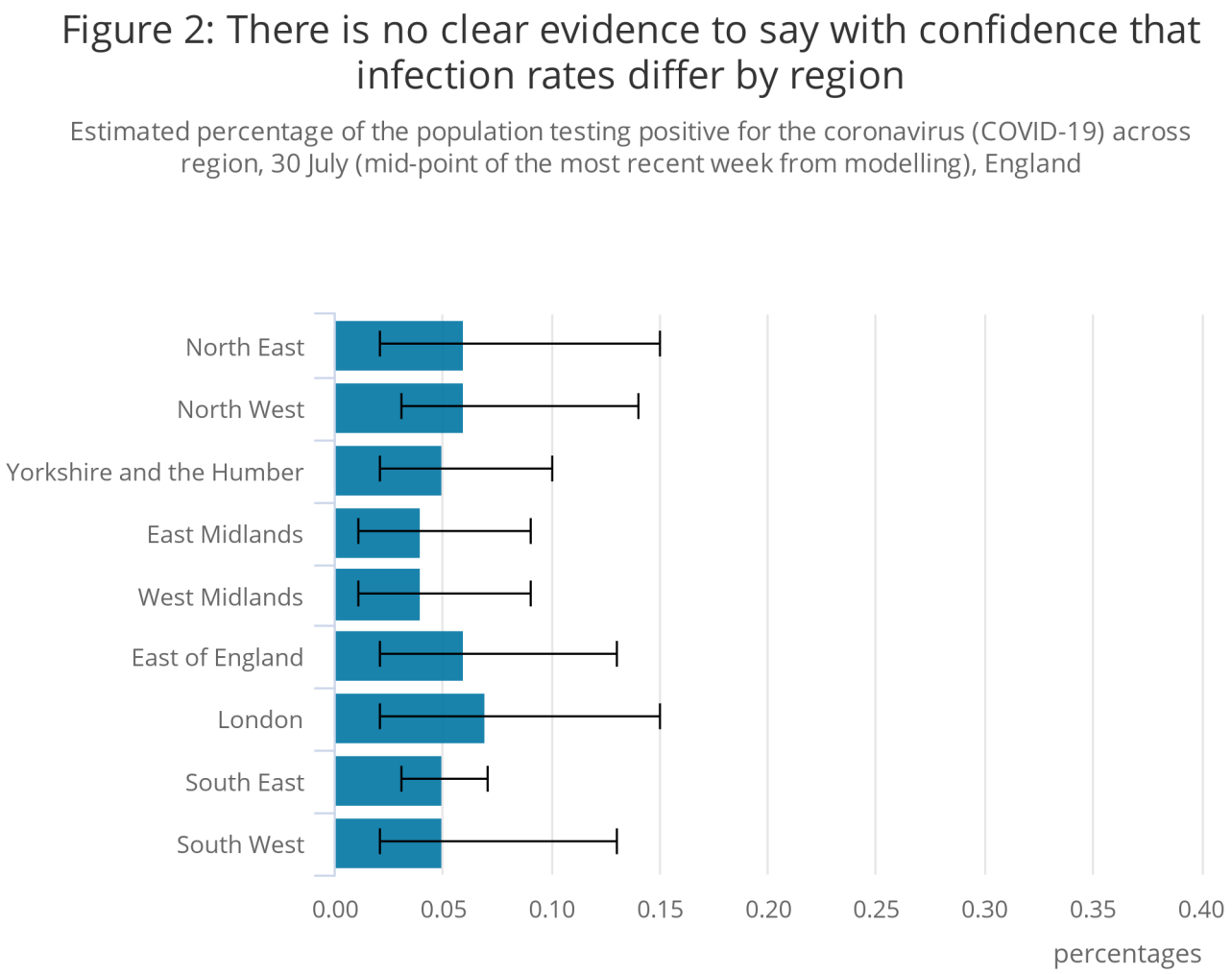
There is no clear evidence from this survey to say there are differences in the percentage of people testing positive for the coronavirus (COVID-19) in different regions of England

There is no clear evidence from this survey that there is a difference in infection rates by regions during the most recent week of the study (27 July to 2 August 2020). This is based on exploratory modelling of nose and throat swab test results.

In the data used to produce these estimates, the number of people sampled in each region who tested positive for COVID-19 is low relative to England overall. This means there is a high degree of uncertainty in the regional estimates for this period, as indicated by large credible intervals.

Figure 2: There is no clear evidence to say with confidence that infection rates differ by region

Estimated percentage of the population testing positive for the coronavirus (COVID-19) across region, 30 July (mid-point of the most recent week from modelling), England



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

Notes:

1. These statistics refer to infections reported in the community, by which we mean private households. These figures exclude infections reported in hospitals, care homes or other institutional settings.

2. Results for this period are provisional as we are still receiving swab test results. This may result in further revisions to the figure.

3. This analysis was produced with our research partners at the University of Oxford.

Looking at trends over time, there is no clear evidence to say that COVID-19 infection rates have changed over the most recent six-week period in any region. The percentage of people testing positive by region was calculated using a similar modelling approach to the national daily estimates in Section 2: Number of people in England who had COVID-19.

The analysis is conducted over a six-week period, which means some individuals testing positive for COVID-19 may move into and then out of the sample. This, together with the low number of positive tests by region, causes variability between estimates over time.

Figure 3: There is high uncertainty within regional estimates with no clear evidence from this survey of recent increases

Estimated percentage of the population testing positive for the coronavirus (COVID-19) on nose and throat swabs daily by region since 22 June 2020, England

Notes:

1. These statistics refer to infections reported in the community, by which we mean private households. These figures exclude infections reported in hospitals, care homes or other institutional settings.

2. Results for this period are provisional, as we are still receiving swab test results. This may result in further revisions to the figure.

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4 . Incidence rate in England

The number of people newly infected with the coronavirus (COVID-19) has increased, but there is evidence that this trend may levelling off.

Based on exploratory modelling, (27 July to 2 August), we estimate that there were 0.68 new infections per 10,000 people per day (95% credible interval: 0.38, 1.17) This equates to 3,700 new infections per day (95% credible interval: 2,100 to 6,400).

Our modelling suggests that the incidence of new cases of COVID-19 has increased following our lowest estimate, which occurred at the end of June 2020 but there is evidence that this trend may be levelling off.

The modelling used to calculate the incidence rate is a Bayesian model that is based on the same approach used for estimating the positivity rates estimates in this bulletin. The model uses all swab test results to estimate the incidence rate for each different type of respondent (by age, sex and region) who tested negative when they first joined the study. It is made to be representative of the overall population using population data. More information on the methodology of this approach is available.

Figure 4: The latest exploratory modelling shows some evidence of an increase in the rate of new infections per day over recent weeks

Estimated numbers of new infections with the coronavirus (COVID-19), England, based on tests conducted daily since 11 May 2020

Notes:

1. Credible intervals are large at both ends of the plot because there is less information available. At the end, although we know that individuals have been visited, there is a short delay in getting the associated swab results. The model does not include people when their next swab result is not known, so the sample size for the most recent days is smaller, resulting in wider credible intervals. At the start, we had fewer people in the study.

2. Results for the most recent period is provisional, as we are still receiving swab test results. This may result in further revisions to the figure.

3. This model does not control for household clustering, where multiple new cases derive from the same household.

Download this chart

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For context, we also present the incidence rate in non-overlapping 14-day periods, which are available in the dataset that accompanies this bulletin.

The incidence rate for households, which controls for any household clustering in new infections, follow a similar trend as for individuals. These are based on 14-day non-overlapping period estimates. The household incidence rates can be found in the dataset.

The incidence rate measures the occurrence of new cases of COVID-19 and the calculation of this is defined in Section 9: Glossary. The incidence rate is not the same as the reproduction rate (R), which is the average number of secondary infections produced by one infected person.

To calculate the estimated average number of people becoming newly infected per day, we multiply the daily incidence rate by the community population (54,628,600, see Coverage in Section 10: Measuring the data). We use the unrounded incidence rate to do this, so results will differ if calculated using the rounded estimates from the dataset.

5 . Number of people in Wales who had COVID-19

Survey fieldwork in Wales began on 29 June 2020 and we now have enough data to produce modelled estimates for the first time. During the most recent week of the study [1], we estimate that 1,400 people in Wales had the coronavirus (COVID-19) (95% credible interval: 400 to 3,400)[2]. This equates to 0.05% (95% credible interval: 0.01% to 0.11%) of the population in Wales or around 1 in 2,200 people (95% credible interval: 1 in 7,800 to 1 in 900). This is based on exploratory modelling of throat and nose swab results. In Wales, the sample size was 4,175 tests and there were fewer than three positive swab tests.

The Welsh Government also publish results from this survey that describe COVID-19 infections in Wales in English and in Welsh.

The survey has also begun in Northern Ireland and we will publish estimates for Northern Ireland when we have a sufficiently large sample. We are working with authorities to explore the possibility of expanding the survey to Scotland.

Notes for Number of people in Wales who had COVID-19:

1. This is based on model estimates from the week's midpoint, Thursday 30 July.

2. These results are provisional and subject to revision.

6 . Test sensitivity and specificity

The estimates provided in Section 2: Number of people in England who had COVID-19 are for the percentage of the private-residential population testing positive for the coronavirus (COVID-19), otherwise known as the positivity rate. We do not report the prevalence rate. To calculate the prevalence rate, we would need an accurate understanding of the swab test's sensitivity (true-positive rate) and specificity (true-negative rate).

While we do not know the true sensitivity and specificity of the test, as COVID-19 is a new virus, our data and related studies provide an indication of what these are likely to be. To understand the potential impact of false-positives and false-negatives, we have estimated what prevalence would be in two scenarios using different test sensitivity and the same specificity rates. The results of these scenarios show that when these estimated sensitivity and specificity rates are taken into account, the prevalence rate would be similar to the main estimate presented in Section 2: Number of people in England who had COVID-19.

For this reason, we do not produce prevalence estimates for every analysis, but we will continue to monitor the impacts of sensitivity and specificity in future.

You can find more information on sensitivity and specificity in a paper written by the Office for National Statistics' academic partners and in our methods article.

7 . COVID-19 Infection Survey data

COVID-19 Infection Survey
Dataset | Released 7 August 2020
Latest findings from the pilot phase of the Coronavirus (COVID-19) Infection Survey.

8 . Collaboration

The Coronavirus (COVID-19) Infection Survey analysis was produced by the Office for National Statistics (ONS) in collaboration with our research partners at the University of Oxford, the University of Manchester, Public Health England (PHE) and Wellcome Trust. Of particular note are:

- Sarah Walker – University of Oxford, Nuffield Department for Medicine: Professor of Medical Statistics and Epidemiology and Study Chief Investigator
- Koen Pouwels – University of Oxford, Health Economics Research Centre, Nuffield Department of Population Health: Senior Researcher in Biostatistics and Health Economics
- Thomas House – University of Manchester, Department of Mathematics: Reader in mathematical statistics

9 . Glossary

Community

In this bulletin, we refer to the number of coronavirus (COVID-19) infections within the community. Community in this instance refers to private households, and it excludes those in hospitals, care homes or other institutional settings.

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. For more information, see our methodology page on statistical uncertainty.

Credible interval

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

False-positives and false-negatives

A false-positive result occurs when the tests suggest an individual has COVID-19 when in fact they do not. By contrast, a false-negative result occurs when the tests suggest an individual does not have COVID-19 when in fact they do. For more information on false-positives and false-negatives, see our methods article.

Incidence rate

The incidence rate is an estimate of how often new cases of COVID-19 occur over a given period of time. In our study, it is calculated by dividing the number of times an individual has a positive test for the first time in the study, having first tested negative, by the total time everyone is in the study. We include the time people are in the study between successive negative tests for those who never have a positive test, and the time up to halfway between their last negative and first positive test for those that have a positive test. This reflects the fact that we do not actually know when a person first becomes positive, only when we tested them. Individuals who are positive when they join the study are not included in this calculation.

10 . Measuring the data

Data presented in this bulletin come from the Coronavirus (COVID-19) Infection Survey, which looks to identify the percentage of the population testing positive for COVID-19 and whether they have symptoms or not. The survey helps track the current extent of infection and transmission of COVID-19 among the population as a whole.

This section of the bulletin provides a short summary of the study data and data collection methods. Our methodology article provides further information around the survey design, how we process data, and how data are analysed. The study protocol specifies the research for the study.

Response rates

The current number of households invited to participate in the survey in England is 66,435, of which 27,252 have enrolled. In responding households, there are 57,922 eligible individuals. Response rates are found in Table 5 of the reference tables that accompany this bulletin, and include initial response rates for Wales. The response rates cannot be regarded as final response rates to the survey since those who are invited are not given a time limit in which to respond.

Coverage

Survey fieldwork for the pilot study began in England on 26 April 2020. Survey fieldwork in Wales began on 29 June and from 7 August, we will report headline figures for Wales. The survey has also begun in Northern Ireland and we will publish estimates for Northern Ireland when we have a sufficiently large sample. We are working with authorities to explore the possibility of expanding the survey to Scotland.

Only private residential households, otherwise known as the target population in this bulletin, are included in the sample. People in hospitals, care homes and other institutional settings are not included.

The overall target population for England used in this study is 54,628,600. The overall target population for Wales used in the study is 3,057,800.

Analysing the data

All estimates presented in this bulletin are provisional results. As swabs are not necessarily analysed in date order by the laboratory, we have not yet received test results for all swabs taken on the dates included in this analysis. Estimates may therefore be revised as more test results are included.

This is a pilot study where the analysis is developed at pace, and these quality enhancements may lead to minor changes in estimates, for example, the positive test counts across the study period.

Other studies

This study is one of a number of studies that look to provide information around the coronavirus pandemic within the UK.

Department of Health and Social Care (DHSC) data

Public Health England (PHE) present data on the total number of laboratory-confirmed cases in England, which capture the cumulative number of people in England who have tested positive for COVID-19. Equivalent data for Wales, Scotland and Northern Ireland are also available. These statistics present all known cases of COVID-19, both current and historical. The large sample size means it is possible to present known cases at local authority level.

The NHS Test and Trace scheme was launched on 28 May. The Test and Trace service ensures that anyone who develops symptoms of COVID-19 can quickly be tested to find out if they have the virus. It includes targeted asymptomatic testing of NHS and social care staff and care home residents. Additionally, it helps trace close recent contacts of anyone who tests positive for COVID-19 and, if necessary, notify them that they must self-isolate.

In comparison with PHE data and NHS Test and Trace data, the statistics presented in this bulletin take a representative sample of the community population (those in private residential households) in England, including people who are not otherwise prioritised for testing. This means that we can estimate the number of people in the community population in England with COVID-19 who do not report symptoms. This is something that is currently missing from PHE and Test and Trace data.

COVID Symptom Study (ZOE app and King's College London)

The COVID Symptom Study app allows users to log their health each day, including whether or not they have symptoms of COVID-19. The study aims to predict which combination of symptoms indicate that someone is likely to test positive for COVID-19. The app was developed by the health science company ZOE with data analysis conducted by King's College London. Anyone over the age of 18 years can download the app and take part in the study. Respondents can report symptoms of children.

The study estimates the total number of people with symptomatic COVID-19 and the daily number of new cases of COVID-19 based on app data and swab tests taken in conjunction with the Department of Health and Social Care (DHSC). The study investigates the "predictive power of symptoms", and so the data do not capture people who are infected with COVID-19 but who do not display symptoms.

Unlike the data presented in this bulletin, the COVID Symptom Study is not a representative sample of the population. It is reliant on app users and so captures only some cases in hospitals, care homes and other communities where few people use the app. To account for this, the model adjusts for age and deprivation when producing UK estimates. The larger sample size allows for detailed geographic breakdown.

Real-time Assessment of Community Transmission-1 and -2 (REACT-1 and -2)

Like our study, the Real-time Assessment of Community Transmission-1 (REACT-1) survey involves taking swab samples to test for COVID-19 antigens to estimate the prevalence and transmission of the virus that causes COVID-19 in the community. The study currently involves around 120,000 participants aged five years and above, selected from a random cross-section sample of the general public from GP registration data, which allows for more detailed geographic breakdowns of infection rates than are currently possible within our study. Trends in infection by characteristics, such as age, sex, ethnicity, symptoms and key worker status, are also possible through the study. The REACT-2 study uses a finger prick test to generate data for antibody analysis.

One of the main differences from our COVID-19 Infection Survey is that the REACT surveys do not require follow-up visits, as the study is interested primarily in prevalence at a given time point. Consequently, the incidence rate cannot be calculated from the REACT studies. It is also important to note that blood samples in the REACT-2 study are self-administered, rather than taken by a trained nurse, phlebotomist or healthcare assistant.

PHE antibody data

PHE also publish an estimate of the prevalence of antibodies in the blood in England using blood samples from healthy adult blood donors. PHE provide estimates by region and currently do not scale up to England. Estimates in this bulletin and those published by PHE are based on different tests; PHE estimates are based on testing using the Euroimmun assay method, while blood samples in our survey are tested for antibodies by research staff at the University of Oxford using a novel ELISA. For more information about the antibody test used in this bulletin, see the COVID-19 Infection Survey protocol.

Next Steps

This edition of the bulletin presents headline analysis of the overall number of people infected with COVID-19, the regional positivity rate, incidence rate and antibodies. We provide headline figures once a week, to give regular, concise and high-quality information on COVID-19 within the community.

Our recent release, 'Coronavirus infections in the community', offers more detailed analysis, which includes further exploration of the characteristics of those with COVID-19, such as age, sex, working location and occupation. We will also include further exploration of ethnicity when we have a large enough sample size to provide reliable analysis.

11 . Strengths and limitations

These statistics have been produced quickly in response to developing world events. The Office for Statistics Regulation, on behalf of the UK Statistics Authority, has reviewed them against several important aspects of the Code of Practice for Statistics and regards them as consistent with the Code's pillars of trustworthiness, quality and value.

The estimates presented in this bulletin contain uncertainty. There are many sources of uncertainty, including uncertainty in the test, in the estimates and the quality of data collected in the questionnaire. Information on the main sources of uncertainty are presented in our methodology article.

12 . Related links

COVID-19 Infection Survey (Pilot): methods and further information
Methodology article | Updated 23 July 2020
Information on the methods used to collect the data, process it, and calculate the statistics produced from the Coronavirus (COVID-19) Infection Survey (pilot).

Coronavirus (COVID-19) infections in the community in England: July 2020
Article | Updated monthly
Analysis on the latest data about the characteristics of those who test positive for COVID-19 in England, from the COVID-19 Infection Survey.

Coronavirus (COVID-19) latest data and analysis
Web page | Updated as and when data become available
Latest data and analysis on the coronavirus in the UK and its effect on the economy and society.

Coronavirus (COVID-19) roundup
Article | Updated as and when data become available
Catch up on the latest data and analysis related to the coronavirus pandemic and its impact on our economy and society.

Deaths registered weekly in England and Wales, provisional
Bulletin | Weekly
Provisional counts of the number of deaths registered in England and Wales, including deaths involving COVID-19, by age, sex and region, in the latest weeks for which data are available.

New survey results provide first snapshot of the current number of COVID-19 infections in England
Blog | Released 14 May 2020
A large study jointly led by the Office for National Statistics (ONS), in partnership with the Universities of Oxford and Manchester, Public Health England (PHE), and Wellcome Trust, is tracking infections within a representative sample of people of all ages across England. This blog explains what these mean, why they are important and how to compare this survey with other COVID-19 estimates.

COVID-19 Infection Survey
Article | Updated 14 May 2020
Whether you have been invited to take part, or are just curious, find out more about our COVID-19 Infection Survey and what is involved.