

Statistical bulletin

# Deaths involving COVID-19 by vaccination status, England: deaths occurring between 1 January 2021 and 31 May 2022

Age-standardised mortality rates for deaths involving COVID-19 by vaccination status, broken down by age group. Deaths occurring between 1 January 2021 and 31 May 2022 in England.

Contact:  
Megan Munro, Charlotte  
Birmingham, Vahé Nafilyan,  
Owen Gethings, Jasper Morgan  
[health.data@ons.gov.uk](mailto:health.data@ons.gov.uk)  
+44 1633 582486

Release date:  
6 July 2022

Next release:  
21 February 2023

## Notice

**23 January 2023**

There will be a delay in publishing the next edition of the deaths by vaccination status dataset. This is because we require data on subsequent booster vaccinations and will be updating to the Census 2021 populations. We are updating the linked dataset used to create the statistics to use Census 2021 data so we can be representative of a much larger percentage of the population. This will include people who have migrated since the 2011 Census and people too young to be included in the 2011 Census. We are also updating the data pipeline so that we can identify spring and autumn booster doses and include these in our publication.

# Table of contents

1. [Main points](#)
2. [Deaths by vaccination status. England data](#)
3. [Measuring the data](#)
4. [Related links](#)

# 1 . Main points

- Monthly age-standardised mortality rates (ASMRs) for deaths involving coronavirus (COVID-19) have been consistently lower for all months since booster introduction in September 2021 for people who had received a third dose or booster at least 21 days ago, compared with unvaccinated people and those with just a first or second dose.
- Before March 2022, those who had received a second vaccine dose over six months ago had higher monthly ASMRs for deaths involving COVID-19 than those who had received a second dose less than six months ago; this indicates a possible waning of protection from vaccination over time.
- The ASMRs for first and second vaccine doses have been similar to those for unvaccinated people from March 2022 to May 2022, indicating a possible waning in protection; however, the confidence limits are wide for these groups because of lower populations in these vaccination statuses.
- The ASMRs are not equivalent to measures of vaccine effectiveness; they account for differences in age structure and population size, but there may be other differences between the groups (particularly underlying health) that affect mortality rates.
- Spring boosters may be present in the data if it is someone's overall third dose but are not yet being distinguished from third doses or boosters.
- Changes in non-COVID-19 mortality by vaccination status are largely driven by the changing composition of the vaccination status groups; this is because of the prioritisation of people who are clinically extremely vulnerable or have underlying health conditions, and differences in timing of vaccination among eligible people.
- Non-COVID-19 mortality rates can also be affected by seasonal mortality and the healthy vaccinee effect.

The ASMRs are not equivalent to vaccine effectiveness and both the COVID-19 and non-COVID-19 ASMRs can be affected by other various factors, such as health status and changes in mortality rates over the year. More information can be found in our [Deaths involving COVID-19 by vaccination status bulletin, published December 2021](#). We are undertaking further analysis to understand the relative impact of these effects.

## 2 . Deaths by vaccination status, England data

[Deaths by vaccination status, England](#)

Dataset | Released 6 July 2022

Age-standardised mortality rates for deaths involving coronavirus (COVID-19), non-COVID-19 deaths and all deaths by vaccination status, broken down by age group.

### 3 . Measuring the data

To compare mortality across coronavirus (COVID-19) vaccination statuses, age-standardised mortality rates (ASMRs) are calculated. ASMRs are used to allow comparisons between populations that may contain different proportions of people of different ages. The 2013 European Standard Population is used to standardise rates. Methodological information on the calculation of ASMRs can be found in our [Weekly COVID-19 age-standardised mortality rates by vaccination status, England: methodology article](#).

Our [accompanying dataset](#) includes monthly ASMRs by vaccination status for deaths involving COVID-19, non-COVID-19 deaths, and all deaths. These are broken down by age group and sex for the population in the Public Health Data Asset (PHDA) using data on death occurrences between 1 January 2021 and 31 May 2022 for deaths registered by 8 June 2022. The dataset also includes counts of deaths by vaccination status and weeks since vaccination for all registered deaths.

A glossary of terms used in this article, other strengths and limitations, and further information can be found in our previous Deaths involving COVID-19 by vaccination status bulletins from [May 2022](#) and [December 2021](#).

#### The Public Health Data Asset (PHDA)

The PHDA is a linked dataset combining the 2011 Census, the General Practice Extraction Service (GPES) data for COVID-19 pandemic planning and research, and the Hospital Episode Statistics (HES). It combines demographic and socio-economic factors with pre-existing conditions based on clinical records. The PHDA covers England only and contains a subset of approximately 79% of the population of England aged 10 years. It allows for analyses to be carried out that require a known living population with known characteristics and the use of variables such as health conditions and census characteristics. We linked this unique dataset to the vaccination data from the National Immunisation Management Service (NIMS) based on NHS number to allow us to analyse how ASMRs differ by vaccination status. The NIMS data in our dataset cover the period up to 15 June 2022; however, there may be some additional lag in reporting the data.

#### Mortality Data

This publication uses death occurrences registered up to 8 June 2022, rather than death registrations. Because of registration delays, more deaths may be registered at later dates, leading to an increase in the death occurrences. This is especially true for more recent deaths. More information can be found in our [Impact of registration delays on mortality statistics in England and Wales: 2020 article](#). Finalised death data for 2021 are used so no additional death registrations for 2021 will be added but some 2021 death occurrences may yet be registered in 2022. However, provisional death registrations for 2022 are used to enable timely analysis to be completed to monitor mortality change but may be subject to change.

This analysis includes 85.4% of all deaths of residents in England that occurred between 1 January 2021 and 31 May 2022, as published in our [Monthly mortality analysis, England and Wales datasets](#). This includes all ages and deaths that were registered by 7 June 2022.

The PHDA data contains lower proportions of deaths for the younger age groups because of migration since the 2011 Census. The proportion of deaths of unvaccinated people included in the PHDA is lower than for vaccinated people. This is because younger people are more likely to be unvaccinated and therefore less likely to link to the PHDA than vaccinated, older people. The percentage of all deaths that are in the PHDA is decreasing slightly over time as there are more deaths of people who were not in the 2011 Census or general practitioner (GP) patient register. This decrease is especially prominent in the deaths of younger and unvaccinated people. This effect does not affect the quality of the estimates portrayed in this bulletin as the rate uses the same population for numerator and denominator and therefore is not biased by this change. Decreasing numbers in particular groups result in wider [confidence intervals](#) for our estimates.

## Vaccination data

The [Joint Committee on Vaccination and Immunisation \(JCVI\) advised in February 2022 a spring booster for the most vulnerable](#). This spring booster may be present in the NIMS dataset if it is the person's third dose or booster, but it is not being differentiated from a normal third dose or booster in our analysis. Further developments to the handling of spring boosters will be available in future publications. More information can be found in our [Deaths involving COVID-19 by vaccination status, England bulletin from May 2022](#).

People with erroneous or inconsistent vaccination data were removed from the analysis. This includes 71,318 people who have a recorded first and third dose or booster but not a second dose. This ensures that deaths are not incorrectly assigned to the wrong vaccination status. However, it also has the effect of reducing the population, therefore increasing the mortality rates for people who received a first dose.

In rare cases, a vaccination may not be recorded if the person has died soon after vaccination and before the record is entered into the system. We therefore include in our dataset an extract of people who died soon after vaccination and do not have a record in NIMS up to 25 May 2022. There were 1,436 people who linked to our PHDA dataset who were vaccinated but not included in the NIMS data as their vaccine record was entered after they had died.

## Age-Standardised Mortality Rates (ASMRs)

ASMR confidence is influenced by death occurrences and person-years in each vaccination status category. In May, 68% of person-years were attributed to those who had a third dose over 21 days ago, and 14% were attributed to unvaccinated people. The remaining categories have much less confidence, which can be seen as wider, and often overlapping, confidence intervals. This is also especially true for the age breakdowns because there are even fewer deaths per status.

Non-COVID-19 rates can be affected by composition effects, such as the prioritisation of younger people with comorbidities for earlier vaccination than other people in their age group. This also includes the poorer health of people who do not go on to receive subsequent vaccinations when eligible. These effects are discussed in our [Deaths involving COVID-19 by vaccination status bulletin from December 2021](#). Seasonal mortality and the healthy vaccinee effect may also be influencing the rates.

## 4 . Related links

### [Weekly COVID-19 age-standardised mortality rates by vaccination status, England: methodology](#)

Methodology | Released 13 September 2021

Detailed quality and methodology information for coronavirus (COVID-19) age-standardised mortality rates by vaccination status, initially published for Weeks 1 to 26 2021 in "Deaths involving COVID-19 by vaccination status and vaccine manufacturer, England: deaths occurring between 2 Jan and 2 July 2021".

### [Coronavirus \(COVID-19\) latest insights](#)

Interactive tool | Updated regularly

A live roundup of the latest data and trends about the coronavirus (COVID-19) pandemic from the Office for National Statistics (ONS) and other sources.

### [Deaths registered weekly in England and Wales](#)

Bulletin | Released 5 July 2022

Provisional counts of the number of deaths registered in England and Wales, including deaths involving coronavirus (COVID-19), in the latest weeks for which data are available.

### [Coronavirus and vaccination rates in people aged 50 years and older by socio-demographic characteristic, England: 8 December 2020 to 12 December 2021](#)

Bulletin | Released 24 December 2021

First, second, third dose and booster COVID-19 vaccination rates among people aged 50 years and older who live in England, including estimates by socio-demographic characteristic.

### [Coronavirus \(COVID-19\) Infection Survey. UK](#)

Bulletin | Released 1 July 2022

Percentage of people testing positive for coronavirus (COVID-19) in private residential households in England, Wales, Northern Ireland and Scotland, including regional and age breakdowns.