Public Health England

Protecting and improving the nation's health

Technical summary

Public Health England Data Series on deaths in people with COVID-19

Updated 1 June 2020 for the incorporation of pillar 2 testing data

Updated 23 June 2020 to update data linkage procedure (Section 4.4)

Prepared 23 June 2020 by COVID-19 EpiCell

Note: this document will not be updated on a regular basis. For most up to date information on the England and UK death data, see the gov.uk Coronavirus Dashboard: https://coronavirus.data.gov.uk/about

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-leading science, research, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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1. Summary

a. Monitoring the number of deaths in people with COVID-19 is a vital part of tracking the pandemic. Public Health England (PHE) has developed a data series that collates reports from multiple sources to give a daily number of deaths in people with a positive COVID-19 test in England, regardless of where they died.

b. Since 29 April 2020, COVID-19 deaths in England are reported using the PHE data series. Each day, PHE combines data from four different sources:
   i. Deaths occurring in hospitals, notified to NHS England by NHS trusts
   ii. Deaths notified to local PHE Health Protection Teams in the course of outbreak management
   iii. Laboratory reports where a person has had a laboratory confirmed COVID-19 test linked to death reports from electronic hospital records; from 1 June this includes laboratory reports from both Pillar 1 and Pillar 2 testing:
      i. Pillar 1: swab testing in PHE labs and NHS hospitals for those with a clinical need, and health and care workers
      ii. Pillar 2: swab testing for the wider population aged 5 and over, as set out in government guidance.
   iv. Office for National Statistics (ONS) death registrations which can be linked to laboratory confirmed COVID-19 tests.

c. The advantage of the PHE data series is that it includes deaths in anyone with laboratory confirmed COVID-19, including those who die outside of hospital settings. It is a timely and complete measure by combining information from multiple sources. The PHE data series also aligns England's COVID-19 death reporting with how deaths are reported in the rest of the UK.

d. Death data are checked for errors and a semi-automated program is run to match records and ensure a person who died is not counted twice across different reporting systems.

e. The PHE data series does not include deaths in people where COVID-19 was suspected but a laboratory test was not carried out or was negative. Furthermore, the PHE data series does not report cause of death, and as such represents *deaths in people with COVID-19* and not necessarily due to COVID-19. The weekly counts of deaths from ONS includes all deaths where COVID-19 is recorded on the death certificate.

2. Background

Monitoring the number of deaths due to COVID-19 is a vital part of tracking the pandemic. It is critical to ensure death data are as accurate, comprehensive and timely as possible.

Public Health England (PHE) has developed a methodology that links data from four sources to provide broader coverage of deaths among people with a confirmed COVID-19 laboratory test, whether they occurred in hospitals, care homes or the wider community.

3. Aims

This paper explains the process for reporting deaths and describes the advantages and limitations of the reporting method. It provides an explanation of how to interpret the PHE COVID-19 death data series and sets out answers to frequently asked questions.

4. Outline of PHE data series

4.1 Definition of COVID-19 related deaths

All deaths reported to Public Heath England that have a laboratory confirmed report of COVID-19 (including at post-mortem), in any setting. The daily number represents new deaths reported to PHE in the 24 hours up to 5pm the previous day. Report date does not necessarily equate to date of death as it may take up to a week for deaths to be reported to PHE.

4.2 Data sources and processing

Public Health England receives reports of death from four sources:

a. Deaths occurring in hospitals, notified to NHS England by NHS trusts using the COVID-19 Patient Notification System (CPNS) *(previously the source of daily COVID-19 deaths in England before 29 April 2020)*
b. Deaths with a confirmed COVID-19 test, notified to PHE Health Protection Teams during outbreak management (primarily in non-hospital settings) and recorded in an electronic reporting system
c. All people with a laboratory confirmed COVID-19 test reported to PHE via the Second Generation Surveillance System (SGSS) (a centralised repository of laboratory results)[1]. This list is submitted on a daily basis to the Demographic

[1]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739854/PHE_Laboratory_Reporting_Guidelines.pdf

Batch Service (DBS)[2] to check NHS patient records for reports of individuals who died in the previous 24 hours in any setting. From 1 June this includes laboratory reports from both Pillar 1 and Pillar 2 testing:

i. Pillar 1: swab testing in PHE labs and NHS hospitals for those with a clinical need, and health and care workers
ii. Pillar 2: swab testing for the wider population aged 5 and over, as set out in government guidance.

d. Office for National Statistics (ONS) death registrations which can be linked to a laboratory confirmed COVID-19 test. Reported on an 11-day lag.

Data from each source are collected and automated programmes check for errors and make sure deaths are not counted twice.

4.3 Quality assurance

Quality assurance is undertaken by PHE using semi-automated programmes, with manual checking before and after processing. This involves sense checking data in relation to key information (eg age at death, date of birth, hospital admission, death report). Data from each source are merged and duplicate reports are removed.

4.4 Data linkage

Multiple records for a single individual are linked principally on NHS number. Records without NHS numbers are linked on a combination of other patient identifying information (PII) such as first name, surname, date of birth and postcode.

On 23 June 2020, an update was made to the data linkage process for laboratory records whereby previously only the PII returned after DBS tracing was used to link records, this was revised to also link on PII that had been sent along with the laboratory specimen. This resulted in an improved linkage rate and 109 historic deaths reported by ONS with COVID-19 listed on the death certificate were then confirmed with a positive laboratory result and reported in the national totals.

5. About the PHE data series

5.1 Advantages of the PHE data series

The PHE data series has the following advantages:

- broader coverage by including deaths in anyone diagnosed with COVID-19, including those outside of hospital settings
- more timely reporting of deaths: there is a time lag between the date of death and the date it is reported to PHE. Using multiple overlapping data sources, the delay is reduced by approximately 1-2 days

[2] https://digital.nhs.uk/services/national-back-office-for-the-personal-demographics-service/demographics-batch-service-bureau

- optimises completeness of hospital reporting by combining information from multiple sources, making it less likely that deaths are missed.
- ensures England COVID-19 death reporting is consistent with how deaths are reported in the rest of the UK. Scotland, Wales and Northern Ireland capture deaths outside hospitals

5.2 Difference in the number of deaths compared to NHS England hospital deaths

Using data reported up to 5pm on 31 May 2020, 26,729 deaths in hospitals were reported by NHS England. The PHE data series currently identifies 34,813 deaths, or an additional 8,084 deaths. Figure 1 and Figure 2 compare the two data series by date of death.

Figure 1: Daily number of COVID-19 laboratory confirmed deaths by date of death and data source; England, 2 March to 31 May 2020

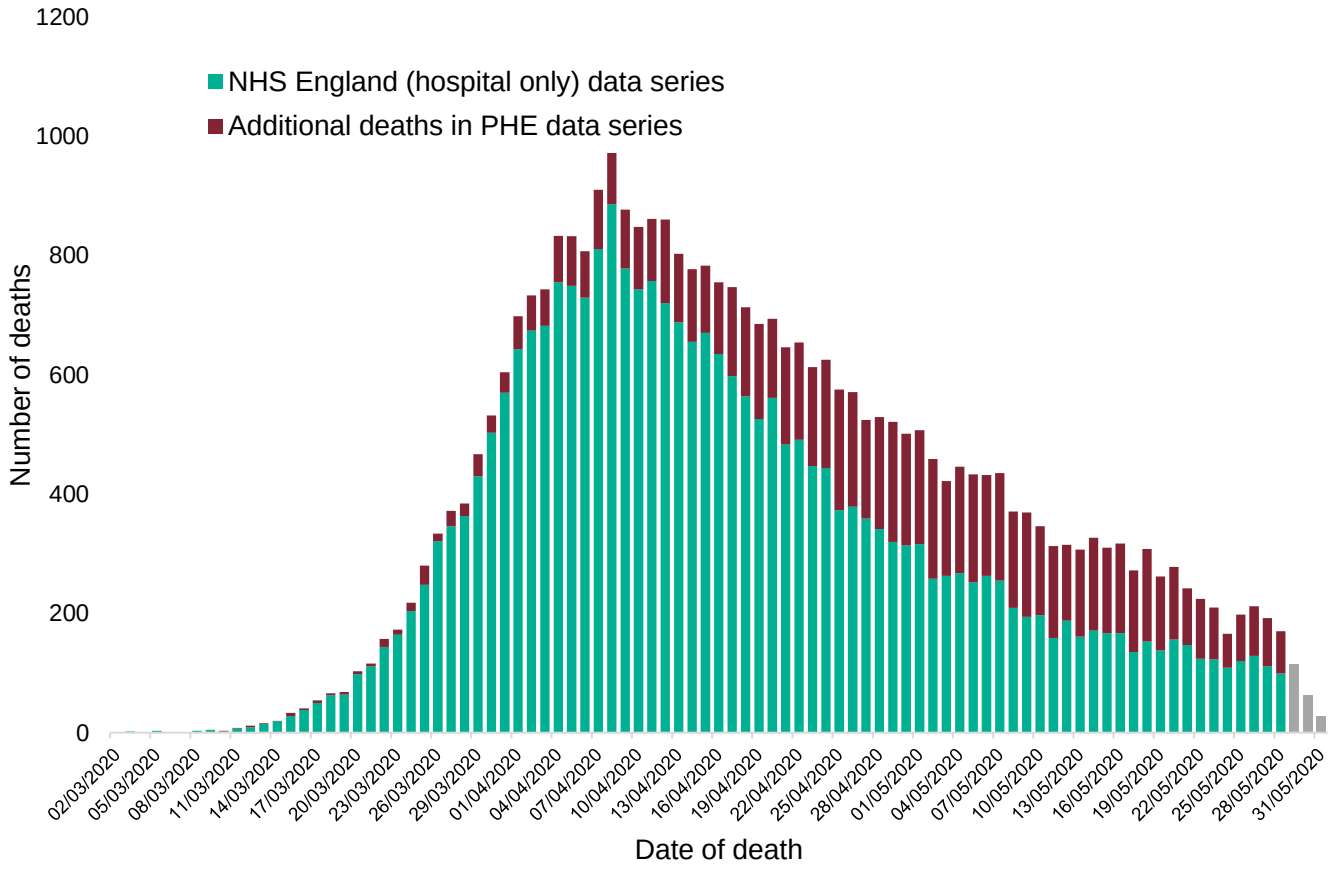
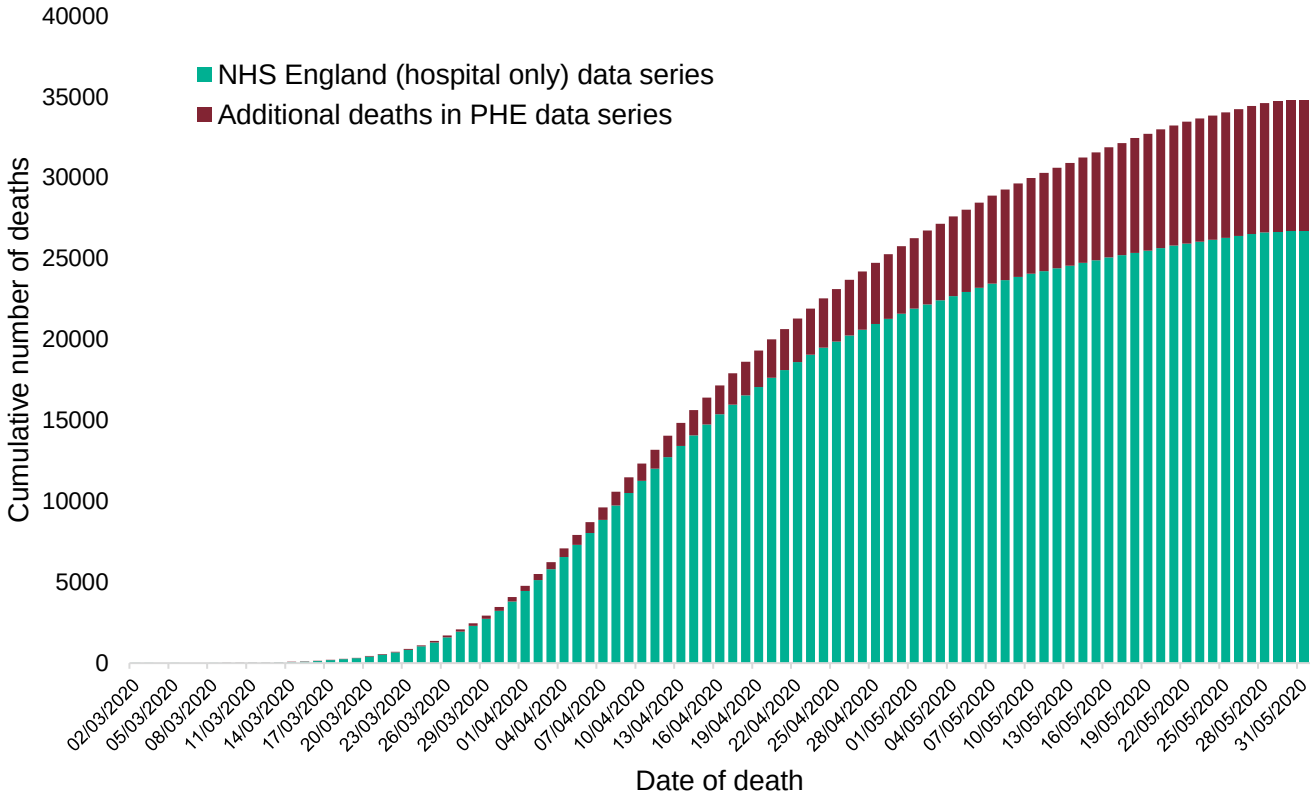


Figure 2: Cumulative number of COVID-19 laboratory confirmed deaths reported by date of death and data source; England, 2 March to 31 May 2020



5.3 Inclusion of Pillar 2 laboratory testing from 1 June 2020

From 1 June 2020, deaths among people with a positive test through Pillar 2 are reported alongside the usual death figures. Pillar 2 tests are undertaken in settings outside of hospitals. This includes testing programmes in community settings and residential care homes.

Deaths among people with a laboratory confirmed COVID-19 test through Pillar 2 testing programme were integrated into the PHE dataset on 24 May 2020 and were first officially reported in the England national total on a daily basis starting on 1 June 2020 (Figure 3).

The inclusion of Pillar 2 testing data has meant an additional 445 deaths that occurred back to 26 April 2020 have been added to the cumulative total of COVID-19 related deaths. This is equivalent to around 10-20 deaths a day (Figure 4). Most of these deaths had been previously notified to PHE but not reported as they were not linked to COVID-19 positive test. Nearly all the additional deaths from Pillar 2 testing were among care home residents.

Figure 3: COVID-19 deaths by date of report: previous PHE data series and additional deaths linked to pillar 2 tests; England, 2 March to 31 May 2020

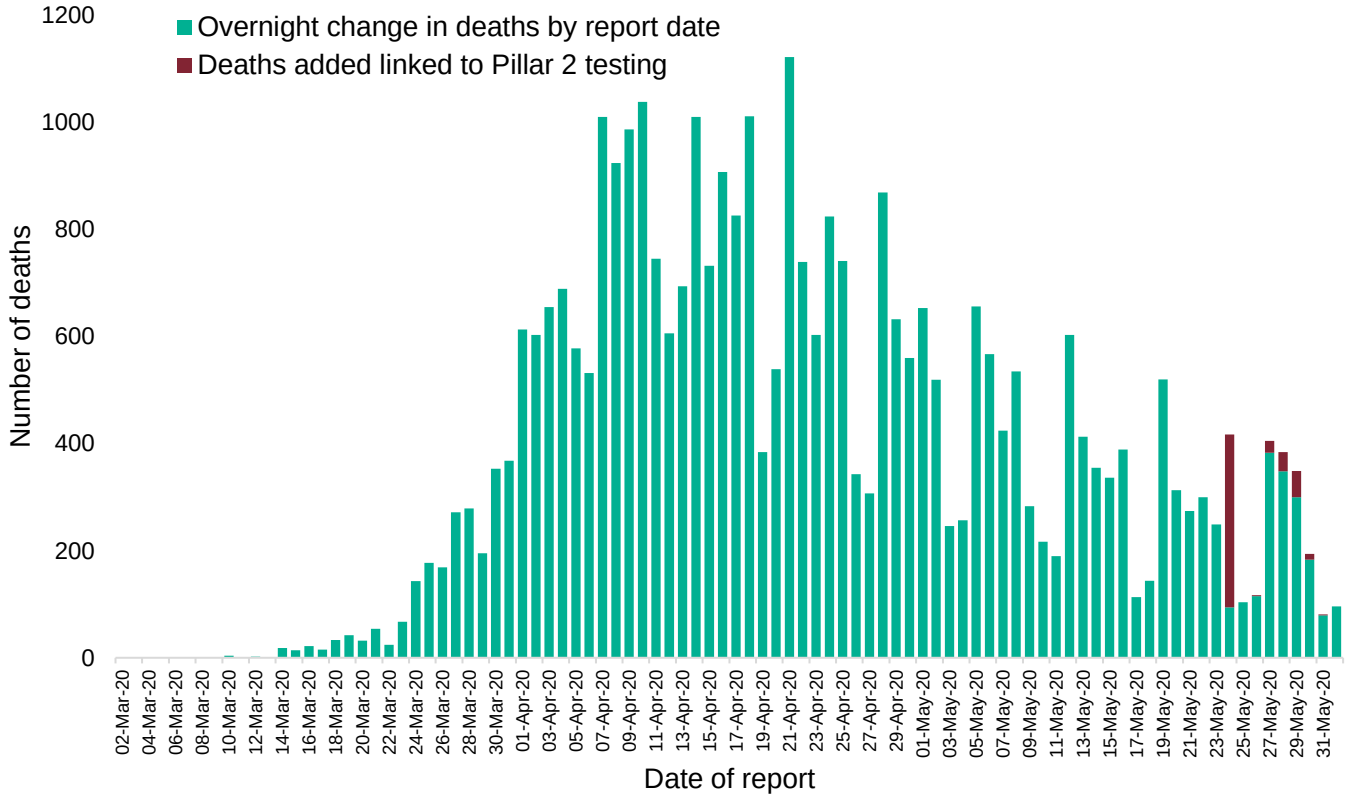
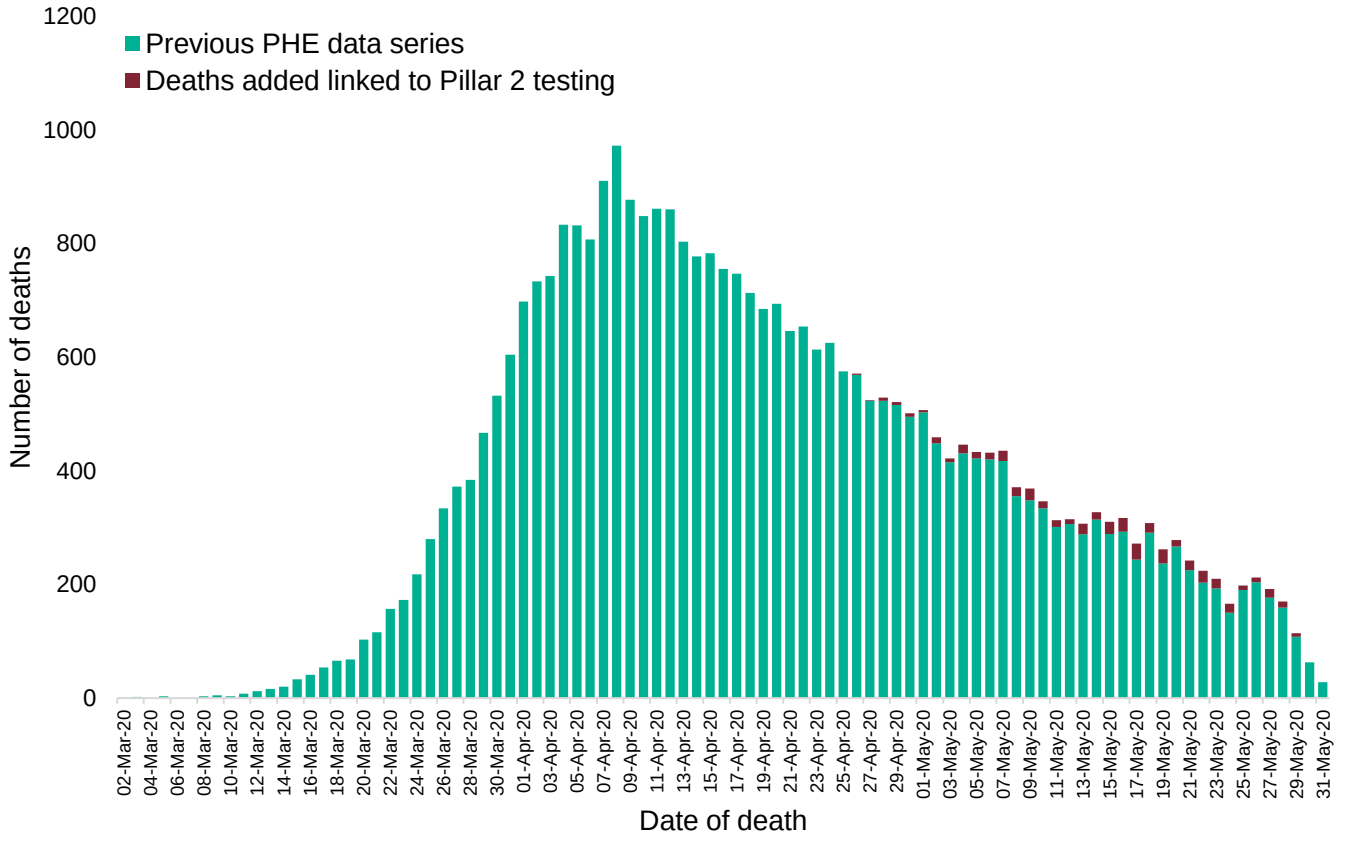


Figure 4: COVID-19 deaths by date of death: previous PHE data series and additional deaths linked to pillar 2 tests; England, 2 March to 31 May 2020



5.4 Limitations of the PHE data series

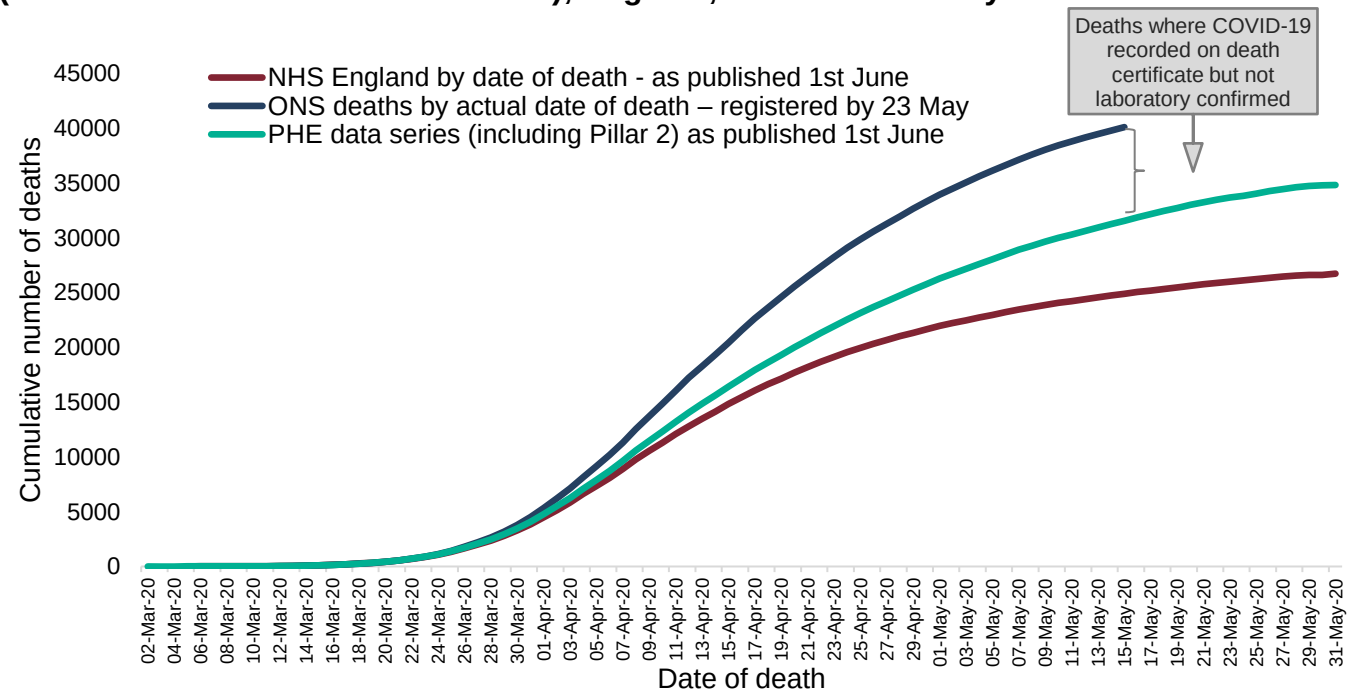
The PHE data series does not include deaths in people where COVID-19 is suspected but not confirmed by testing (either negative or not done). Furthermore, the PHE data series does not report cause of death, and as such represents *deaths in people with COVID-19* and not necessarily due to COVID-19.

5.5 How does the PHE data series compare to the ONS death registrations?

The PHE data series is used to count daily deaths in people with a confirmed COVID-19 test in England. ONS provides a weekly count of all deaths in England and Wales where COVID-19 is recorded on the death certificate (including deaths where COVID-19 was suspected based on symptoms and/or linked to an outbreak, and not limited to laboratory confirmed cases); these are reported on an 11-day lag. ONS death registrations which can be linked to laboratory confirmed COVID-19 tests are included in the PHE data series, but ONS death registrations without laboratory confirmation are not.

Figure 5 shows the PHE data series compared to the ONS death registrations and NHS England data series. The PHE data series more closely aligns with the ONS data series, although there may be up to an additional 8,500 deaths (up to 15 May) reported by ONS which represent deaths where COVID-19 was recorded as a cause of death but there was no laboratory confirmed test. Going forward, as more people are being tested, the PHE data series is likely to capture additional deaths, particularly outside hospitals. PHE are continuing work to understand the number of suspected COVID-19 deaths are taking place in care home settings and the wider community.

Figure 5: Cumulative deaths by date of death: NHS England (lab confirmed COVID-19), PHE combined (lab confirmed COVID-19) and ONS death registrations (COVID-19 listed on death certificate); England, 2 March to 31 May 2020



6. Frequently asked questions

1. **Were we under-estimating deaths before this?**

To date, the England focus on hospital deaths was the best way to give a consistent, reliable number on a daily basis. The PHE data series was developed to provide a broader measure of COVID-19 deaths in England by counting deaths in anyone with a laboratory confirmed COVID-19 test through combining multiple data sources. As of 1 June 2020, the PHE data series counted 34,813 deaths in people with COVID-19, which is 8,084 more COVID-19 deaths compared to the previous hospital-only data series. The incorporation of pillar 2 testing data has meant that 445 deaths have been added to the cumulative total of COVID-19 related deaths. The vast majority of these deaths occurred in people resident in care homes.

2. **Where have these data come from?**

These data are collected and combined from data sources: hospitals, local Health Protection Teams and automated laboratory systems. It means we can include deaths in anyone with a confirmed COVID-19 test which occur in hospitals, care homes and any other setting. Using multiple sources means we are much less likely to miss deaths. Data are checked to and ensure a person who died is not counted twice.

3. **Does this mean that COVID-19 epidemic is getting worse?**

No. The incorporation of pillar 2 testing data has meant that 400 deaths that were previously categorised as probable have now been redefined as “confirmed”. The newly confirmed deaths identified have occurred during a month-long period. This does not represent a new surge in the number of deaths.

4. **Why haven’t you published these data sooner?**

Collating data across all sectors is technically difficult and challenging. It just isn’t possible to get a daily count of deaths from every care home and residence in the country, so this has been done by bringing together a range of existing data systems. It is important to get the numbers right. Together with DHSC, PHE have undertaken rigorous validation and quality assurance of the PHE data series of combining deaths from multiple sources to understand how many additional COVID-19 deaths are captured.

With the expansion of the PHE COVID-19 testing programme, significant work has been conducted across the testing pillars to improve the data flows and integrate Pillar 2 testing data into routine data flows. Data quality of Pillar 2 has improved sufficiently to allow tracing of records on an individual level to identify deaths and integrate these into routine reporting.

5. Does this represent everyone in the country who has died from COVID-19?

This dataset includes all deaths in people who had a positive COVID-19 test. Combining deaths from multiple sources reduces the risk of underreporting compared to the current data series. However, this data series does not include deaths in people who had suspected COVID-19 but were never tested. These deaths will be identified over time through ONS death registrations. Going forward, as more people are being tested, this data series is likely to capture additional deaths, particularly outside hospitals. Options to test post-mortem samples where no testing has been undertaken are being explored to improve the accuracy of death reporting.

6. If deaths are being reported from several sources, are we over counting deaths?

We are carefully going through the data and have developed a process to ensure the data are accurate and a person who died is not counted twice across different reporting systems.

7. Can you provide a breakdown by setting?

This cannot be provided on a daily basis. More accurate information on place of death are available weekly through ONS death registrations, with a 11-day reporting lag.

8. What period do these data cover?

This data series covers all deaths in people in England with laboratory confirmed COVID-19 test diagnosed since 2 March 2020, regardless of where they died. For our UK figures we have combined them with similar series for Scotland, Wales and Northern Ireland. Deaths identified using Pillar 2 laboratory data have been notified to PHE since 24 May and reported in the England totals from 1 June 2020.

Annex 1: Details of data sources included in PHE data series

Data source	Description
NHS England line listing of deaths reported by NHS trusts in the COVID-19 Patient Notification System (CPNS)	This data contains information on deaths of patients who have died in hospitals in England and had tested positive for COVID-19 at the time of death Data are reported to NHS England by individual NHS Trusts via a web-based reporting system
Health protection teams (HPTs) reporting deaths notified to them (primarily non-hospital settings)	These are deaths reported to Health Protection Teams as part of their outbreak management. This are primarily from non-hospital settings such as care homes but can also include other settings
NHS Demographic Batch Service tracing of patients with a laboratory confirmed COVID-19 test	These are reports of deaths among individuals who have a laboratory confirmed diagnosis of COVID-19, as recorded in the SGSS dataset (national dataset extracted directly from laboratories)[3]. From 1 June this includes laboratory reports from both pillar 1 and pillar 2 testing i.Pillar 1: swab testing in NHS hospitals for those with a clinical need, and health and care workers ii.Pillar 2: swab testing for the wider population aged 5 and over, as set out in government guidance. These data are submitted daily to the Demographic Batch Service (DBS)[4] to check NHS patient records for reports that individuals who died in the previous 24 hours These deaths are not limited to specific places of death
Office for National Statistics (ONS) death registrations which can be linked to laboratory confirmed COVID-19 tests.	These are deaths where COVID-19 is mentioned on the death registration which could be linked to a laboratory confirmed COVID-19 test These deaths are not limited to specific places of death

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739854/PHE_Laboratory_Reporting_Guidelines.pdf
[4] https://digital.nhs.uk/services/national-back-office-for-the-personal-demographics-service/demographics-batch-service-bureau