

Statistical bulletin

Coronavirus (COVID-19) Infection Survey pilot: 5 June 2020

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

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1 . Main points

- Within this bulletin, we refer to the number of coronavirus (COVID-19) infections within the community population; community in this instance refers to private households, and it excludes those in hospitals, care homes or other institutional settings.
- At any given time between 17 May and 30 May 2020, we estimated that an average of 0.10% of the community population had COVID-19 (95% confidence interval: 0.05% to 0.18%); this equates to an average of 53,000 people in England (95% confidence interval: 25,000 to 99,000).
- Modelling of the trend over time shows evidence that the number of people in England testing positive has decreased in recent weeks.
- There were an estimated 39,000 new COVID-19 infections per week in England (95% confidence interval: 26,000 to 55,000) between 26 April and 30 May 2020, equating to an incidence rate per week of 0.07 new cases per 100 people.
- Individuals working outside the home show higher rates of positive tests than those who work from home.
- Patient-facing healthcare workers and resident-facing social care workers show higher rates of positive tests than people not working in these roles.
- While those who have symptoms are more likely to test positive than those without symptoms, out of those within our study who have ever tested positive for COVID-19, 29% reported any evidence of symptoms at the time of the visit or at either the preceding or following visit.

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

There is some evidence that the number of people in England testing positive has decreased in recent weeks

Our latest estimates indicate that at any given time during the two weeks from 17 May to 30 May 2020, an average of 53,000 people in England had the coronavirus (COVID-19) (95% confidence interval: 25,000 to 99,000). This equates to 0.10% (95% confidence interval: 0.05% to 0.18%) of the population in England. This estimate is based on tests performed on 19,723 people in 9,094 households.

Out of the 19,723 participants' swab tests included in this analysis, 21 individuals in 15 households tested positive for COVID-19. As a household survey, our figures do not include people staying in hospital or care homes. In these settings, rates of COVID-19 infection are likely to be different.

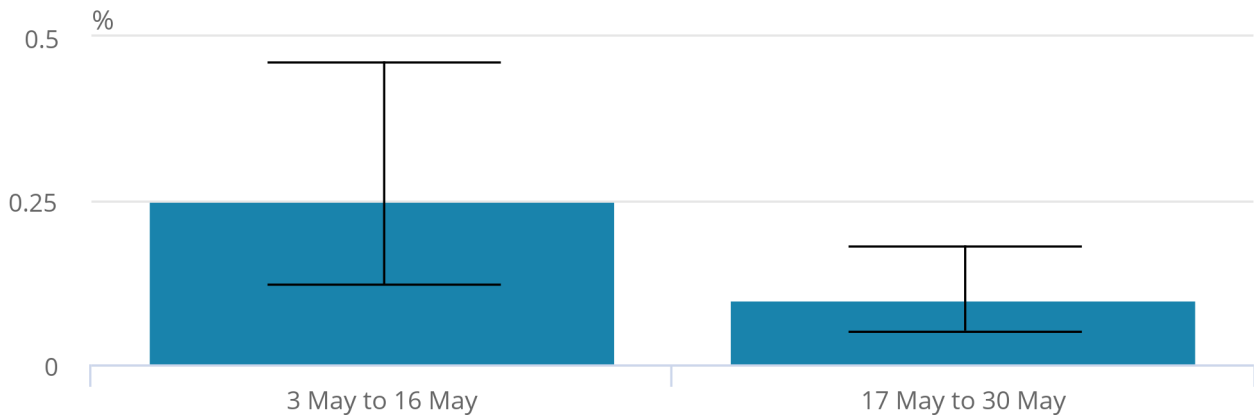
When analysing data for the two most recent non-overlapping 14 day periods, there is some evidence of a decrease in the proportion testing positive (Figure 1).

Figure 1: There is some evidence that the proportion of people testing positive with COVID-19 has decreased in recent weeks

Estimated percentage of the population in England who had the coronavirus (COVID-19), based on tests conducted between 3 May to 16 May 2020 and 17 May to 30 May 2020

Figure 1: There is some evidence that the proportion of people testing positive with COVID-19 has decreased in recent weeks

Estimated percentage of the population in England who had the coronavirus (COVID-19), based on tests conducted between 3 May to 16 May 2020 and 17 May to 30 May 2020



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

In addition to this analysis, a more complex regression modelling approach confirms that there is a clear downward trend (Figure 2). The significance of this downward trend is shown by the credible intervals, as the lower credible interval in the first week of the study period is higher than the upper credible interval for the most recent week. This modelling is an exploratory analysis and was conducted by our research partners at the University of Oxford and the University of Manchester.

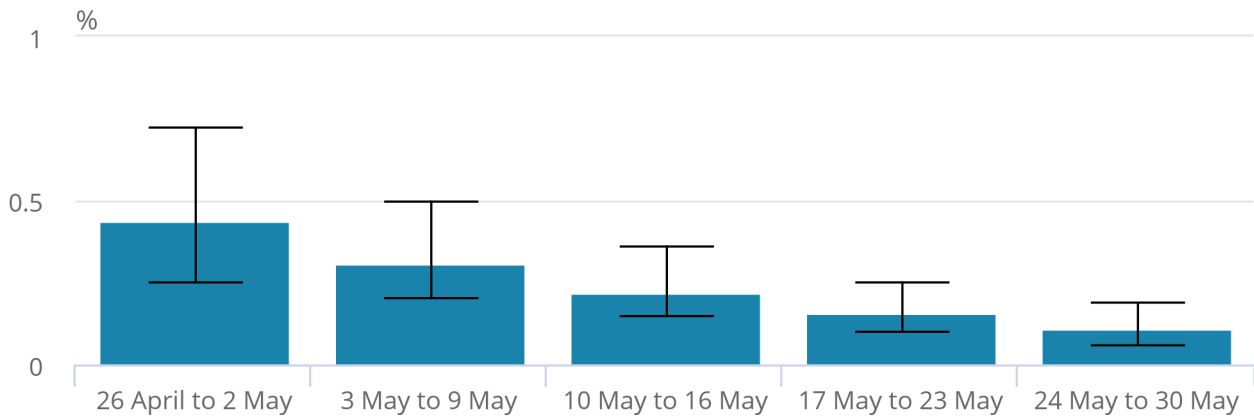
The regression model controls for age, sex and region and allows change over time by week to be analysed since 26 April 2020, when the study period began. More information about the methods used in the regression model is available in [Section 8: Measuring the data](#).

Figure 2: New modelling shows the downward trend in those testing positive for COVID-19 is statistically significant

Estimated percentage of the population in England testing positive for the coronavirus (COVID-19) by week since the start of the study, 26 April 2020

Figure 2: New modelling shows the downward trend in those testing positive for COVID-19 is statistically significant

Estimated percentage of the population in England testing positive for the coronavirus (COVID-19) by week since the start of the study, 26 April 2020



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. It is important to note that the results for the most recent period are provisional, as we are still receiving swab test results. This may result in further revisions to the figure.
3. More information about the methods used in the regression model is available in Section 8: Measuring the data.

All estimates are subject to uncertainty, given that a sample is only part of the wider population. The 95% confidence intervals are calculated so that, if we were to repeat this study many times, with many different samples of households, then 95% of the time the confidence intervals would contain the true value that we are seeking to estimate.

More information on how our estimates compare with other sources is available in [Section 8: Measuring the data](#).

3 . Number of new COVID-19 cases in England

There was an estimated average of 39,000 new COVID-19 infections per week in England

Based on results of people tested throughout the study period, which began on 26 April 2020, we estimate that there were 0.07 new infections per 100 people followed for one week (95% confidence interval: 0.05 to 0.10). This would represent an average of 39,000 new infections per week for people living in private-residential households in the community in England since the study began (95% confidence interval: 26,000 to 55,000). It is important to note that the analysis in this section relates to a different, albeit overlapping, time period to the analysis of the total number of people in England who have the coronavirus (COVID-19) presented in [Section 2](#). This means the numbers cannot be directly compared.

As the proportion of those testing positive in England is decreasing over time, it is likely that the incidence rate is also decreasing. However, because of the low number of new positive cases, we cannot currently measure a [statistically significant](#) reduction.

The incidence rate measures the occurrence of new cases of COVID-19. Incidence refers to the number of individuals who have a positive test in the study divided by the time from joining the study to their last test. Individuals who are positive when they join the study are not included in this calculation. This is not the same as the reproduction rate (R). R is described in the [next section](#).

As of 30 May 2020, 17,725 individuals who were negative on their first test in the study have had one or more follow-up swab tests. The median time between the first and latest tests was 14 days.

Unlike the analysis in [Section 2: Number of people in England who had COVID-19](#) of this bulletin, these estimates have not been weighted to be representative of the target population in England. This is because of the relatively small numbers of positive cases in the sample. We will do more work on the potential to weight these estimates in future publications.

The reproduction rate (R) is being published by the Scientific Advisory Group for Emergencies (SAGE)

The reproduction number (R) is the average number of secondary infections produced by one infected person. The Scientific Pandemic Influenza Group on Modelling (SPI-M), a sub-group of the Scientific Advisory Group for Emergencies (SAGE), has built a consensus on the value of R based on expert scientific advice from multiple academic groups. As of 29 May 2020, [the latest estimate of R](#) was between 0.7 and 0.9.

4 . Antibody tests for COVID-19

Around 6.78% of people who provided blood samples tested positive for antibodies to COVID-19

The estimate for those testing positive for antibodies presented in this publication has not been updated and is the same as estimates presented in our [previous publication](#). Once we have received additional blood sample results, we will provide updated antibodies analysis.

As of 24 May 2020, 6.78% (95% confidence interval: 5.21% to 8.64%) of individuals from whom blood samples were taken tested positive for antibodies to the coronavirus (COVID-19). This is based on blood test results from 885 individuals since the start of the study on 26 April 2020.

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. This is what helps to prevent individuals from getting the same infection again. We try to measure the presence of antibodies in order to work out who has had COVID-19 in the past.

These estimates have not been weighted to be representative of the target population in England. This is because of the relatively small numbers of positive cases in the sample. We will do more work on the potential to weight these estimates in future publications.

More information on how our estimates compare with other sources is available in [Section 8: Measuring the data](#).

5 . Characteristics of people testing positive for COVID-19

This section includes all individuals who have ever been tested for the coronavirus (COVID-19) as part of the study. It looks at the potential risk factors associated with those who have ever tested positive for COVID-19 at any point in the study, even if they now test negative. We have conducted statistical testing to indicate whether there is any evidence of differences in infection rates for each of the characteristics provided. For information on the statistical testing, see [Section 8: Measuring the data](#).

Previous editions of this bulletin have focused on people who tested positive over the most recent 14-day period. Our estimates for the percentage of people testing positive for COVID-19 are stable and low. Including all those who ever tested positive or never tested positive gives a larger dataset, enabling more accurate analysis of risk factors.

Over the whole study period, an estimated 0.41% (95% confidence interval: 0.33% to 0.51%) of people have ever tested positive for COVID-19. This estimate is unweighted and therefore not necessarily representative of the wider community population in England.

The estimates within this section should not be compared with the overall estimate of the percentage testing positive in England in [Section 2: Number of people in England who had COVID-19](#), as they use different time periods and one is a weighted estimate, while the other is unweighted. In addition, the estimates in this section include everyone who has ever tested positive (including many who have now recovered) and this will always be higher than the proportion testing positive in the last 14 days of the study.

Sex and age groups

Based on test results from those who have ever tested positive over the study period (26 April to 30 May 2020), there is no evidence of differences in the proportions of men or women testing positive for COVID-19.

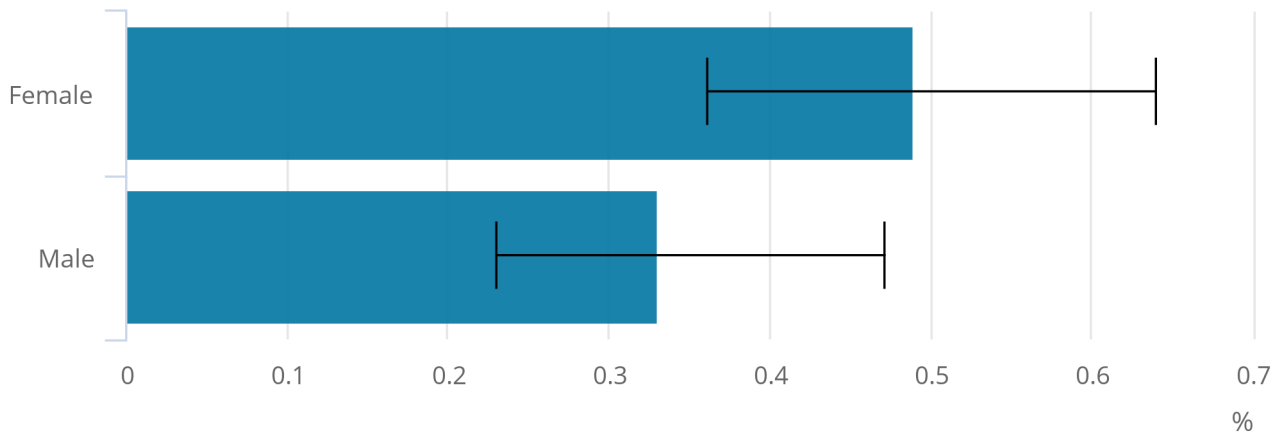
The black lines on Figure 3 show the confidence interval for the estimated percentage of men and women within the study that have ever been infected with COVID-19, showing the range of values overlap substantially. Statistical testing indicates that there is no evidence of different infection rates between men and women. More information on the statistical testing is available in [Section 8: Measuring the data](#).

Figure 3: There is no evidence of differences in the percentage of men and women testing positive for COVID-19

Estimated percentage testing positive for the coronavirus (COVID-19), by sex, England, 26 April to 30 May 2020

Figure 3: There is no evidence of differences in the percentage of men and women testing positive for COVID-19

Estimated percentage testing positive for the coronavirus (COVID-19), by sex, England, 26 April to 30 May 2020



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.

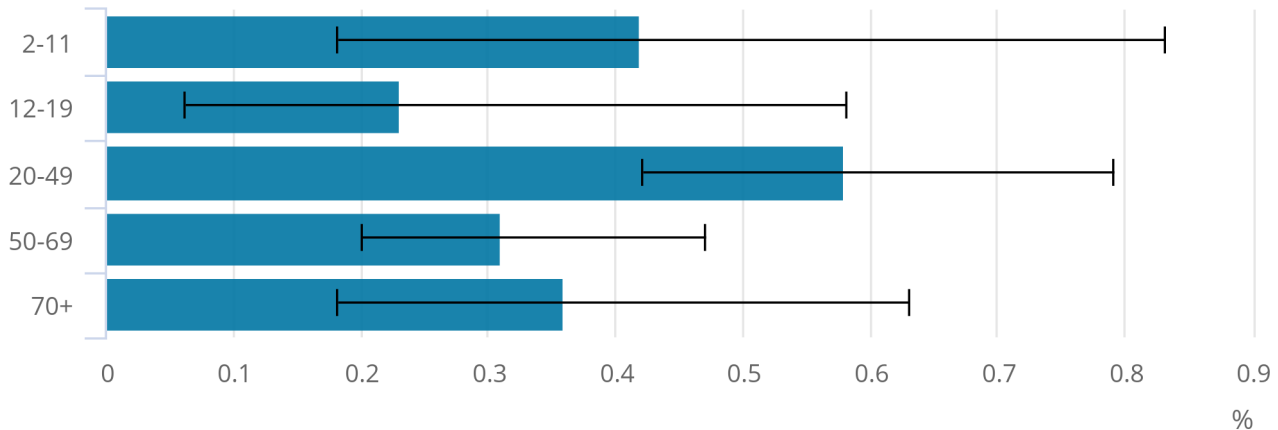
The range of values for the black lines on Figure 4 are relatively large across most age groups. Statistical testing indicates that there is not enough evidence to say with confidence that there is a difference in infection rates between age groups in the community.

Figure 4: It is not possible to say with confidence that there is any difference in the proportion of individuals in different age groups testing positive for COVID-19

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by age groups, England, 26 April to 30 May 2020

Figure 4: It is not possible to say with confidence that there is any difference in the proportion of individuals in different age groups testing positive for COVID-19

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by age groups, England, 26 April to 30 May 2020



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.

Patient-facing healthcare or resident-facing social care workers

Of those in our study who reported working in patient-facing healthcare or resident-facing social care roles ¹, 1.87% tested positive for COVID-19 (95% confidence interval: 1.07% to 3.02%). This includes NHS professionals, such as nurses and doctors, as well as social care workers, such as nursing home or home care workers.

By comparison, the percentage of people reporting not working in these types of roles testing positive for COVID-19 was lower at 0.32% (95% confidence interval: 0.26% to 0.44%).

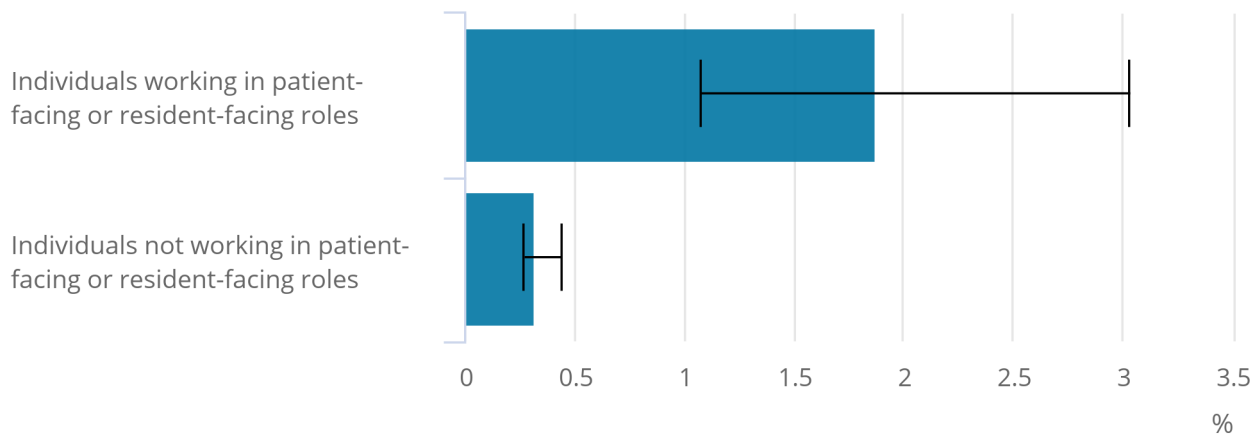
These estimates only include the working age population (those aged between 16 and 74 years old). In previous publications, this analysis included respondents of all ages.

Figure 5: A higher percentage of individuals who report working in patient-facing roles in health or social care tested positive for COVID-19

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by healthcare and social care workers and other individuals, England, 26 April to 30 May 2020

Figure 5: A higher percentage of individuals who report working in patient-facing roles in health or social care tested positive for COVID-19

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by healthcare and social care workers and other individuals, England, 26 April to 30 May 2020



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. We asked individuals to self-report whether they worked in patient-facing healthcare or resident-facing social care; where that information was missing or uncertain, we used the other information they gave us about their occupation to inform this coding.

Working location

Individuals taking part in our study were asked where they are currently working. Rates of infection for COVID-19 appear higher for individuals who work outside the home compared with those who work from home. An estimated 0.72% (95% confidence interval: 0.47% to 1.05%) of individuals who reported working outside of the home tested positive for COVID-19, compared with 0.22% (95% confidence interval: 0.10% to 0.41%) of individuals who reported working at home.

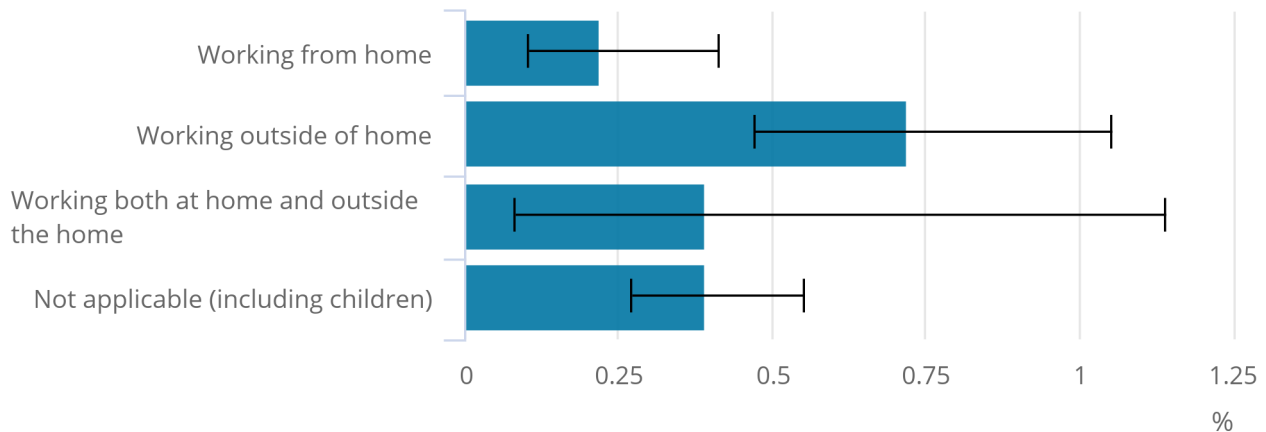
Some individuals reported working both in the home and outside the home. The confidence interval for this group of individuals is large, and statistical testing indicates high [uncertainty](#) in these estimates.

Figure 6: Rates of positive tests for COVID-19 appear higher for individuals who work outside the home compared with those who work from home

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by working location, England, 26 April to 30 May 2020

Figure 6: Rates of positive tests for COVID-19 appear higher for individuals who work outside the home compared with those who work from home

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by working location, England, 26 April to 30 May 2020



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. The “not applicable” category applied to over half the respondents and includes children as well as some people who are retired, furloughed or not working for another reason.

Symptoms experienced

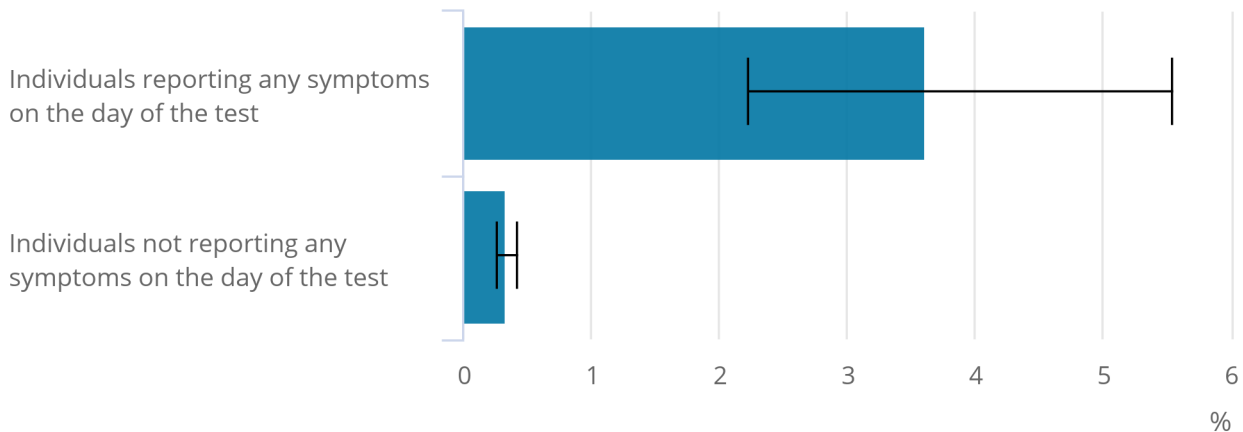
Individuals taking part in the COVID-19 Infection Survey were asked whether they had experienced a range of possible symptoms² on the day that they were tested.³ At this time, 3.62% (95% confidence interval: 2.22% to 5.53%) of people who were experiencing one or more symptoms of COVID-19 tested positive. By comparison, 0.33% (95% confidence interval: 0.25% to 0.41%) of people who were not experiencing any symptoms of COVID-19 at the time of the test tested positive.

Figure 7: A higher percentage of people exhibiting one or more symptoms of COVID-19 at the time of the test tested positive compared with those reporting no symptoms

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by symptoms on the day of the test, England, 26 April to 30 May 2020

Figure 7: A higher percentage of people exhibiting one or more symptoms of COVID-19 at the time of the test tested positive compared with those reporting no symptoms

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by symptoms on the day of the test, England, 26 April to 30 May 2020



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.

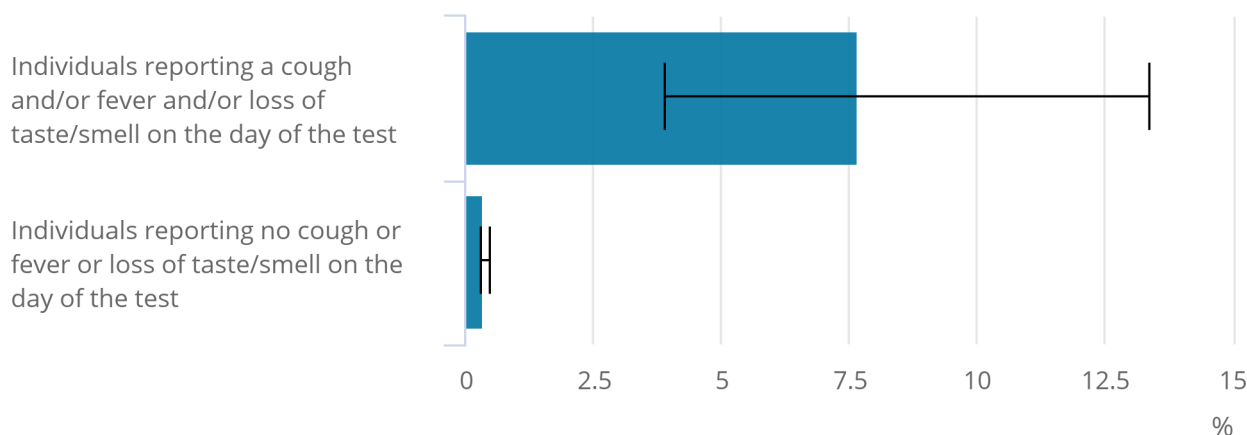
The percentage of people testing positive for COVID-19 was higher for those who reported specifically having a cough or fever, or loss of taste or smell, on the day of testing than for any symptoms in general. Of those reporting these specific symptoms, 7.69% (95% confidence interval: 3.90% to 13.35%) also tested positive for COVID-19. This compares with an estimate of 0.36% of those who did not have a cough or fever or loss of taste or smell (95% confidence interval: 0.29% to 0.45%).

Figure 8: The percentage of people testing positive for COVID-19 when reporting having a cough, fever, or loss of taste or smell was higher than for those not reporting these symptoms

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by cough, fever, or loss of taste or smell on the day of the test, England, 26 April to 30 May 2020

Figure 8: The percentage of people testing positive for COVID-19 when reporting having a cough, fever, or loss of taste or smell was higher than for those not reporting these symptoms

Estimated percentage of those ever testing positive for the coronavirus (COVID-19) in the study, by cough, fever, or loss of taste or smell on the day of the test, England, 26 April to 30 May 2020



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.

Additional analysis we have considered looks at whether people who tested positive also reported symptoms. While those with symptoms are more likely to test positive for COVID-19 than those without symptoms, this analysis shows that out of those who have ever tested positive, the percentage who reported having symptoms at the time of the test was relatively low.

Out of those people that tested positive for COVID-19 over the study period, only 22% (95% confidence interval: 14% to 32%) reported experiencing one or more of the various symptoms at the time of their test. Out of those who reported testing positive, 29% (95% confidence interval: 19% to 40%) reported experiencing symptoms at any point in the period around testing positive. This was at the time of the visit or at either the preceding or following visits.

This analysis is based on 88 individuals in the sample who tested positive for COVID-19. This is a very small denominator, meaning the confidence intervals are wide. Additionally, with such a small number of cases included in this analysis, if any of these are false-positives this would have a large effect on the results.

Notes for: Characteristics of people testing positive for COVID-19

1. We asked individuals to self-report whether they worked in patient-facing healthcare or resident-facing social care roles; where that information was missing or uncertain, we used the other information they gave us about their occupation.
2. The symptoms respondents were asked to report were: fever, muscle ache (myalgia), fatigue (weakness or tiredness), sore throat, cough, shortness of breath, headache, nausea or vomiting, abdominal pain, diarrhoea, and loss of taste or loss of smell.
3. Here we compare symptoms from the first time a person tested positive or, if they have never tested positive in the study, from their most recent test.

6 . COVID-19 Infection Survey data

[COVID-19 Infection Survey data tables](#)

Dataset | Released 5 June 2020

Findings from the first wave of the pilot phase of the COVID-19 Infection Survey.

7 . Collaboration



The Coronavirus (COVID-19) Infection Survey analysis was produced by the Office for National Statistics (ONS) in partnership with the University of Oxford, the University of Manchester, Public Health England and Wellcome Trust.

8 . 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 will help track the current extent of infection and transmission of COVID-19 among the population as a whole.

COVID-19 Infection Survey

We are initially conducting a pilot survey of households in England, working with the University of Oxford, IQVIA and UK Biocentre Milton Keynes to collect and analyse the samples. All individuals aged two years and over in sampled households were invited to provide samples for testing.

At the start of the pilot study, around 20,000 households were invited to take part, with the aim of achieving data from around 10,000 households. To take part, invited households opted in to the survey by contacting a company called IQVIA, working on behalf of the Office for National Statistics (ONS), to arrange a visit. Table 1 provides information regarding responses to our survey. The fieldwork is still ongoing and these cannot be regarded as final response rates to the survey.

Table 1: Current responses to the COVID-19 Infection Survey

	Households	Individuals
	% of Total	% of Total
Households invited to take part (total)	20,275	100%
Households enrolled	9,912	49%
Completed households (provided at least one swab)	9,906	49%
Eligible individuals in responding households (total)		21,563 100%
Individuals who provided first swab		21,225 98%
Individuals who agreed to continue		18,041 84%

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

Notes

1. The management information is taken on 31 May 2020, and the figures in this publication are from the households and individuals figure as at 30 May 2020. This means the management information includes a slightly larger sample than that reported in this publication. [Back to table](#)

Following completion of the pilot survey, we intend the full survey to expand the size of the sample over the next 12 months and look to cover people across all four UK nations.

This study addresses an important clinical priority: finding out how many people across the UK have a COVID-19 infection at a given point in time or at least test positive for it, either with or without symptoms; how many new cases have occurred in a given time period; and how many people are ever likely to have had the infection. It will also contribute to the Scientific Advisory Group for Emergencies (SAGE) estimates of the rate of transmission of the infection, often referred to as "R".

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](#).

The data being collected

The survey involves all participants over the age of two years. We test whether they currently have the virus using self-administered throat and nose swabs, where parents or carers take swabs from younger children. Every participant is swabbed once; participants are also invited to have repeat tests every week for the first five weeks as well as monthly for a period of 12 months in total.

Adults over 15 years of age from around 2,000 households will also provide a blood sample taken by a trained nurse, phlebotomist or healthcare assistant. These tests help determine what proportion of the population has developed antibodies to COVID-19.

We collect information from each participant, including those under 16 years of age, concerning socio-demographic characteristics, symptoms, whether self-isolating or shielding, and whether the participant has come into contact with a suspected carrier of COVID-19.

The sample for this initial survey has been drawn from households in which someone has already participated in an ONS survey and has consented to be approached for future research. Households cannot request to be part of the survey; this ensures the sample is representative of the wider population.

More information on what and how data are collected is available within the [COVID-19 Infection Survey protocol](#) and our [COVID-19 Infection Survey study guide](#).

Coverage

Only England is included in this pilot phase of the study. Discussions are underway with the devolved administrations in Scotland, Wales and Northern Ireland to include the whole of the UK in the main study. Only private households, otherwise known as the target population in this bulletin, are included in the sample. People in care homes, other communal establishments and hospitals are not included.

Analysing the data

We calculate the estimated proportion of the population testing positive for COVID-19 based on the results of swab tests performed between 17 May and 30 May 2020. Where individuals have had more than one swab test during this time, we have included only the latest test for each individual.

It is important to note that all of the 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.

It is important to note that 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. In this update, the total number testing positive has increased by one, which should not be interpreted as a net change of one.

Blood samples used to test for antibodies have been collected from 885 individuals so far, since the survey began on 26 April, to estimate the percentage of the adult population in England that has previously been infected with COVID-19. Samples are collected by a trained healthcare professional and tested by research staff at the University of Oxford for antibodies using a novel Enzyme-Linked Immunosorbent Assay (ELISA) that tests for immunoglobulins IgG and IgM, based on tagged and purified recombinant SARS-CoV-2 trimeric spike protein. Residual blood sera will be stored at the University of Oxford. More information on our antibody testing is available in the [COVID-19 Infection Survey protocol \(PDF, 1.14MB\)](#).

The estimates in [Section 2: Number of people in England who had COVID-19](#) are based on weighted data to ensure they are representative of the target population in England. While the pilot is based on a nationally representative survey sample, some individuals in the original ONS survey samples will have dropped out, while others will not have responded to the pilot. To address this, we apply weighting to ensure the responding sample is representative of the population in terms of age (grouped), sex, region, housing tenure and household size. Analysis in [Section 3](#), [Section 4](#) and [Section 5](#) of this bulletin is unweighted.

Confidence intervals for weighted estimates are calculated using the Korn-Graubard method to take into account the expected small number of positive cases and the complex survey design. The confidence intervals are calculated so that if we were to repeat the survey many times on the same occasion and in the same conditions, in 95% of these surveys the true population value would be contained within the 95% confidence intervals. For unweighted estimates, we use the Clopper-Pearson method as the Korn-Graubard method is not appropriate for unweighted analysis.

We have conducted statistical hypothesis testing to indicate whether there is any evidence of differences in infection rates within the different breakdowns presented in the analysis. We use the results of this to inform our commentary on whether there is any evidence of differences. We will continue to present more information around the statistical testing in future publications.

Test sensitivity

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 COVID-19, otherwise known as the positivity rate. We do not report on the prevalence rate within the analysis sections of this bulletin. To calculate the prevalence rate, we would need to adjust for imperfect test performance, requiring assumptions about the false-positive and false-negative rates.

Using Bayesian analysis and available academic literature, we have calculated what prevalence would be in a couple of scenarios detailed later in this section; we found that even if there was a relatively high rate of false-negative results, the positivity rate of 0.10% presented in [Section 2: Number of people in England who had COVID-19](#) would still be fairly close to the true figure.

Based on similar studies and information in the academic literature, we think the sensitivity of the test may be between 85% and 95% (with around 95% probability) and the specificity of the test above 95%. Sensitivity measures how often the test correctly identifies those who have the virus, so a test with high sensitivity will not have many false-negative results. Specificity measures how often the test correctly identifies those who do not have the virus, so a test with high specificity will not have many false-positive results. If these figures are correct, our overall estimate for COVID-19 prevalence in the community-based population would be 0.13% (credible interval: 0.05 % to 0.22%), similar to our positivity rate of 0.10%.

In addition to test accuracy, we also need to consider the possibility of additional false-negative results caused by individuals incorrectly self-swabbing. We do not know how often this occurs, but to understand the potential impact we have estimated what the prevalence rate would be if the test sensitivity was much lower. Based on evidence within the academic literature, this has been estimated to be 60% (or between 45% and 75% with 95% probability) and when factored in, the overall estimate for COVID-19 prevalence in the community-based population would be 0.19% (credible interval: 0.07 % to 0.35%).

Modelling methodology

Figure 2 presents additional modelling conducted by our research partners at the University of Oxford and the University of Manchester and shows that the percentage of individuals in the population that test positive for COVID-19 is decreasing over time since the first measurement on 26 April 2020.

The regression model adjusts the survey results to be more representative of the overall population in terms of age, sex and region and generates estimated rates of people testing positive for COVID-19 (known as "positivity rates") controlling for age, sex and region. To analyse the trend over time, time in weeks is included as a variable in the model. Given the low number of positive cases, the effect of time was not allowed to vary by other factors. The positivity rate estimates for each different type of respondent (by age, sex and region) were then weighted by the percentage of each type in the actual overall population. This technique is known as dynamic Bayesian multi-level regression post-stratification (MRP) and is used by organisations such as the Centers for Disease Control and Prevention (CDC) to provide prevalence of diseases at both a national and subnational level in the United States. In future analyses, we plan to account for correlation within the household, which will likely increase the width of the credible intervals, and more covariates if there are a sufficient number of positive cases to fit more complex models.

Our research partners are considering the most appropriate way to publish further information on the methodology behind the modelling. Further information will be provided in due course.

Other studies

While this study looks to identify the proportion of the population testing positive for COVID-19, it is one of a number of studies that look to provide information around the coronavirus pandemic within the UK.

People testing positive for COVID-19: 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. They also only test people eligible for testing according to particular rules, for example, people in hospital with symptoms and certain at-risk groups of key workers. By comparison, the statistics presented in this bulletin take a representative sample of the whole population in England, including people who are not otherwise prioritised for testing, something that is currently missing from other studies.

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 this survey are tested by research staff at the University of Oxford for antibodies using a novel ELISA. For more information about the antibody test used in this bulletin, see the [COVID-19 Infection Survey protocol \(PDF, 1.14MB\)](#).

9 . Strengths and limitations

These statistics have been produced quickly in response to developing world events. The Office for Statistics Regulation (OSR), 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](#).

Timeliness

The results presented on the number of people in England infected with the coronavirus (COVID-19) in [Section 2: Number of people in England who had COVID-19](#) of this bulletin are based on the results of swab tests performed between 17 May and 30 May 2020, providing users with the most timely estimates for the percentage of the target population in England testing positive for COVID-19.

Uncertainty in this data

The estimates presented in this bulletin contain [uncertainty](#). There are many sources of uncertainty, but the main sources in the information presented include each of the following.

Uncertainty in the test (false-positives, false-negatives and timing of the infection)

These results are directly from the test, and no test is perfect. There will be false-positives and false-negatives from the test, and false-negatives could also come from the fact that participants in this study are self-swabbing. More information about the potential impact of false-positives and false-negatives is provided in [Section 8: Measuring the data](#).

The data are based on a sample of people, so there is some uncertainty in the estimates

Any estimate based on a random sample contains some uncertainty. If we were to repeat the whole process many times, we would expect the true value to lie in the 95% confidence interval on 95% of occasions. A wider interval indicates more uncertainty in the estimate.

Quality of data collected in the questionnaire

As in any survey, some data can be incorrect or missing. For example, participants and interviewers sometimes misinterpret questions or skip them by accident. To minimise the impact of this, we clean the data, editing or removing things that are clearly incorrect. In these initial data, we identified some specific quality issues with the healthcare and social care worker question responses and have therefore applied some data editing (cleaning) to improve the quality. Cleaning will continue to take place to further improve the quality of the data on healthcare and social care workers, which may lead to small revisions in future releases.

10 . Next steps

As the study progresses, we will continue to provide greater detail into the extent of the coronavirus (COVID-19) infection, for example, by providing regional breakdowns.

11 . Glossary

Community

Within 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. 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.

False-positives and false-negatives

A false-positive result occurs when the test suggests 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.

Incidence rate

Incidence is the rate of occurrence of new cases of the disease over a given period of time. Incidence refers to the number of individuals who have a positive test in the study divided by the time from joining the study to their last test. Individuals who are positive when they join the study are not included in this calculation.

12 . Related links

[Coronavirus \(COVID-19\) latest data and analysis](#)

Web page | Updated as and when data become available

data and analysis on the coronavirus (COVID-19) in the UK and its effect on the economy and society.

[Coronavirus \(COVID-19\) round-up](#)

Article | Updated as and when data become available

Catch up on the latest data and analysis related to the coronavirus (COVID-19) pandemic and its impact on our economy and society.

[Deaths registered weekly in England and Wales, provisional: week ending 15 May 2020](#)

Bulletin | Released 26 May 2020

Provisional counts of the number of deaths registered in England and Wales, including deaths involving the coronavirus (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 ONS, in partnership with the Universities of Oxford and Manchester, Public Health England 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 coronavirus (COVID-19) estimates.

[Coronavirus \(COVID-19\) Infection Survey pilot: England, 10 May 2020](#)

Bulletin | Released 10 May 2020

Estimates of people testing positive for the coronavirus (COVID-19) in England. Provisional results from COVID-19 Infection Survey pilot.

[COVID-19 Infection Survey \(CIS\)](#)

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.