Office for National Statistics

Statistical bulletin

Coronavirus (COVID-19) Infection Survey pilot: England, Wales and Northern Ireland, 25 September 2020

Estimates for England, Wales, and Northern Ireland. This survey is being delivered in partnership with University of Oxford, University of Manchester, Public Health England and Wellcome Trust.

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16. Related links

1 . Main points

- An estimated 103,600 people (95% credible interval: 85,600 to 123,400) within the community population in England had the coronavirus (COVID-19) during the most recent week, from 13 to 19 September 2020, equating to around 1 in 500 people (95% credible interval: 1 in 600 to 1 in 400).
- The estimate shows the number of infections has increased in recent weeks.
- In recent weeks, there has been clear evidence of an increase in the number of people testing positive for COVID-19 in all age groups, with the current rates highest in the 17 to 24 years age group.
- There is evidence of higher infection rates in the North West, Yorkshire and the Humber, London and North East; both West and East Midlands are recently showing a small increase.
- During the most recent week (13 to 19 September 2020), we estimate there were around 1.75 (95% credible interval: 1.31 to 2.30) new COVID-19 infections for every 10,000 people per day in the community population in England, equating to around 9,600 new cases per day (95% credible interval: 7,100 to 12,600).
- The estimate shows that the incidence rate for England has increased in recent weeks.
- In England, between 26 April and 08 September, 6.2% of people tested positive for antibodies against SARS-CoV-2 on a blood test, suggesting they had the infection in the past; the percentage of people testing positive for antibodies is higher in London than in the East Midlands, the South East and the South West of England.
- During the most recent week (13 to 19 September 2020), we estimate that 10,800 people in Wales had COVID-19 (95% credible interval: 4,400 to 20,200), equating to 1 in 300 people (95 % credible interval: 1 in 700 to 1 in 200).
- We have extended the survey to Northern Ireland; during the most recent two weeks (6 to 19 September 2020), we estimate that 0.35% of people in Northern Ireland had COVID-19 (95% confidence interval: 0.11% to 0.84%), which is around 1 in 300 people (95 % credible interval: 1 in 900 to 1 in 100).

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.

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

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

During the most recent week of the study, we estimate that 103,600 people in England had the coronavirus (COVID-19) (95% credible interval: 85,600 to 123,400).[1] This equates to 0.19% (95% credible interval: 0.16% to 0.23%) of the population in England or around 1 in 500 people (95% credible interval: 1 in 600 to 1 in 400). This is based on statistical modelling of the trend in rates of positive nose and throat swab results.

Estimates of infection rates over time are presented in Figure 1. While the percentage of people testing positive for COVID-19 has decreased since the start of the study (26 April 2020), the most recent modelled estimate shows the number of infections has increased in recent weeks.

In the latest six-week period there were 248,030 swab tests, and a total of 282 positive tests, in 226 people from 188 households.

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. Both these and the modelled estimates are presented in Figure 1 and are used to interpret change over time.

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: The most recent modelled estimate shows the number of infections in England has increased in recent weeks

Estimated percentage of the population in England testing positive for the coronavirus (COVID-19) on nose and throat swabs since 26 April 2020

Notes:

1. These results are provisional and subject to revision.

2. The break distinguishes between the latest five-week estimates and the earlier period. The earlier estimates will be updated periodically. Using data from only the last five weeks in the model enables us to continue to provide timely results.

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. Official reported estimates are plotted at a reference point believed to be most representative of the given week. Details of which day was used for each week can be found in the dataset that accompanies this bulletin.

5. Modelled estimates include all swab results that are available at the time the official estimates are produced. Additional swab tests that become available after this are included in subsequent models, meaning that modelled estimates can change slightly as additional data is included.

6. For the modelled estimates, we have included the last five weeks data due to instability in the estimates for the week from 9 to 15 August when there were low numbers of positives.

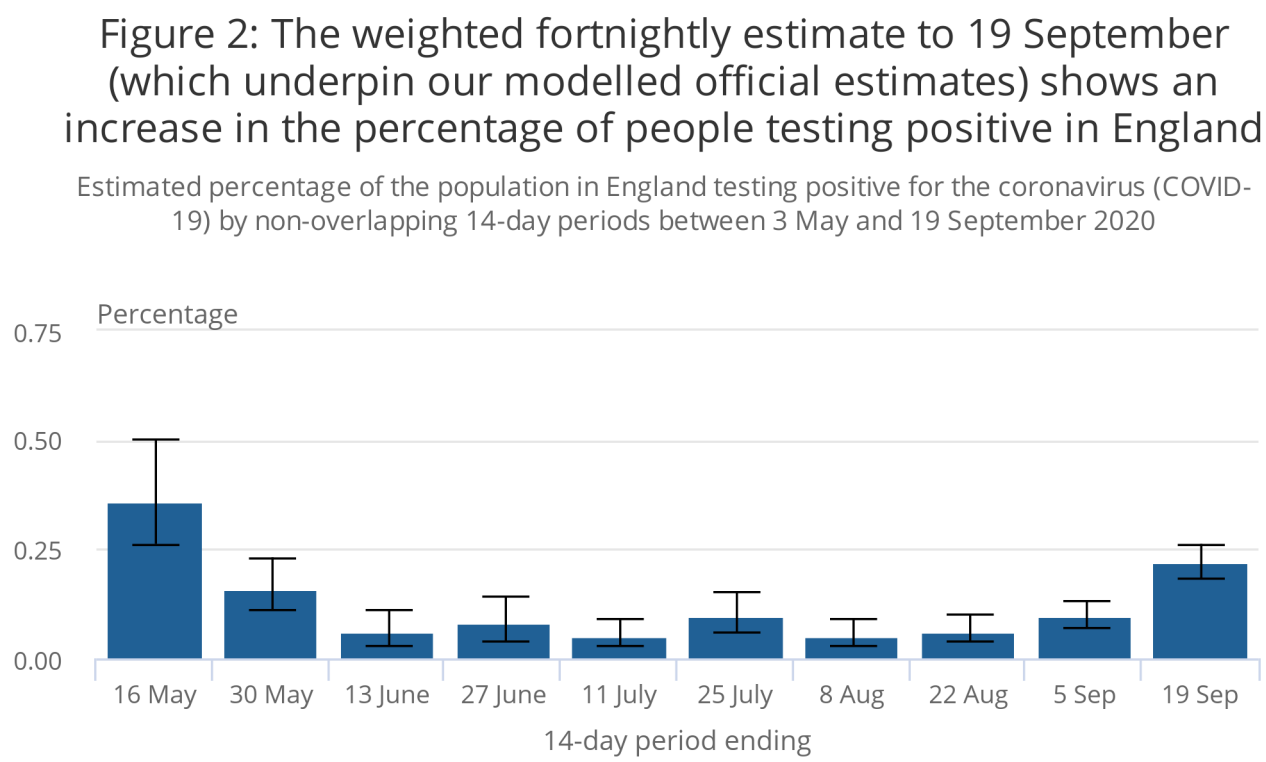
Data download

The estimates for non-overlapping 14-day periods (which underpin our modelled official estimates) are presented in Figure 2 and the dataset that accompanies this bulletin. These 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 most recent estimate shows the number of infections has increased in recent weeks. The 14-day time periods presented in Figure 2 overlap with those presented in the data tables in our previous publication, so direct comparisons are not possible.

The percentage testing positive in the latest 14-day period (6 to 19 September 2020) was 0.22% (95% confidence interval: 0.18% to 0.26%).

Figure 2: The weighted fortnightly estimate to 19 September (which underpin our modelled official estimates) shows an increase in the percentage of people testing positive in England

Estimated percentage of the population in England testing positive for the coronavirus (COVID-19) by non-overlapping 14-day periods between 3 May and 19 September 2020



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

Notes:

1. All results are provisional and subject to revision.

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

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

We are continuously refining and looking to improve our modelling and presentations. We would welcome any feedback via email: infection.survey.analysis@ons.gov.uk.

For information about the potential impact of false-positive and false-negative test results, see our methods article. We estimate that when different plausible test sensitivity and specificity rates are taken into account, the number of people testing positive for COVID-19 would be fairly similar to the main estimate presented in this section.

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 reference point of the most recent week (13 to 19 September 2020), Wednesday 16 September 2020. More information on reference dates can be found in Section 14: Measuring the data.

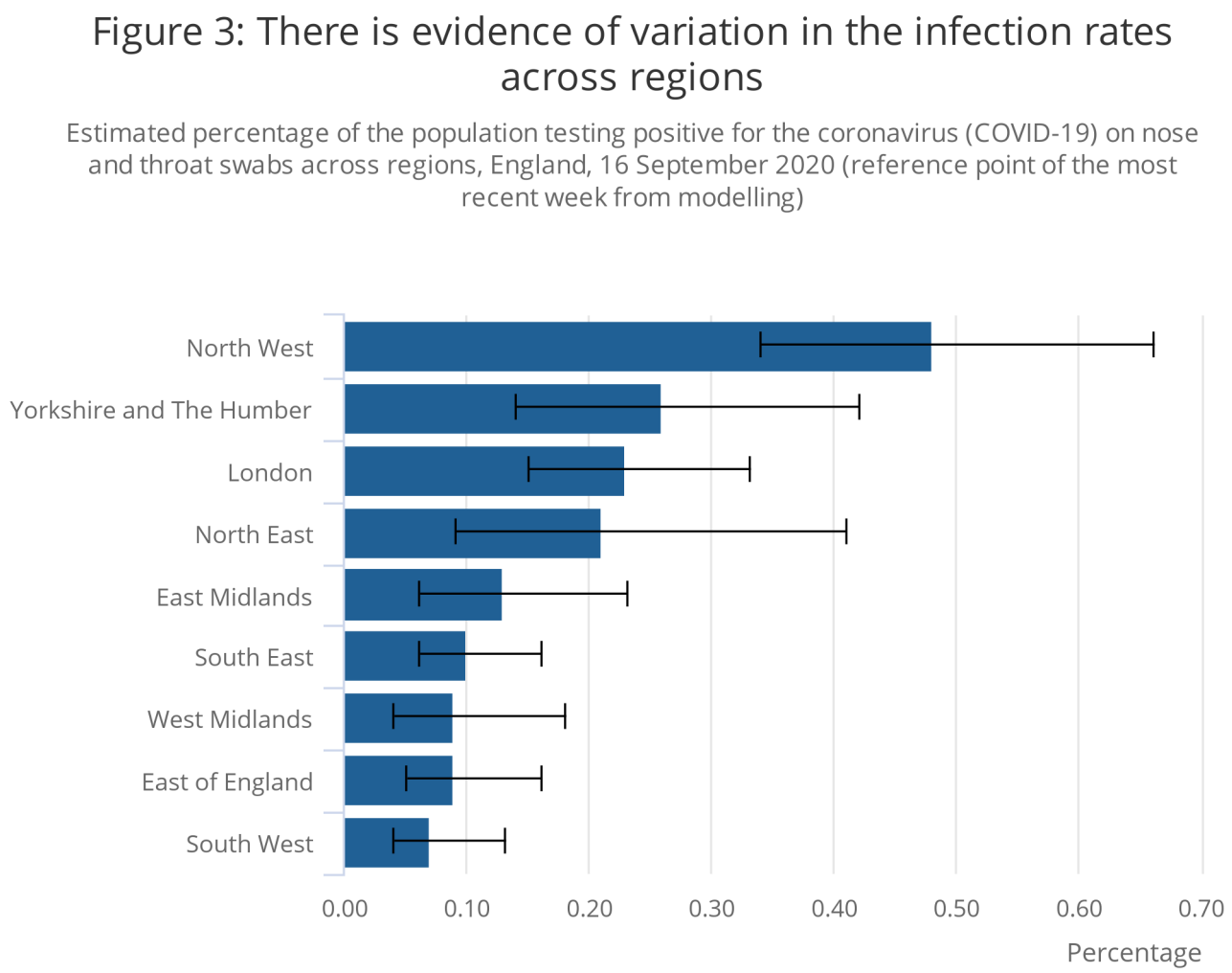
3 . Regional analysis of the number of people in England who had COVID-19

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

During the most recent week of the study (13 to 19 September 2020), there is evidence of variation in COVID-19 infection rates across the regions of England: rates in the North West have risen particularly sharply in recent weeks. Increases are also evident in London, the North East, and Yorkshire and The Humber. Both West and East Midlands are also showing recent, if smaller, increases. This is based on statistical modelling of nose and throat swab test results.

Figure 3: There is evidence of variation in the infection rates across regions

Estimated percentage of the population testing positive for the coronavirus (COVID-19) on nose and throat swabs across regions, England, 16 September 2020 (reference point of the most recent week from modelling)



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

Notes:

1. All results are provisional and subject to revision.

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

Looking at trends over time, rates of COVID-19 have risen in the North West, London, the North East and Yorkshire and the Humber. Both the West and East Midlands are also showing recent but smaller increase. 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 specific positive cases move into and then out of the sample. This causes variability between estimates over time, which is expected given the lower number of positive tests within each region, compared with England as a whole.

Figure 4: There is evidence that infection rates have increased in most regions, particularly the North West, Yorkshire and The Humber and London in recent weeks

Estimated percentage of the population testing positive for the coronavirus (COVID-19) on nose and throat swabs, daily, by region since 09 August 2020, England

Notes:

1. All results are provisional and subject to revision.
2. These statistics refer to infections reported in the community, by which we mean private households. These figures exclude infections reported in hospitals, care homes and/or other institutional settings.

Data download

4 . Age analysis of the number of people in England who had COVID-19

In recent weeks, there has been clear evidence of an increase in the number of people testing positive for the coronavirus (COVID-19). We now have evidence that positivity has increased in all age groups. Current rates are highest in the 17 to 24 years age group. This is based on statistical modelling of nose and throat swab test results.

In the data used to produce these estimates, the number of people sampled in some age groups who tested positive for COVID-19 is lower relative to England overall. This means there is a higher degree of uncertainty in estimates for some age groups over this period, as indicated by larger credible intervals.

Figure 5: COVID-19 infection rates have increased in all age groups

Estimated percentage of the population testing positive for the coronavirus (COVID-19) on nose and throat swabs, daily, by age group since 9 August 2020, England

Notes:

1. All results are provisional and subject to revision.
2. These statistics refer to infections reported in the community, by which we mean private households. These figures exclude infections reported in hospitals, care homes and/or other institutional settings.
3. The modelled estimates are presented at the reference value for a region which is the East Midlands. This does not affect the overall trend over time, but estimated probabilities for other regions would vary in level.

Data download

5 . Incidence rate in England

Based on statistical modelling, we estimate that during the most recent week of the study (13 to 19 September 2020), there were 1.75 new infections per 10,000 people per day (95% credible interval: 1.31 to 2.30).[1] This equates to 9,600 new infections per day (95% credible interval: 7,100 to 12,600).

The official estimate shows that the incidence rate for England has increased in recent weeks.

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 in this bulletin. The model uses all swab test results to estimate the incidence rate of new infections 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.

We are continually refining the way we estimate incidence and continue to present the absolute numbers for transparency in the dataset that accompanies this bulletin. As it takes time to process the swab tests, the amount of information available at the end of the time period decreases relative to the number of tests available in earlier periods. The increased uncertainty at the end of the time period is indicated by wider credible intervals.

Figure 6: The incidence rate for England has increased in recent weeks

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

Notes:

1. All results are provisional and subject to revision.
2. The break distinguishes between the latest six-week estimates and the earlier period. The earlier estimates will be updated periodically. Using data from only the most recent six weeks in the model enables us to continue to provide timely results.
3. Credible intervals are large at both ends of the plot because there is less information available. At the end, although we know that people 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, there were fewer people in the study.
4. This model does not control for household clustering, where multiple new cases derive from the same household.
5. Official reported estimates are plotted at a reference point believed to be most representative of the given week. Details of which day was used for each week can be found in the dataset that accompanies this bulletin.
6. Modelled estimates include additional swab test results not available when the official reported estimates were produced.
7. Initial unweighted estimates covering the full study period to date are not included in the official reported estimates chart.

Data download

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 rates for households, which controls for any household clustering in new infections, follow a similar trend as for people. 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 the coronavirus (COVID-19), and the calculation of this is defined in Section 13: 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 (see Coverage in Section 14: 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.

Notes for: Incidence rate in England

1. This is based on model estimates from the reference point of the most recent week (13 to 19 September 2020), Sunday 13 September 2020. More information on reference dates can be found in Section 14: Measuring the data.

6 . Antibody data for England

As of 8 September 2020, 6.2% (95% confidence interval: 5.4% to 7.1%) of individuals aged 16 years and over tested positive for antibodies to the coronavirus (COVID-19) from any blood sample taken during the study. This equates to around 1 in 16 people. The estimate is weighted to be representative of the overall population and suggests that around 2.8 million individuals (95% confidence interval: 2.4 million to 3.2 million) in England would test positive for antibodies if they were tested.[1]

The analysis in this bulletin is based on test results from 9,343 individuals received since the start of the study on 26 April 2020. Of those who have provided blood samples, 476 tested positive for antibodies.

One way the body fights infections like COVID-19 is by producing small particles in the blood called antibodies. It takes between two and three weeks for the body to make enough antibodies to fight the infection but once a person recovers, antibodies remain in the blood at low levels, although these levels can decline over time to the point that tests can no longer detect them. Having antibodies can help to prevent individuals from getting the same infection again, although other parts of the immune system can also protect people.

We measure the presence of antibodies to understand who has had COVID-19 in the past, although the length of time antibodies remain at detectable levels in the blood is not fully known. It is also not yet known how having detectable antibodies, now or at some time in the past, affects the chance of getting COVID-19 again.

More information on how our estimates compare with other studies can be found in Section 14: Measuring the data.

Notes for: Antibody data for England

1. Changes in the rate of people testing positive for antibodies between bulletins should not be interpreted as a trend over time. This is because it relates to a change in the number of individuals whose blood has now been tested for antibodies.

7 . Regional analysis of antibody data for England

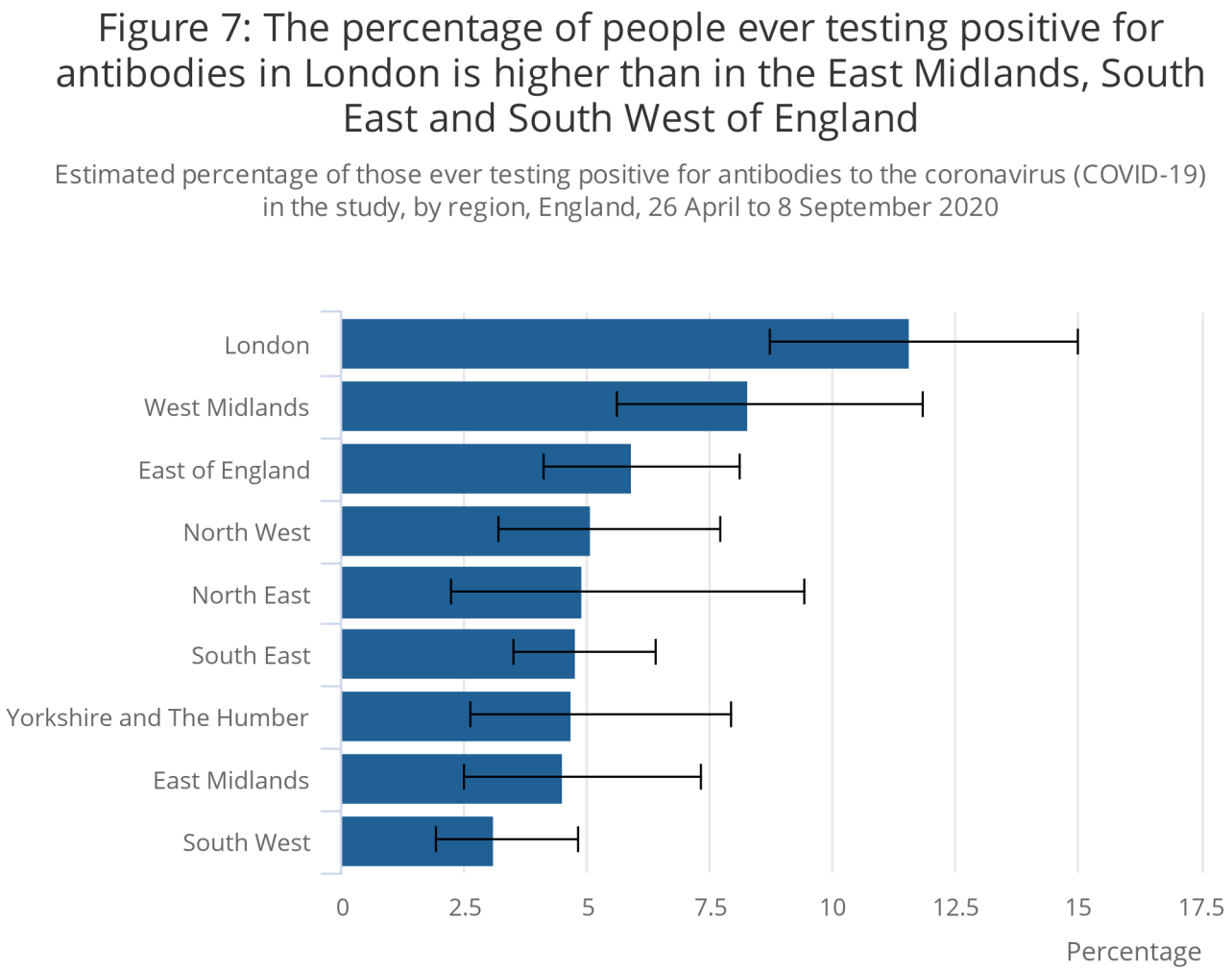
There is some evidence of differences in the percentage of people testing positive for antibodies by region. Confidence intervals are large for some regions indicating high uncertainty in those estimates but there is evidence of differences in the percentage of people testing positive for antibodies between some regions. The percentage of people in the sample ever testing positive for antibodies in London is higher than in the East Midlands, South East and South West of England.

Increasing sample sizes and positive counts for our regional estimates mean we are now able to provide weighted regional estimates for antibodies. Please note that these weighted estimates cannot be directly compared with previous unweighted estimates.

Recent findings from the REACT (Real Time Assessment of Community Transmission) study, led by Imperial College London, show similar results. More information on REACT and other studies can be found in Other studies in Section 14: Measuring the data of this bulletin.

Figure 7: The percentage of people ever testing positive for antibodies in London is higher than in the East Midlands, South East and South West of England

Estimated percentage of those ever testing positive for antibodies to the coronavirus (COVID-19) in the study, by region, England, 26 April to 8 September 2020



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

Notes:

1. All results are provisional and subject to revision.

2. 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.

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

During the most recent week of the study[1], we estimate that 10,800 people in Wales had the coronavirus (COVID-19) (95% credible interval: 4,400 to 20,200). This equates to 0.35% (95% credible interval: 0.14% to 0.66%) of the population in Wales or around 1 in 300 people (95% credible interval: 1 in 700 to 1 in 200). Our modelling suggests that the number of COVID-19 cases in Wales has increased in recent weeks. This is based on exploratory modelling of throat and nose swab results.

Due to a relatively small number of tests and a low number of positives in our sample, credible intervals are wide and therefore results should be interpreted with caution.

In Wales, the modelled estimates for the latest six-week period are based on 9,268 swab tests collected over this period. During these weeks, there were a total of 12 positive swabs taken from nine people from seven households.

Figure 8: The most recent modelled estimate suggests the number of infections in Wales has increased in recent weeks

Estimated percentage of the population in Wales testing positive for the coronavirus (COVID-19) on nose and throat swabs since 9 August 2020

Notes:

1. These results are provisional and subject to revision.
2. 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.
3. Official reported estimates are plotted at a reference point believed to be most representative of the given week. Details of which day was used for each week can be found in the dataset that accompanies this bulletin.
4. Modelled estimates include all swab results that are available at the time the official estimates are produced. Additional swab tests that become available after this are included in subsequent models, meaning that modelled estimates can change slightly as additional data is included.

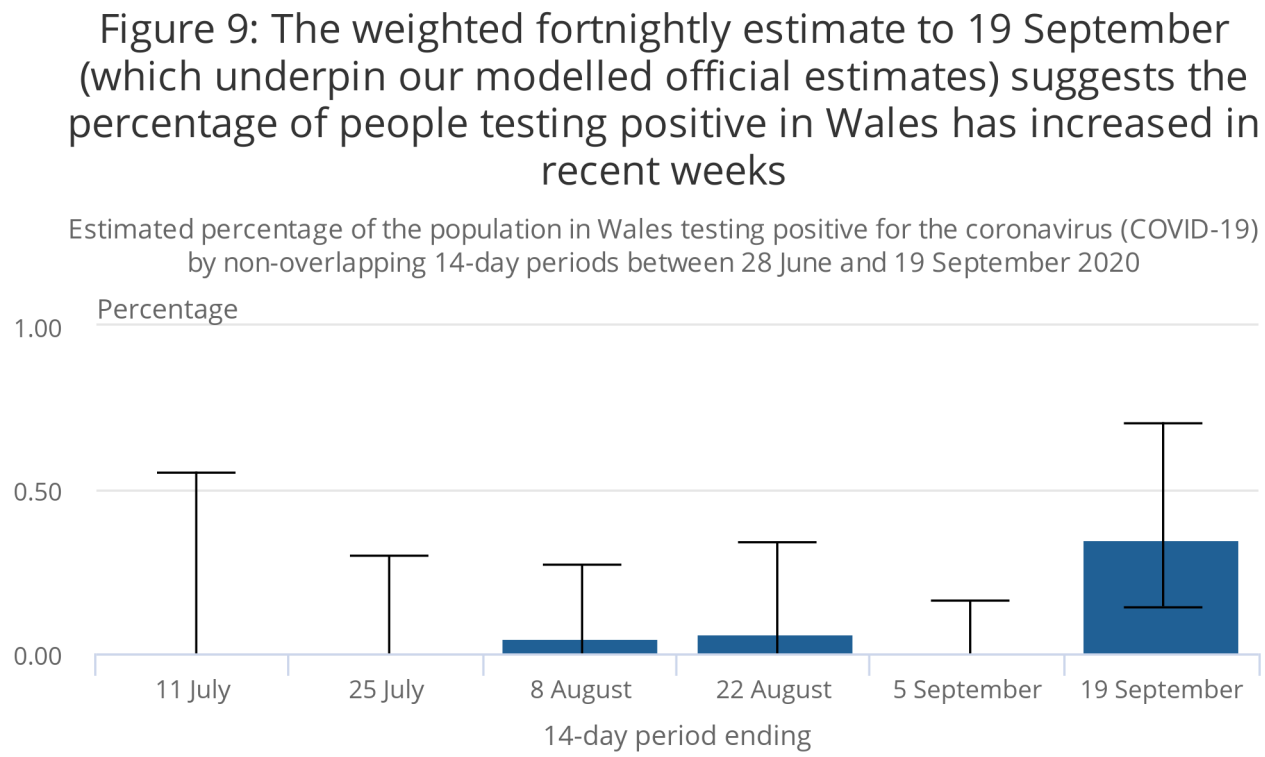
Data download

The estimates for non-overlapping 14-day periods (which underpin our modelled official estimates) are presented in Figure 8 and the dataset that accompanies this bulletin. These 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 8: that the most recent estimate suggests the number of infections in Wales has increased in recent weeks.

The percentage testing positive in Wales in the latest 14-day period (6 to 19 September 2020) was 0.35% (95% confidence interval: 0.14% to 0.70%).

Figure 9: The weighted fortnightly estimate to 19 September (which underpin our modelled official estimates) suggests the percentage of people testing positive in Wales has increased in recent weeks

Estimated percentage of the population in Wales testing positive for the coronavirus (COVID-19) by non-overlapping 14-day periods between 28 June and 19 September 2020



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

Notes:

1. All results are provisional and subject to revision.

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

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

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

1. This is based on model estimates from the reference point of the most recent week (13 to 19 September 2020), Wednesday 16 September 2020. More information on reference dates can be found in Section 14: Measuring the data.

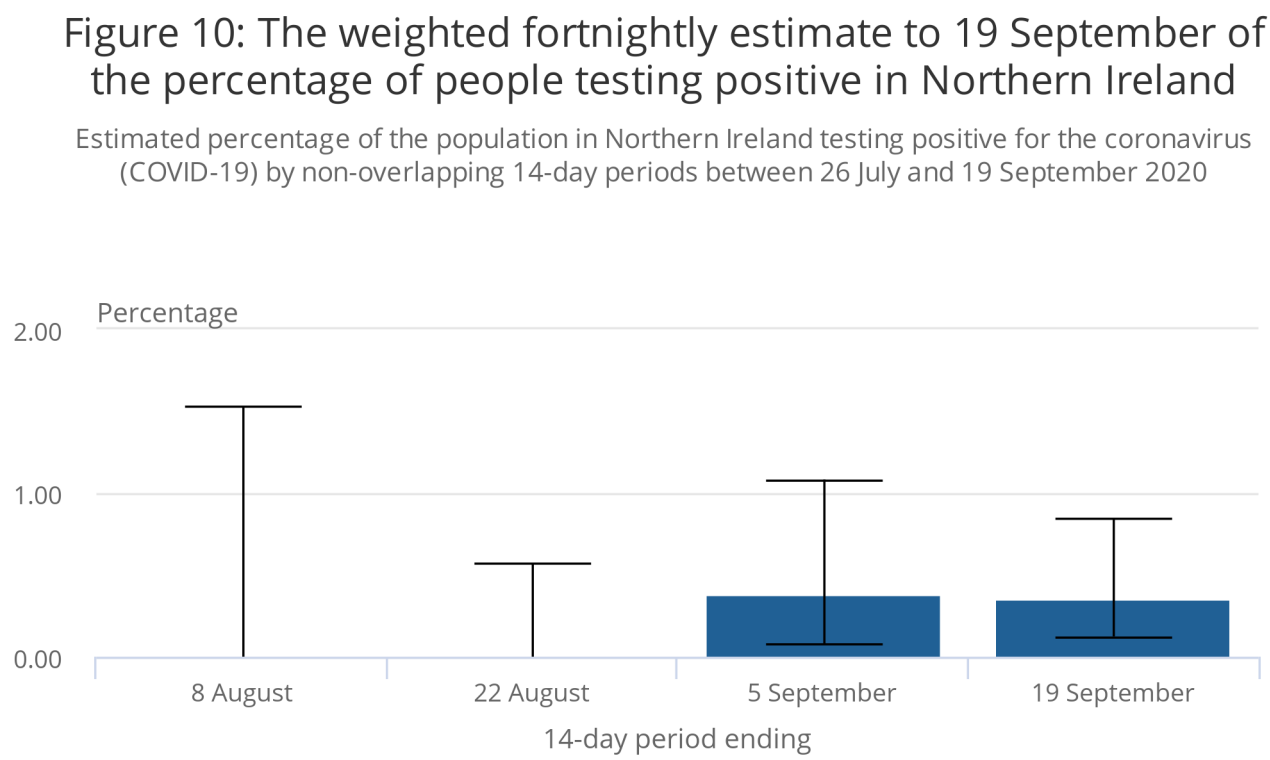
9 . Number of people in Northern Ireland who had COVID-19

During the most recent two weeks of the study (6 September to 19 September)[1], we estimate that 0.35% of people in Northern Ireland had COVID-19 (95% confidence interval: 0.11% to 0.84%). This equates to 1 in 300 people (95% credible interval: 1 in 900 to 1 in 100). Estimates of the total national proportion of the population testing positive for COVID-19 are weighted to be representative of the population of Northern Ireland that live in private-residential households in terms of age (grouped), sex, region, and household size. Due to relatively small number of tests within our sample, confidence intervals are wide and therefore results should be interpreted with caution.

In Northern Ireland, the weighted estimates for the latest two-week period are based on 1,996 swab tests collected over this period. During these weeks, there were five people from four households who tested positive.

Figure 10: The weighted fortnightly estimate to 19 September of the percentage of people testing positive in Northern Ireland

Estimated percentage of the population in Northern Ireland testing positive for the coronavirus (COVID-19) by non-overlapping 14-day periods between 26 July and 19 September 2020



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

Notes:

1. All results are provisional and subject to revision.

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

10 . 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 the 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 fairly 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' (ONS') academic partners and in our methods article.

11 . COVID-19 Infection Survey data

Coronavirus (COVID-19) Infection Survey
Dataset | Released 25 September 2020
Findings from the pilot phase of the Coronavirus (COVID-19) Infection Survey, England, Wales and Northern Ireland.

12 . 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

13 . 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 a person has COVID-19 when in fact they do not. By contrast, a false-negative result occurs when the tests suggest a person 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 a person 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 (or maximum of seven days, whichever is later) 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. People who are positive when they join the study are not included in this calculation.

14 . 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.

Reference dates

We aim to provide the estimates of positivity rate and incidence that are most timely and most representative of each week. We decide the most recent week we can report on based on the availability of test results for visits that have already happened, accounting for the fact that swabs have to be couriered to the labs, tested and results returned. On most occasions the reference data align perfectly but sometimes this is not feasible. This week, the reference week falls between 13 to 19 September 2020.

Within the most recent week, we provide an official estimate for positivity rate and incidence based on a reference point from the modelled trends. For positivity rates, we can include all swab test results, even from the most recent visits. Therefore, although we are still expecting further swab test results from the labs, there is sufficient data for the official estimate for positivity to be based on a reference point after the start of the reference week. To improve stability in our modelling while maintaining relative timeliness of our estimates we are reporting our official estimates based on the midpoint of the reference week. This week, the reference day for positivity rates is Wednesday 16 September 2020.

The calculation of incidence uses time between two tests; so, for example, a participant who was last seen two weeks ago and is not due their next visit for another two weeks only contributes to the model up to two weeks ago. Our official estimates of incidence are therefore based on the first day of the reference week. This week, the reference day for incidence was Sunday 13 September 2020. The model includes all information up to 19 September (the end of the reference week), and people who tested negative on a test between 19 and 20 September are included as negative up to 19 September.

Response rate

At the start of the pilot study we invited 20,276 households in England to take part, of which 10,329 have enrolled as of 19 September. In responding households, there are 22,308 eligible people. The likelihood of enrolment decreases over time and response rate information for those initially asked to take part at the start of the survey can be considered as relatively final.

We expanded our sampling at the end of May and again at the end of July. The number of households invited to participate in the survey in this expansion in England, as of 19 September, was 707,797, of which 95,526 have enrolled. In responding households, there are 202,785 eligible people. We are significantly expanding the infection survey to 400,000 people in England, making it the UK's largest study tracking COVID-19 in the general population. 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.

The number of households invited to participate in the survey in Wales, as of 19 September, was 7,185, of which 2,239 have enrolled. In responding households, there are 4,696 eligible people.

The number of households invited to participate in the survey in Northern Ireland, as of 19 September, was 4,122, of which 1,461 have enrolled. In responding households, there are 3,174 eligible people.

Response rates for England are found in Table 4 of the dataset that accompanies this bulletin. Initial response rates for Wales are in Table 6 and initial response rates for Northern Ireland are in Table 8. We provide response rates separately for the different sampling phases of the study.

Coverage

Survey fieldwork for the pilot study began in England on 26 April 2020. Survey fieldwork in Wales began on 29 June, and since 7 August we have reported headline figures for Wales. Survey fieldwork began in Northern Ireland on the 26 July and this is the first time we have reported headline figures for Northern Ireland. We are working with authorities to set up the survey in 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 3,059,461. The overall target population for Northern Ireland used in the study is 1,893,667.

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.

We are giving increasing prominence to the weighted estimates to ensure we are giving appropriate visibility to all available indicators.

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, UK

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.

Each nation of the UK has a testing and tracing system. These ensure that anyone who develops symptoms of COVID-19 can quickly be tested to find out if they have the virus. Some nations also include 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), including people who are not otherwise prioritised for testing. This means that we can estimate the number of people in the community population with COVID-19 who do not report any evidence of symptoms.

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

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), England

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.

Other antibody estimates

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.

In addition, the REACT study, led by Imperial College London, uses antibody finger-prick tests to track past infections and monitor the progress of the pandemic, and the estimates have been published. Estimates in this bulletin and the REACT study use different tests and different methods, for example, the REACT estimates are based on self-administered and self-read finger prick tests, whereas tests in this survey are carried out by a trained nurse, phlebotomist or healthcare assistant.

Next steps

This edition of the bulletin presents headline analysis of the overall number of people infected with COVID-19, the regional positivity rate and the incidence rate. 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 (COVID-19) Infection Survey: characteristics of people testing positive for COVID-19 in England, August 2020, offers more detailed analysis, including further exploration of the characteristics of those with COVID-19, such as age, sex, ethnicity, working location and occupation.

We are significantly expanding the infection survey to 400,000 people in England, making it the UK's largest study tracking COVID-19 in the general population. We have begun this expansion by increasing the sample size in local authorities of interest in the North West, Yorkshire and The Humber, and London. For more information, please see the Office for National Statistics (ONS) expansion press notice, released on 18 August 2020.

15 . 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 in the quality of data collected in the questionnaire. Information on the main sources of uncertainty are presented in our methodology article.

16 . Related links

COVID-19 Infection Survey (Pilot): methods and further information
Methodology article | Updated 21 September 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) Infection Survey: characteristics of people testing positive for COVID-19 in England, August 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 pandemic in the UK and its effect on the economy and society.

Coronavirus (COVID-19) roundup
Web page | 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 | Updated 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.